appendix A

green infrastructure plan

GARY GREEN INFRASTRUCTURE PLAN

delta institute

February 2019

ACKNOWLEDGEMENTS

The Gary Green Infrastructure Plan was funded through support from the Indiana Department of Natural Resources – Lake Michigan Coastal Program and the Gary Redevelopment Commission.

The Gary Green Infrastructure Plan was prepared by Delta Institute for the City of Gary, in partnership with City staff, the Alliance for the Great Lakes, and Dynamo Metrics.

The project team would like to recognize the support and contributions made by various officials, partner organizations, and individuals in developing the Gary Green Infrastructure Plan:

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Marquette Lagoons

I. INTRODUCTION

Like many legacy industrial cities in the United States, Gary, Indiana has struggled with population loss and the problem of vacant land throughout its various neighborhoods and corridors. In response to these problems, many policy experts have argued that certain abandoned blocks in cities like Gary should "go back to nature," since the weak real estate market in these areas present unclear prospects for new development, and declining property tax revenues and decreased demand for utility services may legitimize removing roads, sewers, lighting, etc. However, these arguments lead to a simple question:

What does it mean for a city to go back to nature, particularly if a city is to continue to exist?

In spite of its population loss and its scattered acres of vacant land, Gary, Indiana is not disappearing. It's location within the Chicago metro region (the 3rd largest in the United States),[1] excellent transportation infrastructure, and access to Lake Michigan (the 6th largest fresh water body in the world by volume),[2] among other assets, represent the unique strengths that can drive future economic development. In turn, the question is not whether Gary will redevelop, but what that redevelopment will and should look like. Similarly, the question is not whether the city should go back to nature, but rather, how environmental strategies and assets can be integrated into the City's ongoing land use planning and redevelopment projects, to create a healthier environment, in balance with a revitalizing economy and rising quality of life.

Ivanhoe Nature Preserve in the Brunswick Neighborhood

Gary possesses both significant environmental assets and challenges: natural treasures like the Indiana Dunes National Park and Lake Michigan coexist with severe flooding, polluted stormwater runoff, contaminated properties, invasive species, and illegal dumping, all of which serve to threaten the quality of the City's land, water, and air. These challenges exist alongside questions of how to stabilize, manage, and redevelop thousands of vacant and abandoned properties, how to eliminate neighborhood blight, and how to regenerate its economy and tax base by attracting and cultivating new businesses.

Through its involvement in the Strong Cities Strong Communities program (a partnership between the City of Gary and numerous federal agencies), leaders in Gary identified **green infrastructure** as a strategy that simultaneously supports the goals of environmental protection and redevelopment. Green infrastructure has taken on numerous definitions, including a "strategically planned and managed network of wilderness, parks, greenways, conservation easements, and working lands with conservation value," as well as "planned systems and practices that use or mimic natural processes to manage and reuse stormwater, including green roofs, trees, rain gardens, vegetated swales, pocket wetlands, infiltration planters, vegetated median strips."[3] For the purposes of this Plan, both definitions have been included, because all of these features have an impact on environmental health and land development, and in Gary, a comprehensive slate of challenges require a comprehensive array of solutions. Through the **Gary Green Infrastructure Plan**, the City (in collaboration with Delta Institute, Alliance for the Great Lakes, Dynamo Metrics, and many other local and regional partners) targets a comprehensive strategy for green infrastructure that addresses its various priorities and challenges:

Figure 1: Green Infrastructure Diagram

1. **Strengthening and expanding environmental assets and addressing environmental problems.**
2. **Providing solutions for blight elimination and vacant land management**.
3. **Balancing environmental protection with positive and impactful redevelopment projects.**
4. **Improving public health and quality of life.**

By providing a framework for planning, implementing, regulating, and managing green infrastructure, the Plan creates a blueprint for integrating redevelopment with open space planning, stormwater management, and blight elimination, and demonstrates that nature is an integral part of Gary's future, instead of a past that it returns to.

II. EXECUTIVE SUMMARY

Green infrastructure can either be its own land use (conservation land) or a site design treatment on another land use (such as landscaping improvements on residential, commercial, or industrial property). In a city like Gary, where social and economic circumstances have resulted in thousands of vacant properties, it can be difficult to provide land use and site design policies in advance of understanding whether an area's land uses will be different in the future. However, while green infrastructure is just one consideration in the planning process (amongst others like housing and transportation), it is both dictated by conditions that pre-date development (rivers and wetlands) as well as being a response to existing development (improvements on roads that routinely flood). In turn, as plans and developments evolve and change, this Plan's specific recommendations may evolve and change as well, but since green infrastructure is heavily informed by natural conditions that pre-date development, many of the policies of this plan are likely to stay relevant as the City continues to evolve and change.

Informed by over two years of research, planning, and engagement, the Gary Green Infrastructure Plan provides a city-wide framework for green infrastructure that is integrated with its broader land use planning and redevelopment efforts. In the early stages of this initiative, three clear and distinct purposes for green infrastructure in the city emerged, based on municipal and professional input:

1. **Environmental Conservation:** Expansion, restoration and enhancement Gary's native landscape, including the globally-rare features of the Indiana Dunes National Park, such as black oak savanna, dune and swale, etc.

2. **Stormwater Management:** Reduction of flooding and polluted stormwater runoff through the strategic installation of engineered green infrastructure practices in flood prone areas, along the public right of way, and on public and private property.

3. **Beautification & Recreation:** Enhancement of the aesthetics and accessibility of the City's neighborhoods, corridors, and parks, through strategically planned and well-maintained landscaping, gardens, park spaces, etc.

Duneland ecosystem in the Indiana Dunes National Park

While it is certainly possible for a particular green infrastructure project to serve more than one purpose, clarifying each purpose helps to identify which problem a potential land use policy or recommended project will address, and how it all works together as part of a comprehensive strategy.

To measure and evaluate an area's suitability for a type of green infrastructure, Delta Institute and Dynamo Metrics developed the **Gary Green Infrastructure Tool**, an interactive map that indexes different conditions and presents various layers, thereby identifying which properties are best suited to be new conservation land, and which areas would beautification and stormwater management improvements make the biggest impact. The findings of the Tool, along with several stakeholder mapping sessions, interviews, and surveys led to the development of a **Green Infrastructure Framework Map** and **Priority Project List**, which identify recommended green infrastructure strategies throughout the city, based on existing and planned land uses and redevelopment projects.

Additionally, the Plan includes **Model Zoning and Permitting Guidelines**, developed by the Alliance for the Great Lakes and Delta Institute, which establishes recommended codes and permitting processes for implementing green infrastructure on new construction and significant renovation projects. The guidelines serve as a regulatory tool for limiting the impact that new development can have in areas with critical ecosystems and stormwater concerns.

The Plan concludes with a **Financial Analysis** that details the return of investment from a city-wide implementation of the Plan's Priority Projects, as well as suggested **Management, Funding & Financing Strategies** for implementing and maintaining green infrastructure.

The recommendations of this Plan shall both inform and be informed by other past and present planning efforts in the city. Subsidiary to the Gary Comprehensive Plan, the Gary Green Infrastructure Plan will both influence its land use recommendations and be a product of it. The Gary Green Infrastructure Plan also builds off of the Gary Green Link Plan (2004), a conservation restoration and trail planning document that identifies a loop of high quality ecosystems and native landscapes throughout the city, and advances a vision for upgrading those ecosystems and creating a continuous, accessible trail throughout the corridor. The stormwater management recommendations of the Gary Green Infrastructure Plan will inform the overall strategies of the Gary Sanitary District's (GSD) Long Term Control Plan. To satisfy a consent decree from US EPA, the Long Term Control Plan will provide GSD with a comprehensive strategy for addressing the City's pollution problems related to its Combined Sewer Overflows (CSOs). Green infrastructure is one solution of many for GSD in managing stormwater-related pollution, and the Gary Green Infrastructure Plan serves as a blueprint for where in the City to deploy it. It will serve similar function for the Gary Stormwater Management District's future Stormwater Master Plan, a document that will combine both gray and green infrastructure strategies to reduce flooding and stormwater runoff in the city.

EXISTING CONDITIONS

Little Calumet River Basin

III. EXISTING CONDITIONS

Indiana Dunes Ecosystem

Gary is an industrial city existing within the Indiana Dunes ecosystem, a unique and diverse coastal environment that spans the southern shores of Lake Michigan. Surrounded by areas of existing development, this native landscape is comprised of dunes, oak savannas, swamps, bogs, marshes, prairies, rivers, and forests, all of which mix together over 15,000 acres and 15 linear miles of National Park, in addition to state preserves and land trust properties, stretching from Gary to Michigan City.[4]

Marquette Park, Miller Woods, Marquette Lagoons, Miller Beach, Lake Michigan Coastline.

The Indiana Dunes ecosystem is special for a number of reasons, including its biodiversity, rare native species, recreational opportunities, and its beauty. Formed from the movements of prehistoric glaciers, the Indiana Dunes stands at the crossroads of many different ecosystems, resulting in a unique mixture of soils and plant life that are rarely found in the same location. Jack pines that are common to the northern regions of Canada coexist with prickly pear cactus, more common to the American southwest. Reptile species like Five-lined Skink and the Slender Glass Lizard, more commonly found in the American southeast, coexist with rare and endangered wildlife like the Karner Blue Butterfly. In total, over 1,100 species of vascular plants and over 900 different wildlife species exist in the Indiana Dunes, making it one of the most diverse ecosystem in the National Park system.[5] With its density of diverse, sheltered, and dynamic organisms and landscapes, the Indiana Dunes played an important role in the development of ecology science, by serving as a living lab for Henry Cowles, an early twentieth century botany scholar at the University of Chicago, known as the "father of plant ecology."[6]

The Indiana Dunes also possesses many globally-rare landscapes, including black oak savanna, an ecosystem where eastern hardwood forests meet western tall grass prairies. Less than 0.02% of high quality black oak savanna still exist in the Midwest, making the 1,045 acres in the Indiana Dunes a significant concentration. The same can be said of "dune and swale," a landscape composed of parallel ridges with marshy depressions formed by the glaciers and receding coastlines. The feature is both globally-rare, and often home to rare species.[7]

National Parks and Nature Preserves in the City of Gary

Lake Michigan Coastline: Of the 13 miles of coastline in Gary, 3.5 miles is comprised of publicly-accessible beach front, representing nearly 16% of the regional total (over 22 miles). This includes grass-covered sand ridges and blowouts, in addition to public beaches, formed through the shifts of the glaciers, and thousands of years of wind, waves, lake currents, ice, and storms. The ecosystem is very dynamic and perpetually shifting. The various segments of preserved beachfront are entirely under public ownership, by the City of Gary and the National Park Service (NPS).

Miller Woods/Green Heron Pond/Bayless Dune: Serving to bookend the Miller neighborhood on Gary's east lakefront, Miller Woods, Green Heron Pond, and Bayless Dune are a combination of properties owned by the National Park Service and Shirley Heinz Land Trust, that possess the entire range of unique features in the Indiana Dunes ecosystem, with many miles of trails to support public access. These areas includes black oak savanna, forested dunes, marshes, bogs, prairies, and a succession of unique plant life.

Clark & Pine Nature Preserve: Owned and managed by the Indiana Department of Natural Resources, the two primary parcels that comprise Clark & Pine Nature Preserve combine for approximately 300 acres of globally-rare dune and swale landscape, including sand savanna, sand prairie, wet prairie, sedge meadow, emergent marsh, and shrub swamp. The properties are completely surrounded by industrial uses and heavy infrastructure. They sit just to the north of the Gary Chicago International Airport, and to the west of Canadian National's Kirk Yard and US Steel Gary Works. They are split in half by Clark Road, a heavy trucking corridor that serves the industrial properties to the north, and directly abuts vacant brownfield sites that are targeted for redevelopment as industrial uses. There are no public access trails on site, and the challenge for Indiana Dept. of Natural Resources (IDNR) is how to preserve the health of the ecosystem in area of Gary where industrial redevelopment stands as the top priority of the city and regional economic development entities.

Ivanhoe Nature Preserve: Managed jointly by the Nature Conservancy and Shirley Heinz Land Trust, Ivanhoe Nature Preserve provides approximately 113 acres of rare dune and swale, composed of black oak savanna, sandy beach ridges, and narrow wetlands, with diverse communities of flora and fauna. Ivanhoe is located directly to the west of Gary's Brunswick neighborhood, with 5th Avenue (US 20) splitting the north and south portions of the property. Similar to Clark & Pine, Ivanhoe stands as a natural resource that is tucked away from the adjacent development and land uses, but unlike Clark & Pine, publicly-accessible trails are maintained on site, and the existing stewards have actively engaged the community, and worked to connect the nature preserve more closely with the surrounding neighborhood.

Serving as the western gateway to the Indiana Dunes, Gary possesses 2,623 acres[8] of conserved duneland ecosystem, managed by the National Park Service, Indiana Department of Natural Resources, Shirley Heinz Land Trust, and the Nature Conservancy. While remnant features of this ecosystem can be found on throughout the city, there are four primary areas of conserved native landscape in Gary: Lake Michigan Coastline, Miller Woods, Clark & Pine, and Ivanhoe. In considering how these natural areas integrate into Gary's long-range land use planning, two key questions emerge:

Can these natural features be man-made and reproduced?

Particularly in a context like Gary, with thousands of vacant parcels, the prospect of restoring the Indiana Dunes native landscape is an exciting one to conservationists and land managers. The greatest determining factor for whether this level of restoration can be made a reality is soil composition and hydrology, fundamental considerations for any type of green infrastructure. While certain features, like wetlands, have successfully been man-made, these installations often prove not to be as effective or resilient as their natural-constructed cousins.[9] The Indiana Dunes ecosystem is a product of gradual shifts in climate and landscape that has transpired over millions of years. In turn, the complex soil composition found in this ecosystem is hard to reproduce, particularly in an urban area, where soils oftentimes need to be remediated.[10] That said, ecosystems do not start and stop at the boundary lines of conservation land, and for that reason, many land managers take interest in the question of vacant land reuse, not for the purposes of reproducing conservation land, but rather buffering existing conservation land from the impacts of adjacent development. This strategy helps to protect ecosystems from invasive species and pollution, and provides sanctuary for birds and other wildlife.

How do natural features like these coexist with urban development?

Balancing contrasting land uses is challenging in any city. The chief consideration is what the respective impacts are that these differing uses have on one another, and if necessary, how these impacts can be mitigated. In Gary, Miller Woods and Ivanhoe Nature Preserve border medium density residential development. Conversely, the Clark & Pine Nature Preserve is surrounded by heavy industrial properties. These contrasting combinations require differing, context-sensitive solutions. To mitigate potential impacts, these solutions can come in the form of land use controls, zoning and permitting guidelines, to reduce the environmental or social harm that one use can have on another. These guidelines often focus on managing flooding, stormwater, debris, pollution, and visual screening. The result can help balance the differing uses by regulating how sites are developed and maintained, success of a redevelopment project, such as cost, time, or administrative hardship. To assist Gary in striking this balance between redevelopment and wetland preservation, the Plan will explore specific land use policies, development guidelines, and wetland mitigation opportunities in Section VIII.

Wetlands and Economic Development

As in many cities, balancing wetland preservation with economic development is a primary challenge in Gary. Throughout American history, industry and infrastructure have often located in wetland-rich areas for obvious reasons: they are commonly found near coastlines, or located where a river meets a larger body of water, and in contrast to other landscapes, they are comparably flat, sitting at low elevations, and can be filled-in and graded fairly easily. All of these factors make wetlands historically attractive locations for commerce and urban development and in Gary, as in other places, wetlands (and sand dunes) were leveled and filled at the beginning of the 20th century to lay the foundations for many of its legacy industrial properties (like US Steel) and infrastructure (like its airport and Class I railroads).[11]

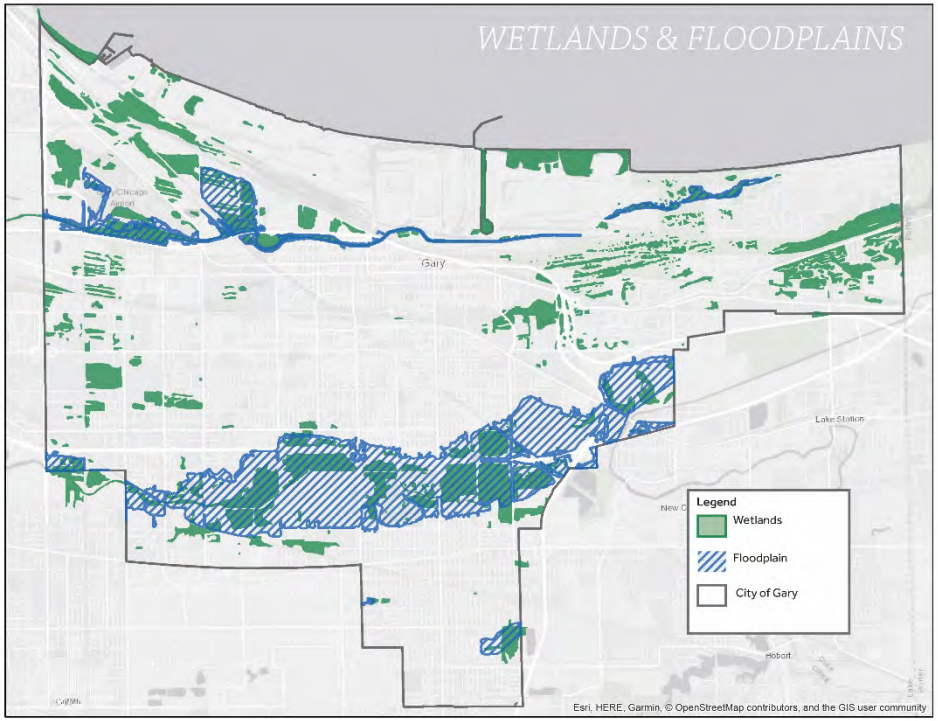


Figure 2: Wetlands and Floodplains in Gary

Where the Wetlands Are:

According to the US Fish & Wildlife Service, there are an estimated 4,169 acres of wetlands in Gary, the majority of which are found along two corridors:

1. **Lake Michigan Watershed:** Between the Lake Michigan coastline and US 20 exist thousands of acres of wetlands. This includes both the protected conservation land (Miller Woods, Clark & Pine, etc.), as well unprotected wetlands. Many of these wetlands are close to the Grand Calumet River, as well as Gary's oldest industrial properties (like US Steel), and major infrastructure like the Gary Chicago International Airport, Interstate 90, and numerous Class I railroads.

2. **Little Calumet River Watershed:** Running from south Cook County, Illinois to LaPorte County, Indiana, the Little Calumet river spans about 7 miles across Gary, running both north and south of the Interstate 80/94. The river is surrounded both by active wetlands and developed areas with a high water table, including the Black Oak, University Park, and Pulaski neighborhoods. The river and many of the wetlands are managed by the Little Calumet River Basin Commission, an area-wide agency responsible for managing the river's levee system and adjacent floodplain, to reduce riverine flooding events.

However, after the passage of the Clean Water Act in 1972, the process of defining wetlands, and discharging, dredging, or filling material in wetlands became a heavily regulated-activity under Section 404 of that law. In turn, any development project that potentially degrades, disturbs, or destroys existing wetlands must now undergo a permitting review process from the US Army Corps of Engineers (US ACE), the Indiana Department of Environmental Management (IDEM), and in some instances, the Indiana Department of Natural Resources (IDNR). If the development is deemed to have an adverse effect on existing wetlands, permits may not be granted.[12]

Much of Gary's industrial development transpired prior to the creation of these environmental protections, and it is arguable that much of it would not be permitted for development today, given that it necessitated removing hundreds of acres of dune and swale. Indiana as a whole has lost 87% of its original wetland ecosystem.[13]

Balancing Wetlands with Development:

While protecting existing wetlands is a critical concern, in a city like Gary that has struggled with disinvestment and a loss of jobs, population, and tax base, redevelopment and economic development are also deeply critical needs. The reality is that many of the city's largest vacant properties sit adjacent to wetlands, but limiting a legacy industrial city's ability to redevelop its sites, and spur new growth, puts its environmental protection priorities at odds with its economic fortunes. Additionally, in spite of the longstanding narrative that the city is "de-industrializing," industrial uses like manufacturing, warehousing, and freight transportation all still exist as primary and growing economic sectors in the region in Gary.[14]

Clark and Pine Nature Preserve

There are a number of measures that a community can take to balance industrial redevelopment and wetland preservation. One is through sound land use policy and development regulations, which guide a development's location and apply controls on the environmental impacts from a particular land use (like pollution and stormwater, etc.). Another is wetland mitigation techniques (like restoration, enhancement, or preservation), which provide a model for improving and expanding wetland habitat as part of a specific development project.[15] Similar to "gray infrastructure" improvements that a development project can bring, like reconstructing roads, "green infrastructure" improvements

Little Calumet River Flooding

In September 2008, the Little Calumet River flooded adjacent properties throughout the region after nine inches of rain fell in 24 hours. In Gary, much of the campus at Indiana University Northwest flooded, Interstate 80/94 (which runs parallel to the Little Calumet River) was closed for a week, and many of the neighborhoods that sit adjacent to the river experienced massive flooding and property damage. In total, it is estimated that the cost of the flood to the region was $881 million. The River is managed by the Little Calumet River Basin Development Commission (LCRBDC), a public authority that oversees its levee system and adjacent floodplain. Since 2008, the LCRBDC has made significant efforts to improve the river's levees, as well as acquire and manage critical parcels in the floodplain, including pump station improvements at Burr Street, and raising the road at Clark Road, Grant Street, 35th Avenue, and Harrison Street.

Flooding at Indiana University Northwest north parking lot (2008)

like wetland mitigation provide an opportunity for striking a balance between land uses, and limiting environmental impacts. Of course, application of these strategies must be sensitive to requirements and conditions that can inhibit the success of a redevelopment project, such as cost, time, or administrative hardship. To assist Gary in striking this balance between redevelopment and wetland preservation, the Plan will explore specific land use policies, development guidelines, and wetland mitigation opportunities in Section VIII.

Flooding

Like many cities, Gary struggles with regular and significant flooding issues.[16] Flooding in cities typically falls into two categories:

Urban Flooding: Catalyzed by storm events, urban flooding is largely a product of city's development patterns and topography. When rainfall occurs, impervious surfaces like roads, parking lots, and buildings inhibit the rainwater's ability to be absorbed by the land's soil and replenish its groundwater. Instead, it collects on the surface, and runs off into streets, sewers, and properties.[17]

Riverine Flooding: Catalyzed by storm events, riverine flooding occurs when rainfall increases the volume of water in the river to such an extent that it floods over the river banks, on to the adjacent floodplain, and beyond. It can also be triggered by the melting of snow and ice.[18]

Gary suffers from both types of flooding. With 793 miles of roads, dense neighborhoods, and numerous industrial properties, Gary's total acreage of impervious surfaces is significant. As a result, flooding is common throughout the city during storms. It is worth mentioning however that these impervious surfaces mask the tremendous ability of Gary's native sandy soils to absorb water.

As a coastal community, Gary's soil composition has a high sand content, meaning that its water infiltration rate is greater than soil that is higher in silt or clay content. Even when accounting for the fact that much the City's soil is urban fill (as in other cities), Gary's sandy soils stand as a tremendous underlying asset for managing stormwater. [19] Specifically regarding riverine flooding, the Little Calumet River is the primary source in Gary. The Grand Calumet River, whose levels are heavily managed by the adjacent industrial facilities, does not experience the same level of flooding.

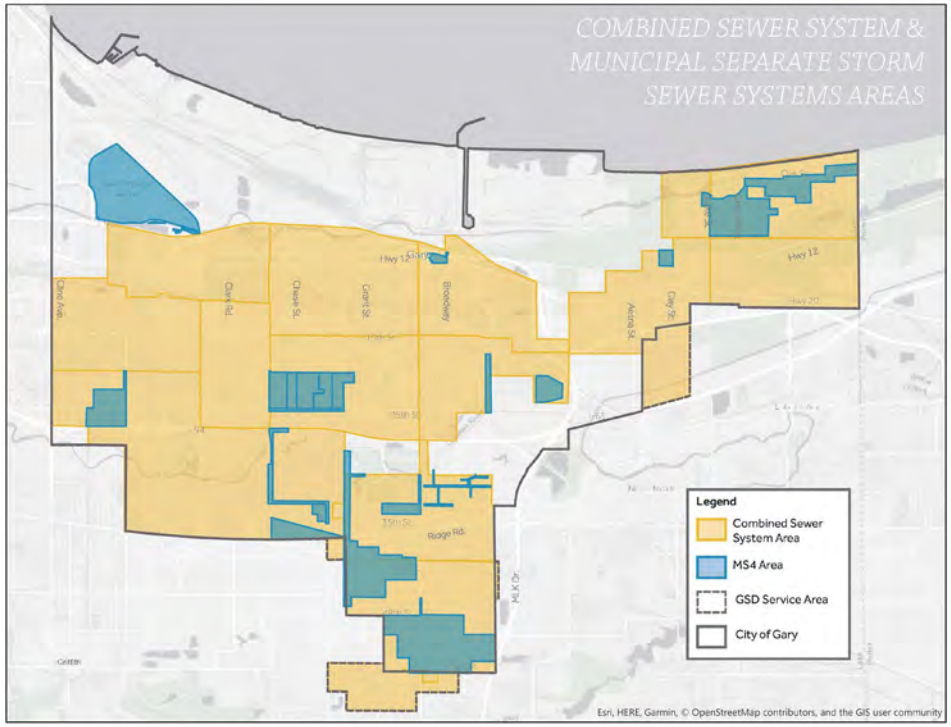


Figure 3: MS4 and CSO Areas

Combined Sewer Overflows (CSOs)

While flooding is directly related to problems of water quantity, the impacts that iT has on water quality is great. Like many legacy cities, Gary has a combined sewer system that joins domestic sewage, industrial wastewater, and stormwater runoff into the same pipe. Combined sewers account for about 90% of the City's sewer system, and serve approximately 25,000 customers. This system is designed to efficiently transport the combined wastewater to a sewage treatment plant, where it is treated, and then discharged into a water body (in the case of Gary, 4 CSO outfalls discharge to the Little Calumet River, 7 discharge to the Grand Calumet River, and 1 is inactive). The problem with a combined sewer system is that during massive storms, when a large volume of stormwater rushes into the system, the wastewater in this system will overflow and discharge polluted, untreated water into larger water bodies. In turn, Gary's Combined Sewer Overflows (CSOs) have negative impacts on the water quality of the Lake Michigan watershed, and for this reason, the US Environmental Protection Agency (US EPA) placed the Gary Sanitary District under a consent decree to better control its Combined Sewer Overflows, through the creation of a Long Term Control Plan (LTCP), which the Plan explores in greater detail in Section IV. [20]

Municipal Separated Stormwater Sewer Systems (MS4's)

In addition its Combined system, Gary possesses a Municipal Separated Stormwater Sewer System (MS4), which covers about 10% of the city, mostly around the Little Calumet River (a corridor particularly prone to flooding), as well as Glen Park, and areas north of US 20. MS4's do not connect with the wastewater treatment facilities. In turn, polluted runoff simply enters the MS4, and is disposed untreated into the City's water bodies. In addition to this, there are areas in the city, like the Black Oak neighborhood, where properties are served by sanitary sewer, but there is no existing storm sewer system.[21] Due to the serious implications that separated sewers can have on water quality, MS4's are regulated by US EPA and IDEM under the National Pollutant Discharge Elimination System (NPDES) through a permitting process. To reduce the risk of non-point source pollution from properties and development sites in the City, the Gary Stormwater Management District (GSWMD) undertakes a series of Minimum Control Measures (MCMs) with property owners and developers including:

(1) Public Education and Outreach
(2) Public Participation & Involvement
(3) Illicit Discharge Detection & Elimination
(4) Construction Site Storm Water Runoff Control
(5) Post-Construction Storm Water Runoff Control
(6) Pollution Prevention & Good Housekeeping.[22]

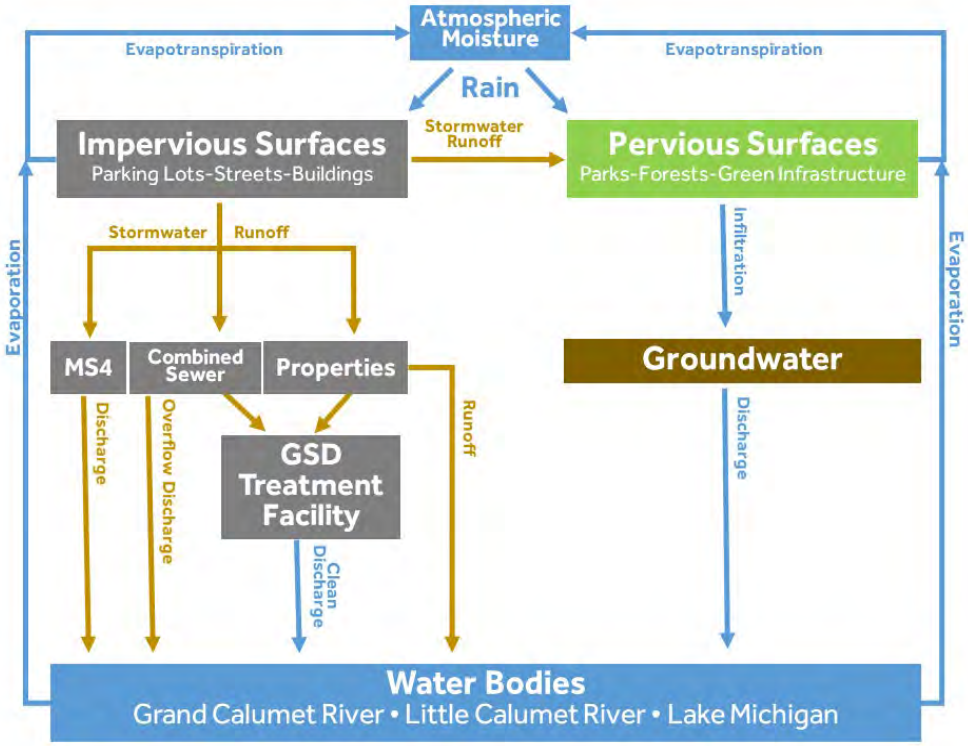


Figure 4: Gary Stormwater Diagram

Green infrastructure Best Management Practices (BMPs) serve as a key tool in helping communities address Post-Construction Storm Water Runoff Control, and in turn, when located in close proximity to MS4's, they can have a positive impact on the reduction of non-point source pollution that ends up in Lake Michigan and Gary's rivers.

Vacant Land and Adjusting Infrastructure

Like many legacy industrial cities struggling with disinvestment and population loss, Gary has a large percentage of vacant and abandoned properties. Specifically, 41% of all parcels in the City of Gary are vacant residential parcels (including parcels with vacant structures, and no structure). These residential properties are oftentimes small (commonly sized at 25 x 125 square feet),[23] and since they become vacant on an ad hoc basis, they are widely scattered throughout the city's streets and neighborhoods (though they do tend to concentrate in certain neighborhoods, like Midtown, Pulaski, and Aetna). Small, non-contiguous vacant parcels present many challenges for urban redevelopment and infrastructure management. In weak housing markets, fewer developers are willing to construct scattered-site single family housing. Additionally, to successfully include small urban lots as part of a larger redevelopment project, many challenges must be overcome, including land acquisition, site preparation, infrastructure adjustments, and zoning and regulatory approvals, balancing land uses, etc. Simultaneously, utilities like the GSD and GSWMD must now manage systems that remain the same in size, but benefit from fewer and less reliable rate payers (the collection rate for the two utilities is currently 80%).[24] This results in less revenues to fund basic repairs, to modernize the City's sewers and roads, and to satisfy its regulatory obligations from state and federal agencies.

Given the city's shrinking population, the question that emerges is whether infrastructure and utilities should be vacated on streets that have become entirely vacant, so that capital improvements can be prioritized in stronger, more densely-populated areas. When a city "goes back to nature," is not a key part of this the relinquishment of roads, sewers, water mains, gas and power lines; the foundational infrastructure for permanent human settlement. The problem is that neighborhoods rarely become entirely vacant, one at a time, and while certain cities have experimented with incentive programs aimed at relocating residents from high vacancy areas, these initiatives have struggled due to low participation rates.[25] Residents may choose to leave or remain in communities for a variety of reasons, if choice is even factor. Nonetheless, it can be difficult to accelerate shifting land use patterns.

Vacant Lot in the Midtown neighborhood

How can Gary adjust its infrastructure to fit its future land use patterns and economic realities? While it can be difficult to accelerate changes, the City can utilize the comprehensive plan process to identify future areas of prioritized development, gray infrastructure improvements, and any land use changes. Since green infrastructure can serve both as a land use and as a design treatment for a particular site, it can be part of the strategy for both upgrading infrastructure (through green stormwater management techniques on roadways) and relinquishing infrastructure (by vacating existing roads and sewers on streets that have become entirely vacant, and managing these areas as open space in advance of clear redevelopment plans and projects). This Plans covers specific green infrastructure strategies in Section IX and area-wide recommendations for the green infrastructure in Gary in Section VII.

Blight Elimination and Neighborhood Stabilization

A product of the city's high rate of abandoned properties and disinvestment, Gary currently struggles with over 4,000 blighted properties.[26] This blight problem not only comes in the form of vacant and abandoned buildings, but also occupied structures with code violations and overgrown empty lots. In residential neighborhoods in particular, blight poses significant threats to quality of life, economic health, and public safety. For this reason, blight elimination stands as a top priority for the City of Gary and the Gary Redevelopment Commission. Since 2014, the City has secured approximately $10 million in funding from the Indiana Housing and Community Development Authority's Hardest Hit Fund Blight Elimination Program (HHF BEP), to fund the demolition of blighted and abandoned residential properties. Thus far, the City has removed 365 homes, with an additional round of demolitions planned for 2019.[27] The removal of blighted vacant homes contributes to the stabilization of a city's neighborhoods, by improving aesthetics, property values,[28] and safety.

Vacant property in the Emerson neighborhood

While nature can also contribute to blight in the form of overgrowth on a vacant lot, intentional green infrastructure can stand as effective interim (or permanent) land management strategy. Installing neighborhood rain gardens on vacant lots can serve as an effective tool for beautification that poses benefits for stormwater management and access to open space, and since 2014, the City has pursued this strategy through its Vacant to Vibrant Program.

Vacant to Vibrant Program

Since 2014, the City has overseen two rounds of the Vacant to Vibrant Program, an initiative focused on stabilizing neighborhood vacant lots with green infrastructure.

1200 Oklahoma Street – Vacant to Vibrant site

In **Round 1**, neighborhood rain gardens were installed on three vacant lots in the city's Aetna neighborhood, located at 1035 Oklahoma Street, 1200 Oklahoma Street, and 1252 Dakota Street. This round was supported by the Great Lakes Protection Fund, and led by Cleveland Botanical Garden, the City of Gary, Indiana University Northwest, and the Strong Cities Strong Communities Federal Partnership, with design assistance from Implement, LLC and the University of Buffalo. Constructed in 2015, at a total project cost of $18,000 per installation, the three sites made immediate impact on the beautification and blight reduction of their blocks. Supported by the City of Gary's Urban Conservation Team, the sites remained well maintained over the three year period, and block residents have been engaged in maintaining and enjoying these sites.[29]

Round 2 of Vacant to Vibrant began in 2016. Supported through funding from the City's Hardest Hit Fund Blight Elimination Program, the Indiana Department of Natural Resources – Lake Michigan Coastal Program, and the National Parks and Recreation Association, the project has targeted five new neighborhood green infrastructure installations on vacant residential lots that have been cleared through demolition under the Hardest Hit Program. The project was led by a team of the City of Gary and the Alliance for the Great Lakes, with design assistance from Implement, LLC.

Specifically, former Hardest Hit Fund sites were chosen for the project, because the program's US EPA-approved guidelines ensured that clean fill and soil had been installed on site, post-demolition. Out of the 365 demolitions that had been completed under the first round of HHF BEP, 40 sites were selected based specific conditions that made them amenable for open space development, including adjacency to occupied properties, proximity to a schools, churches, and playgrounds, and other factors that would draw visitors.

In July 2017, a Site Selection Charrette was held with 35 Gary residents. Residents provided survey responses on desired green infrastructure improvements in their neighborhoods, summarized in Figure 3, and selected five locations for new Vacant to Vibrant sites in five different neighborhoods: 743-753 Vermont Street (Emerson), 4261 Virginia Street (East Glen Park), 5210 W 3rd Street (Brunswick), 2432 Marshalltown Lane (Marshalltown), 3534 E 10th Avenue (Aetna).

In February 2018, a customizable site design framework was created by Implement, LLC that enabled residents to design and program their neighborhood Vacant to Vibrant sites. The framework followed a "board game"-like process, where a residential-sized lot is subdivided into different segments, and can be programmed with various elements, like rain gardens, flower gardens, trees, benches, bird feeders, public art, vegetable growing beds, etc. Beyond Vacant to Vibrant Round 2, this site design framework can be transferrable across similarly-sized residential lots in Gary, because of the consistency of their size and topography.

At a March 2018 design workshop, 23 residents from five neighborhoods convened to identify the components and layouts for each site. In May 2018, resident recommendations were transformed into site designs and bid specifications, to steer the site's planned installations in Spring 2019, at a projected cost of $7,500 per site.

As with the first round of Vacant to Vibrant, management and maintenance of the sites will be led by local residents, and supported by the City of Gary's Urban Conservation Team. A project Advisory Committee was also organized, composed of local environmental agencies, land trusts, nonprofits, and philanthropic organizations, to provide ongoing technical assistance to local residents.

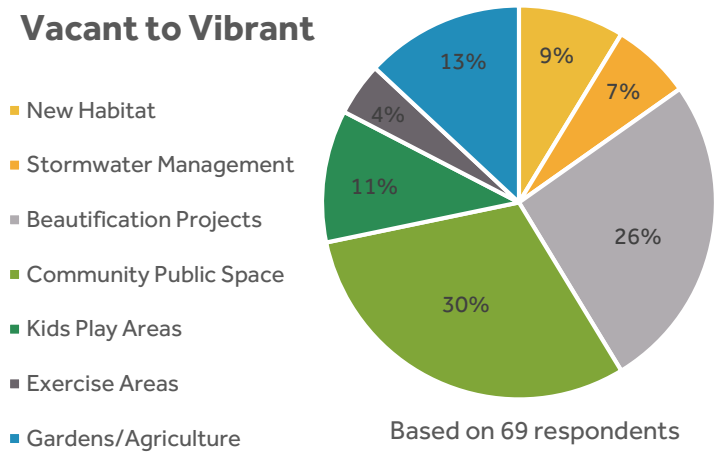


Figure 5: Vacant to Vibrant Survey Results

Vacant to Vibrant planning site design workshop (March 2018)

EXISTING & EMERGING PLANS

Gary Green Link Trail

IV. EXISTING & EMERGING PLANS

Gary Green Link Plan

Authored in 2005, the Gary Green Link Plan is a visionary document that identifies a 38.25 mile, 9,735 acre conservation and recreation loop throughout Gary. Created by the project team of the City of Gary, Wolff Clements and Associates, Applied Ecological Services, UrbanWorks, McElroy Associates, and Ambriz Graphic Design, the Green Link Plan is an equal parts environmental restoration plan and trail plan. Central to its vision is enhancing and connecting the various ecosystems in the city, as well as 11 out of the 15 of its neighborhoods onto the same trail system, to the benefit of the city's residents, plant life, and animal life.[30]

Marquette Trail segment of the Green Link in Miller neighborhood

The native ecosystem communities that the plan targets for restoration and conservation include: (1) Sand dune and beach, (2) Dune and Swale, (3) Oak Savanna, Upland and Bottomland Woodlands, (4) Prairie, (5) Old field, (6) Upland & Bottomland Scrub Shrub, (7) Marsh, (8) Wet meadow, and (9) Pond and open water. The assessment also identifies existing agricultural land, brownfields, and turf grass areas that could be prioritized along the corridor for restoration activities (Figure 4).

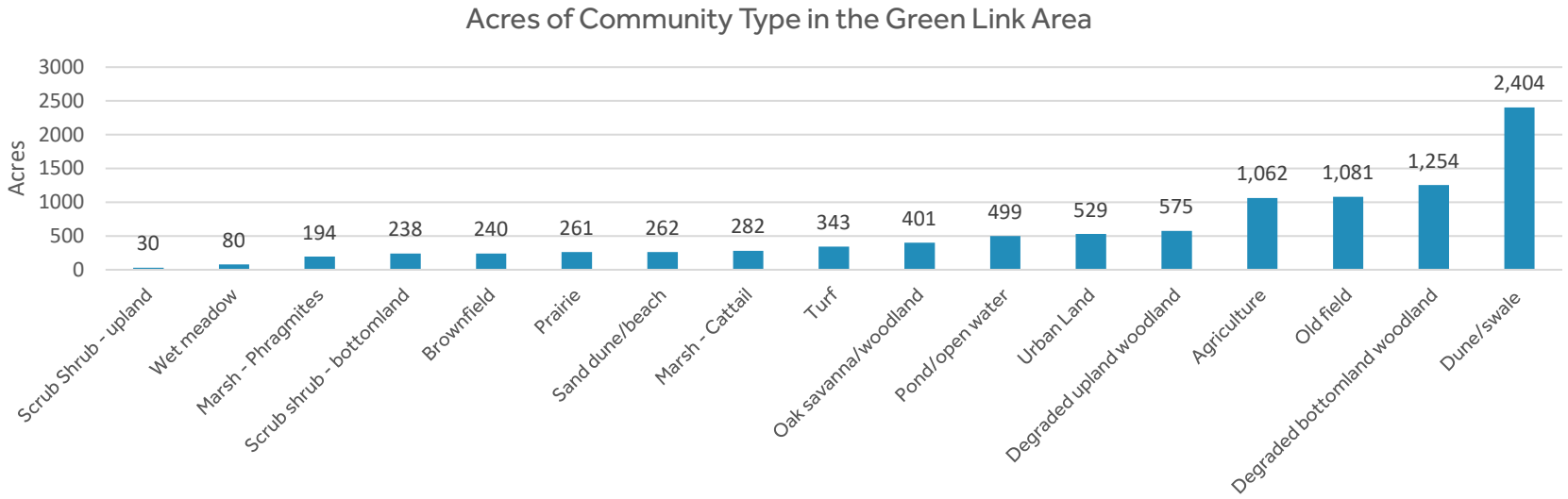


Figure 6: Acres of Community Types in the Green Link Area (Gary Green Link Master Plan)

With a primary focus on conservation and restoration, the Green Link Plan provides the following information by community type: (1) Plant species, (2) Land cover maps and surveys, (3) Restoration and management policy guidance, and (4) Site prioritization frameworks for acquisition, protection, and restoration.

Prioritizing Ecosystems for Protection & Restoration

Conservation land is not monolithic, different ecological communities present varying benefits, and in turn, their protection and restoration can be valued on differing metrics, based on a neighborhood or agency's goals. The Gary Green Link Plan followed a methodology of valuing Gary's open space, by evaluating each community type on a three tier scale (High=2, Medium=1, Low=0), under four key categories (Existing Biodiversity, Habitat, Water Quality, Flood Control). Across these four categories, each community type earned a cumulative score. Where the score fell on the following five tier rubric dictated the overall value of the ecosystem (Low=0-2, Medium Low=3-4, Medium=5-6, Medium High= 7-8, High=9-10) from a benefits perspective. The scores in the table below, reflect the highest priority areas for protection and restoration:[31]

Ecological Community	*Functional Value*				*Management Potential*	*Ecological Community Ranking (0-10)*
	Biodiversity	**Habitat**	**Water Quality**	**Flood Control**		
Dune/Swale (not degraded)	H	H	H	H	H	10 (H)
Dune/Swale (degraded)	M	H	H	H	H	9 (H)
Sand dune/beach	M	H	H	H	H	9 (H)
Oak savanna - woodland	H	H	M	M	H	8 (MH)
Degraded woods - upland	M	M	M	L	M	4 (ML)
Degraded woods -bottomland	M	M	H	H	M	7 (ML)
Prairie	H	H	M	M	H	8 (MH)
Old field	L	L	L	L	L	0 (L)
Turf	L	L	L	L	L	0 (L)
Scrub shrub - upland	L	M	L	L	M	2 (L)
Scrub shrub - bottomland	M	M	H	M	M	6 (M)
Marsh - Phragmites	L	L	H	H	L	4 (ML)
Marsh - cattail	M	H	H	H	M	8 (MH)
Wet meadow	M	M	H	H	M	7 (MH)
Pond/open water	M	M	H	H	M	7 (MH)
Agriculture	L	L	L	L	H	2 (L)
Brownfield	L	L	L	L	L	0 (L)
EPA Brownfield/Greenspace	M	L	L	L	M	2 (L)

Figure 7: Ecological Community Value Assessment (Gary Green Link Master Plan)

The Plan also provides an existing assessment of the city's rivers, including information on erosion, obstructions, runoff, and their current hydrology. Best management practices are also included for improving water quality and habitat, reducing riparian flooding, stabilizing banks, upgrading gray infrastructure, and balancing adjacent land uses.

As illustrated in Figure 8, dune and swale, oak savanna, wet meadows, and prairies rank the highest overall in terms of ecological value. In turn, the acquisition and restoration of these assets in Gary has been the primary focus of public agencies and land trusts since the Green Link Plan's adoption in 2005. Since then, 1.2 miles of trail has been built, and 38.76 acres of new conservation land has been acquired.

Green Link Plan Implementation since 2005[32]

Activity		Overall Goal	2005 Baseline	Implemented since 2005	Planned (2018)	Remaining Goals (2018)
Trails	Distance	38.25 miles	8.62 miles	1.2 miles	.75 miles *(10.57)*	27.68 miles
	Segments	29	2	2 (1A and portions of 1B)	Remaining portion of 1B	25
	Cost	$12,594,949	-	$2,342,000	$1,250,000	$9,002,949
Land Acquisition	Acres	9,735	3,847.2	38.8 *(48 parcels)*	-	5,849

Figure 8: Green Link Implementation since 2015: Acquisitions include Shirley Heinz Land Trust (20), National Park Service (17), Nature Conservatory (10), State of Indiana (1)

Connecting the Green Link Plan with the Green Infrastructure Plan

The Gary Green Link Plan primarily focuses on conservation land protection, expansion, and restoration, as well as trail planning. Conversely, the Gary Green Infrastructure Plan connects conservation area planning with planned stormwater management and beautification improvements throughout Gary's developed areas. It is the view of the Green Infrastructure Plan that the elements that impact the quality of Gary's environment extend beyond its forest preserves and parks, and are heavily influenced by the design and conditions of its streets, neighborhoods, and industrial centers. Conservation land is one piece of the ecosystem services puzzle. That said, the Green Link Plan does provide this Plan with critical baseline information:

Existing & Potential Conservation Land: The majority of land identified as conservation priority areas in this Plan are a product of the assessments and recommendations of the Green Link Plan. In turn, conservation land is referred to as "Green Link Area" in this Plan's Green Infrastructure Framework Map (Section VII).

Ecological Function: With the associated Gary Green Infrastructure Tool (Section VI), this Plan provides a city-wide assessment stormwater management capacity amongst all of Gary's parcels. Information on the flood control capacity of different ecosystems is derived from the site prioritization methods of the Green Link Plan.

Model Ordinances and Best Management Practices: Section VIII of this Plan includes policy recommendations for zoning ordinances and design guidelines intended to protect conservation land and riparian areas from impacts associated with adjacent development. The model ordinance utilizes stormwater best management practices and land buffers to achieve these goals, which build upon the recommendations of the Green Link Plan.

Management Strategies: This Plan provides management strategies, including cost information, for implementing and maintaining green infrastructure throughout the City. Strategies and information pertaining to conservation area restoration and management are derived from the Green Link.

Long Term Control Plan

In 2006, US EPA filed a Consent Decree against the City of Gary and the Gary Sanitary District for violating Sections 301 and 309 of the Clean Water Act (33 U.S.C. §§ 1311 and 1319) and the terms and conditions of the National Pollution Discharge Elimination System (NPDES), by failing to properly manage pollution discharges from its combined sewer overflows. These problems derive from many of the previously mentioned issues: the city's aging sewer infrastructure, its vast acreage of impervious surfaces, increased storm events, declining revenues, and difficulties around matching infrastructure investment with changing population and land use patterns.

GSD provides sewage treatment and wastewater services to City of Gary, and portions of Merrillville, Hobart, and Lake Station. It owns and operates a wastewater collection treatment system (WCTS) and wastewater treatment plant. The WCTS is ninety percent combined, and consists of approximately 375 miles of sanitary and storm sewers, 12 CSO regulators, and 28 pumping stations. Five of the CSO outfalls discharge to the Little Calumet River, and seven to the Grand Calumet River. The City's service area is fifty square miles, with an estimated service of 160,000.

As part of the Consent Decree, GSD is required to develop a Long Term Control Plan (LTCP) to reduce CSO outfall discharges over a 25 year period, in accordance to 2012 NPDES permits. Targeted for completion over the next 5 years, the plan will include the following:

- CSO control measure alternatives or combined alternatives
- Design and performance criteria for all CSO control measures
- A schedule for design, construction, and implementation of all selected CSO control measures and alternatives

Combined Sewer Outfall (City of Richmond, Virginia)

With these improvements, the targeted pollution reductions will include:

- 274,954 pounds of total suspended solids
- 36,850 pounds of biological oxygen demand
- 892,893 pounds of chemical oxygen demand[33]

Standing as a solution to the issue of impervious surfaces, GSD and GSWMD have identified green infrastructure as a tool for improving water quality, by reducing the quantity of water that enters the combined sewer system, and limiting the amount of non-point source pollution that that stormwater brings into the sewer. As highlighted in Green Infrastructure Framework Map (Section VII), Zoning Guidelines (Section VIII), and Priority Projects (Section X), green infrastructure projects can be prioritized in areas with demonstrated flooding problems and a density of impervious surfaces. When paired with gray infrastructure improvements, green infrastructure can serve as a valuable component in achieving the LTCP's pollution reduction goals.

GARY GREEN INFRASTRUCTURE TOOL

VI. GARY GREEN INFRASTRUCTURE TOOL

Overview

In partnership with the City, Delta Institute and Dynamo Metrics created a mapping tool that assists municipal leaders in reviewing and prioritizing different green infrastructure strategies for vacant land reuse. The tool was built upon a series of stakeholder convenings, to identify existing issues and priorities throughout Gary related to environmental protection, redevelopment, and infrastructure management, and how green infrastructure can advance those priorities. These convenings included multiple city departments, federal and state agencies, conservation groups and land trusts, economic development entities, local green infrastructure experts, and community organizers (included in Appendix A). Directed by this input, the tool's analysis focuses on three priority areas for green infrastructure planning in the city: Protecting and expand existing natural areas, stormwater management, and neighborhood revitalization.

Methods

Delta used an index framework to assess the suitability of parcels within Gary for green infrastructure from these three perspectives. In its most basic form, an index is a system of measurement that can be used to assess and compare multiple features. To create a system of measurement that would allow the City to make a value judgment that one parcel is more suitable for a particular green infrastructure treatment, an exhaustive list of variables and features pertaining to a parcel's status were collected from the stakeholder committee. These features included ownership, improvement status, proximity to public amenities and green spaces, as well as soil drainage classifications and surface permeability.

The list of variables relevant to a parcel's suitability were gathered through feedback provided by the stakeholder committee. Once the list was compiled, redundant variables were removed to avoid double counting, and the final list was revised and approved by the stakeholder committee.

For each variable, a positive value option was created, to enable each feature to be assessed in Boolean, or a true-false form (for example, is a parcel is publicly-owned: true or false). Each parameter that results in the "true" response would indicate that the parcel meets a criteria and should be scored with a positive value. Each question that resulted in the "false" response would indicate that the parcel does not meet a criteria and should not be scored for that particular variable.

Once all variables were compiled and coded in Boolean form, they were grouped into primary indices to represent the three perspectives of green infrastructure that were identified by the stakeholder committee. The primary indices are: 1) Conservation, 2) Stormwater Management, and 3) Recreation and Beautification. With these primary indices, variables were separated into sub-indexes which included "site readiness" (pertaining to a parcel's ease of acquisition or redevelopment) and "external factors" (how well site conditions pertain to the primary index, irrespective of ownership).

Site Readiness Factors: A density analysis of parcels against the criteria outlined below was conducted for each primary index:

- Parcel is publicly-owned AND does not contain a structure.
- Parcel is publicly-owned AND contain a vacant structure.
- Parcel is available for purchase through a Commissioners tax sale, AND does not contain a structure.
- Parcel is available for purchase through a Commissioners tax sale, AND contains a vacant structure.

External Factors: A density analysis of parcels against the criteria outlined below was conducted for each primary index:

- **Conservation:**
    - Parcel is in a federally-protected area, including Natural Preserves or National Park properties

  - Parcels are actively managed by a conservation entity, including, the Indiana Department of Natural Resources, the Shirley Heinz Land Trust, and the Nature Conservancy.
  - Parcels that are defined as "high" or "medium high" Restoration Priority Areas in the Gary Green Link Plan
- **Stormwater Management:**
  - Parcel with land cover that is impervious.
  - Parcels that have been classified under A (high infiltration rate) or B (moderate infiltration rate) Soil Hydrologic Group.
  - Parcels that are at or near reported street flooding or sewer backups, based on 311 reports from residents.
- **Recreation and Beautification:**
  - Parcels that contain existing community anchors as defined by the stakeholder group, including schools, universities, churches, block clubs, community gardens, veterans centers, healthcare facilities, cultural landmarks, and public libraries
  - Parcels that contain service businesses, including all businesses that are classified by NAICS (North American Industry Classification System) sectors 44-45 (Retail Trade), 71(Arts, entertainment, and recreation), 72 (Accommodation and food service), and 81 (Other Services [except public administration]).
  - Parcels that contain occupied residential structures.
  - Parcels that function as green space with public access (parks, Vacant to Vibrant lots, phytoremediation)

Each variable included in the primary indices was assigned a distance factor that would be used to define density. Each distance factor was defined to assess the density of features in a way that was most relevant to the index. The distance factor for density analysis for each primary index is as follow:

- **Conservation:** 50ft, 100ft, and 150ft
  - Rational: Continuous and connected spaces are required to maximize effective and impactful conservation and restoration efforts.
- **Stormwater Management:** 550 ft
  - Rational: 550 ft. is the average radius of a city block and stormwater runoff is not likely to travel farther than that distances to enter existing stormwater infrastructure.
- **Recreation and Beautification:** .25 miles (1,320 ft)
  - Rational: Reflective of people's willingness to walk to a public amenity.

All variables were then weighted within their internal sub-indices as well as individually. Weighting was determined by the stakeholder committee and was an iterative process. The complete index framework for all indices can be viewed in Appendix B.

Gary Green Infrastructure Tool

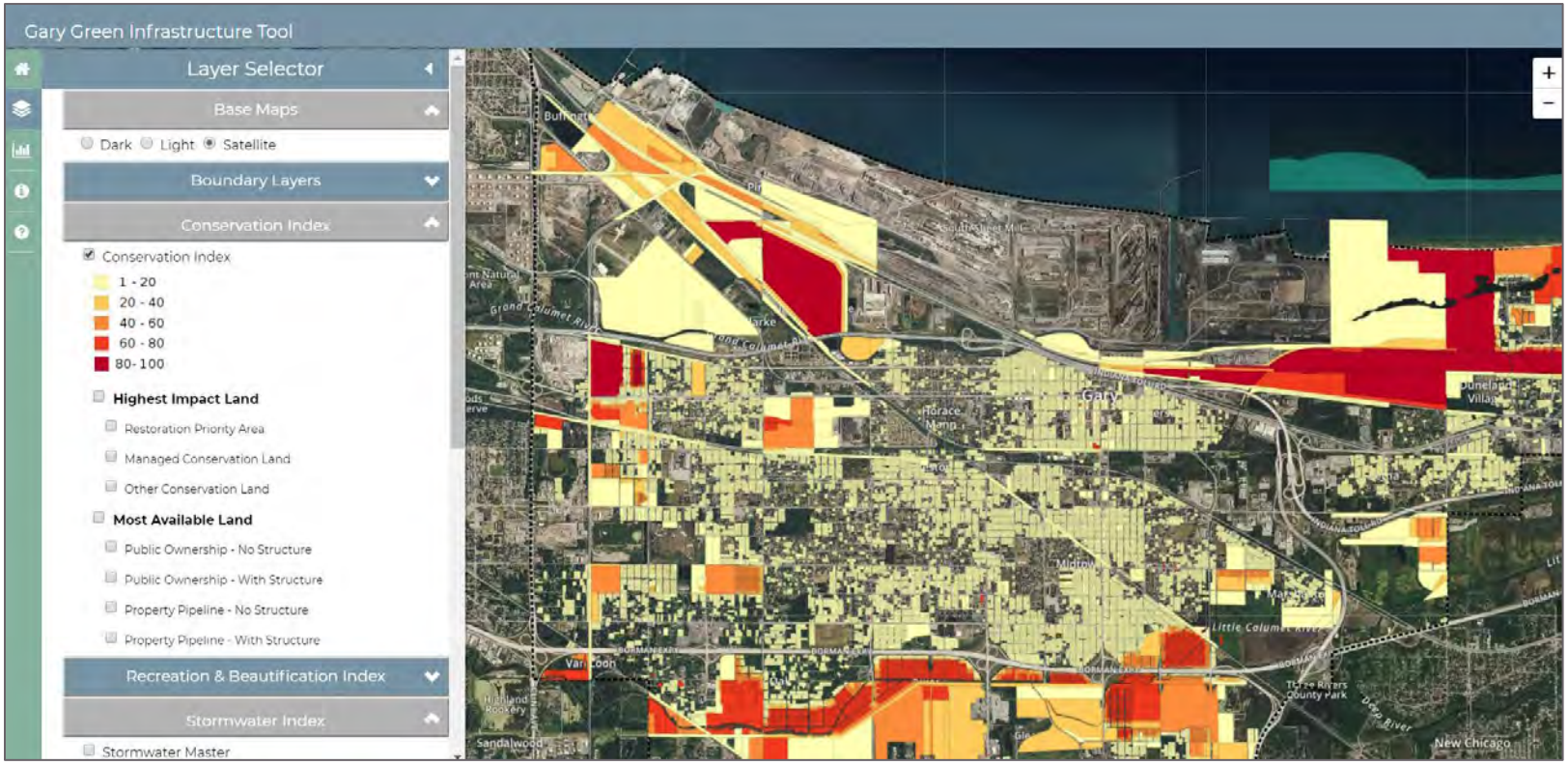
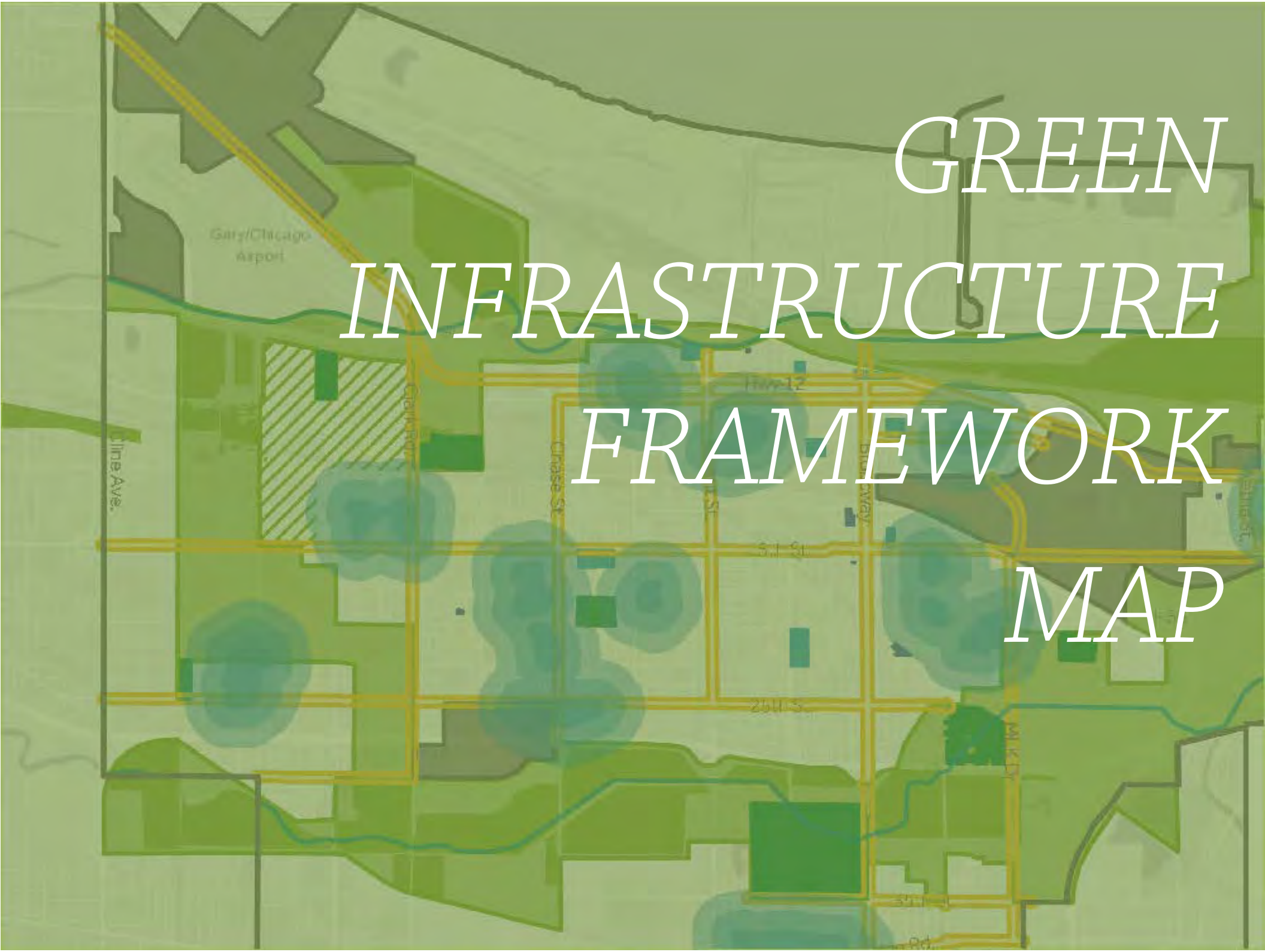


Figure 9: Gary Green Infrastructure Tool Map

After development of the indices, Delta Institute worked with Dynamo Metrics to analyze parcels using the index framework in a Geographic Information Systems (GIS) platform, and scored all parcels within Gary. The results were visualized and made available through an interactive web map called the Gary Green Infrastructure Tool (GGIT), now publicly available on the City's Gary Counts website (http://garycounts.org/tools/) or at https://in-gary.dynamo.city/green/#12/41.5813/-87.3569.



GREEN INFRASTRUCTURE FRAMEWORK MAP

VII. GREEN INFRASTRUCTURE FRAMEWORK MAP

Process & Methodology

In June 2017, a stakeholder mapping session was convened, involving various organizations, departments, and individuals involved in conservation, development, and infrastructure management. The intent of the meeting was to identify: the goals of each organizations represented, the assets in Gary to be enhanced and protected, areas of conflict and alignment between participants, and to generate recommendations. Participants were put in groups of 4-7 and sat around large maps for discussion and brainstorming. They were asked a series of questions by a facilitator and were encouraged to annotate the maps throughout the process. These questions included:

City of Gary Staff participating in June 2017 mapping charrette

1. What are your organization priorities in Gary in the short and the long term?
2. Does your organization currently have any Gary-based projects?
3. What are some of the challenges your organization faces related to these goals and projects, and are any of these problems environmental?
4. What areas of the City do you see with competing priorities between different organizations and entities?
5. What areas of the City do you see aligned priorities between different organizations/entities?

Using the information and data collected through this process in tandem with the mapping tool and other existing plans, six different classifications for Green Infrastructure and corresponding geographies were identified. These areas include: **Green Link Areas, Green Link Neighborhood Areas, Neighborhood Stabilization Areas, Green Industrial Areas, Green Corridors, and Conservation & Stormwater Parks**.

All of these features are included in the **Green Infrastructure Framework Map** (displayed on page 41), and broken out separately and by sub area on pages 37-45. Standing as features on the same map they demonstrate how green streets projects, green industrial parks, and conserved habitat sit adjacent to one another, and if properly planned and regulated, can coexist with one another.

Green Infrastructure Framework Map

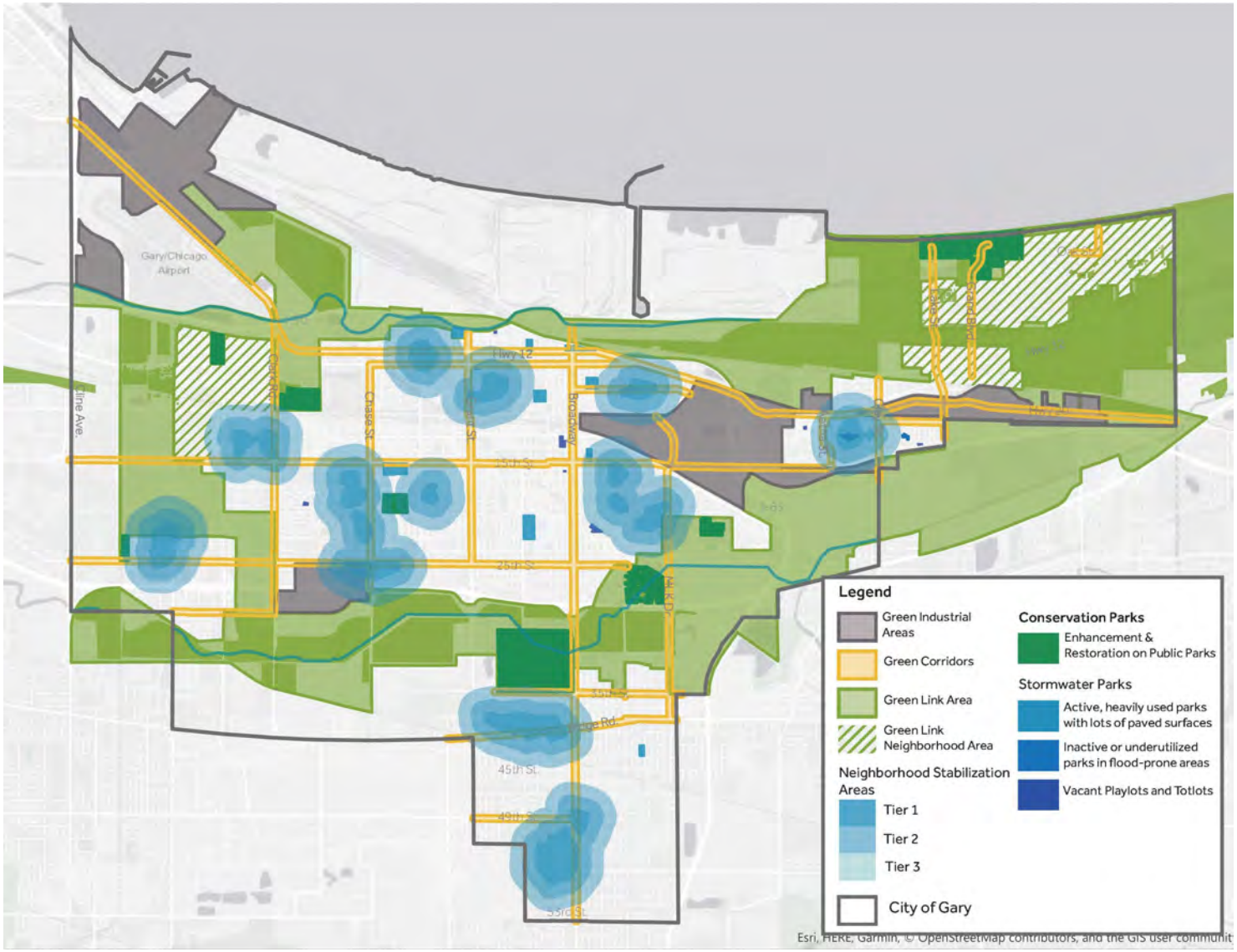


Figure 10: City Wide Framework Map

Green Link Area and Green Link Neighborhood Area

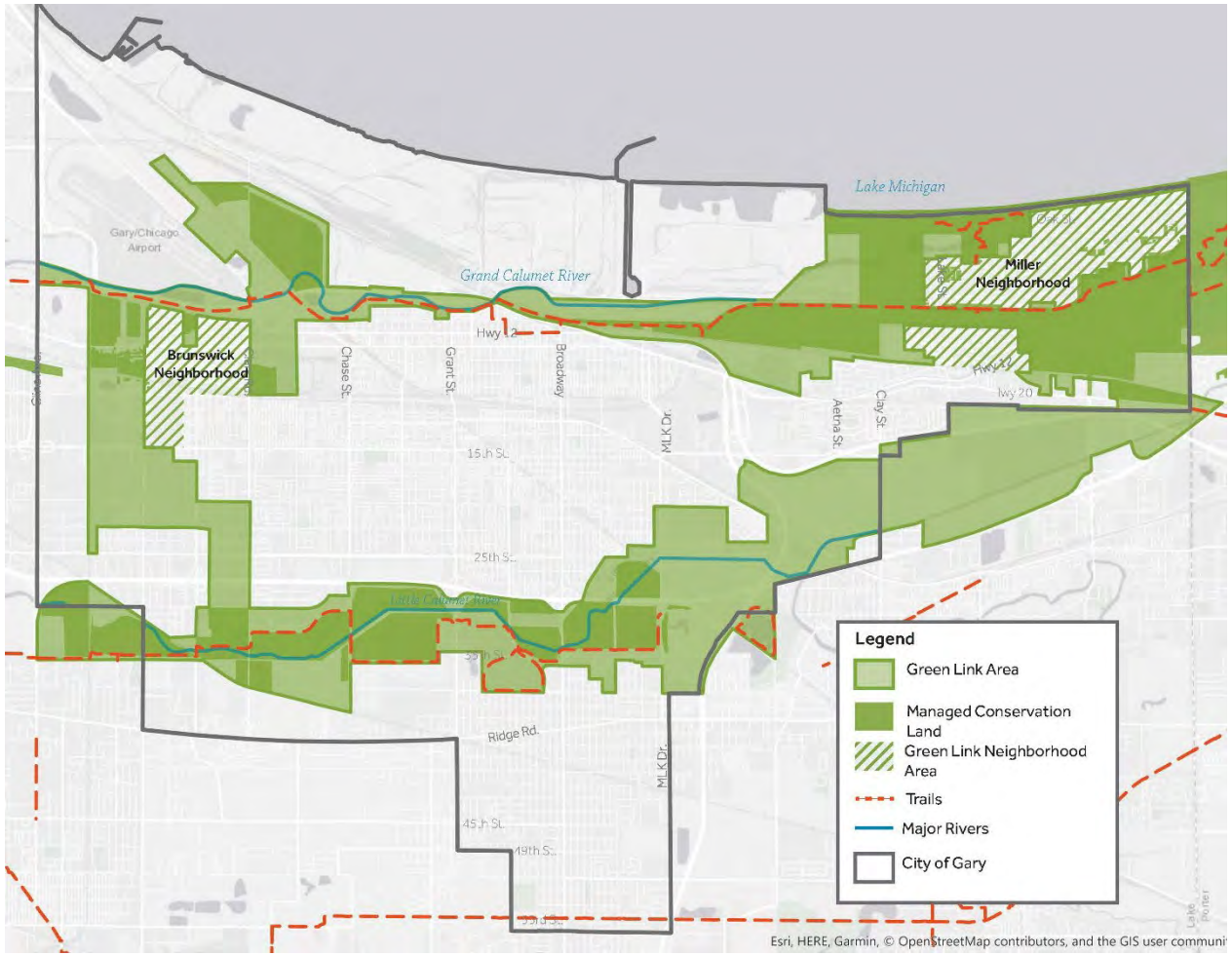


Figure11: Green Link and Green Link Neighborhood Area Maps

Green Link Area: This area was initially defined by the Gary Green Link Plan, and is reinforced by the Gary Green Infrastructure Tool and Stakeholder Mapping session. It connects high-quality natural areas with green space by utilizing existing protected areas, core natural areas (that may not be protected), and unprotected open space.

Green Link Neighborhood Area: A few residential areas in Gary are nested within or adjacent to the Green Link, including the Miller and Brunswick. While redevelopment and increased density should continue to be prioritized in these areas, conservation land and green infrastructure should play a role in this process, by providing current and future residents with direct access to natural resources. This may include conserving and connecting unprotected natural areas in these neighborhoods or implementing native landscaping practices on streets that serve as gateways to natural areas.

Neighborhood Stabilization Areas

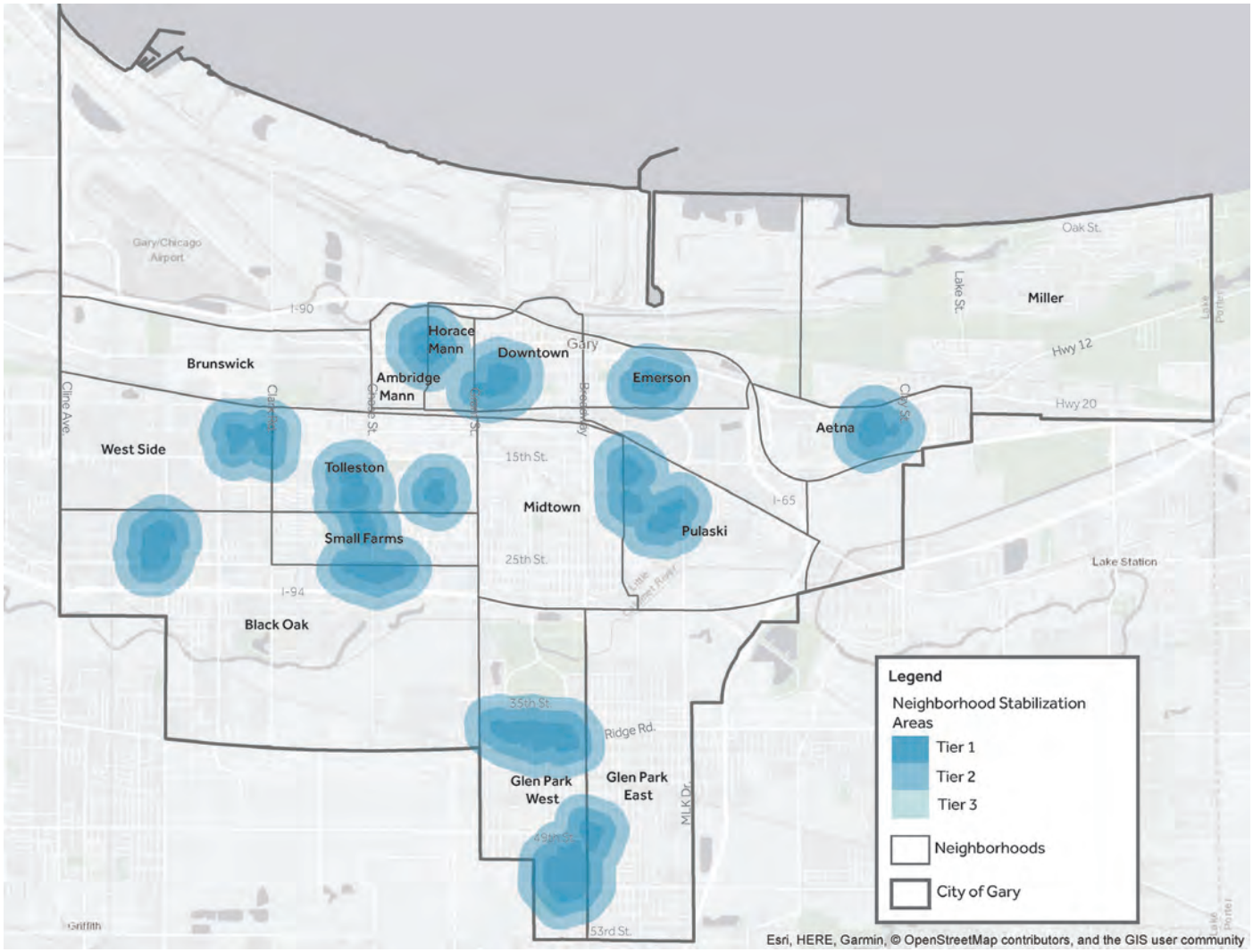


Figure 12: Neighborhood Stabilization Areas Map

Neighborhood Stabilization Areas: There are several clusters of blocks throughout Gary where around 25% of the lots are vacant, but where there also exist many occupied and well-maintained properties. Interventions like the Vacant to Vibrant program, neighborhood beautification, and pocket parks could help these areas to stabilize property values, while reducing blight and vacancy. Neighborhood Stabilization Areas were identified using the results of the GGIT's Recreation and Beautification Index. Tier 1 properties are highest priority, Tier 3 are lowest priority.

Green Industrial Areas

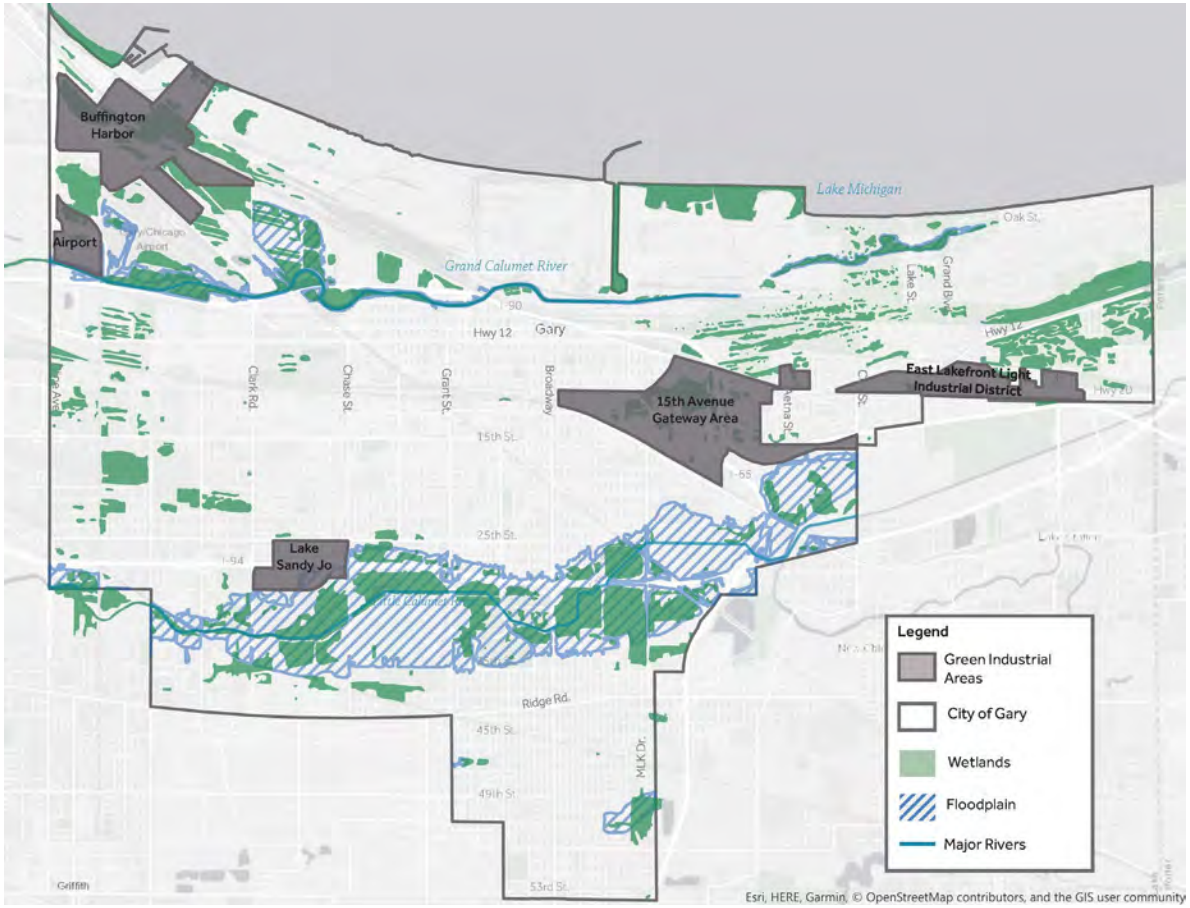
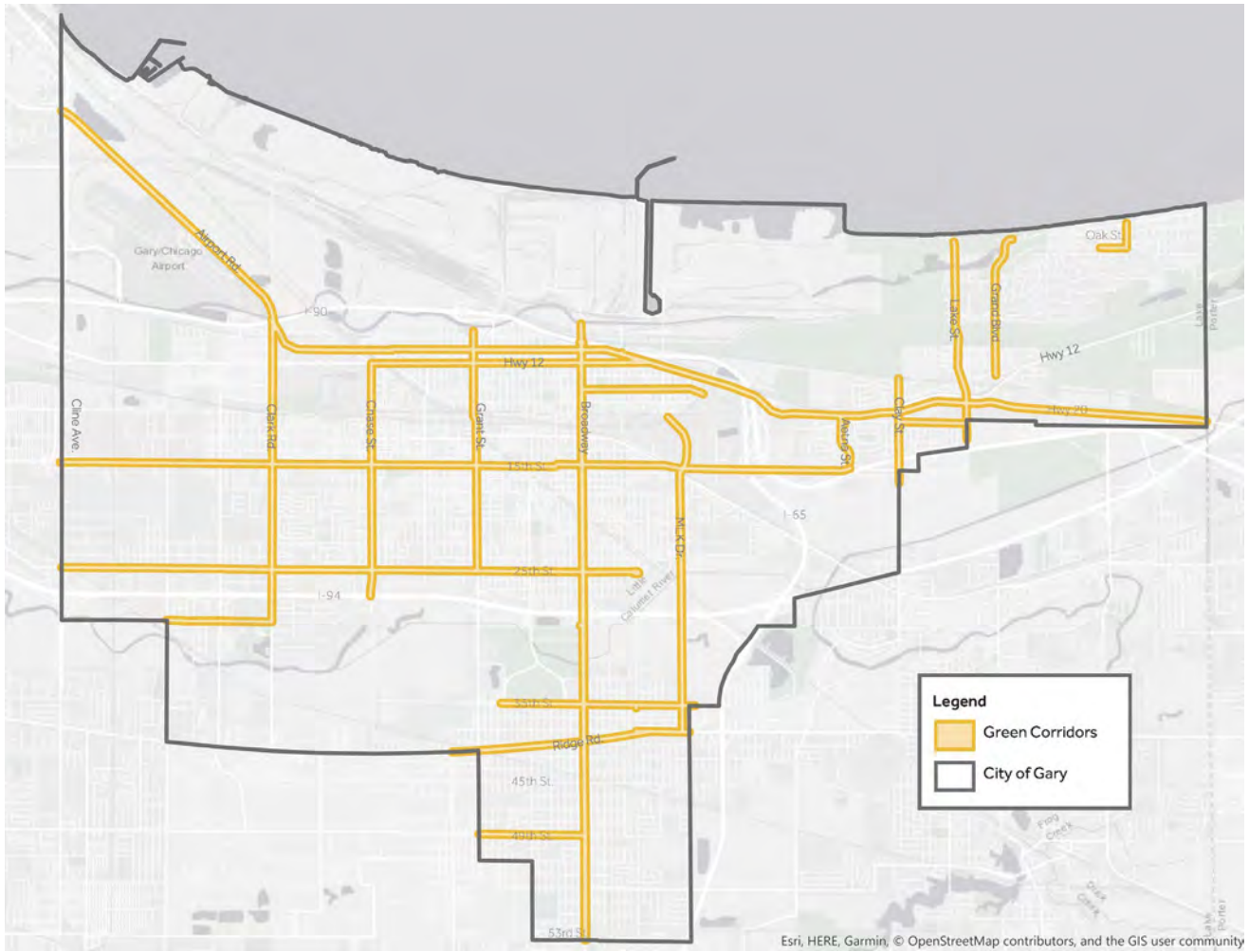


Figure13: Green Industrial Areas Map

Green Industrial Area: 22.1% of Gary's land is zoned for industrial or light industrial uses. Since these areas are mostly impervious, they generate lots of runoff. Many also abut conservation land. Future development of these sites with green infrastructure and conservation easements could greatly reduce the runoff generated, and enhance nearby natural areas. These areas were identified by economic development and environmental entities via the following factors: (1) Existing or Potential Redevelopment Projects, (2) Existing Wetlands and Rivers, (3) Publicly-Owned Parcels, or in TIF district.

1) Airport & Buffington Harbor Area (1,000 ac): Includes a mixture of airport infrastructure, heavy manufacturing and logistics, as well as Clark & Pine Nature Preserve, the Grand Calumet River, and floodplain properties.
2) 15th Ave Gateway Area (936 ac): Includes light industrial land near I-65, in close proximity to the Little Calumet River floodplain.
3) East Lakefront Light Industrial District (331 ac): Includes light industrial properties on US 20, and sits adjacent to National Park land.
4) Lake Sandy Jo Area (231 acres): Includes a remediated superfund site near I-80, ideally situated for redevelopment as a logistics center, but sits in close to the Little Calumet River floodplain

High Priority Green Corridors

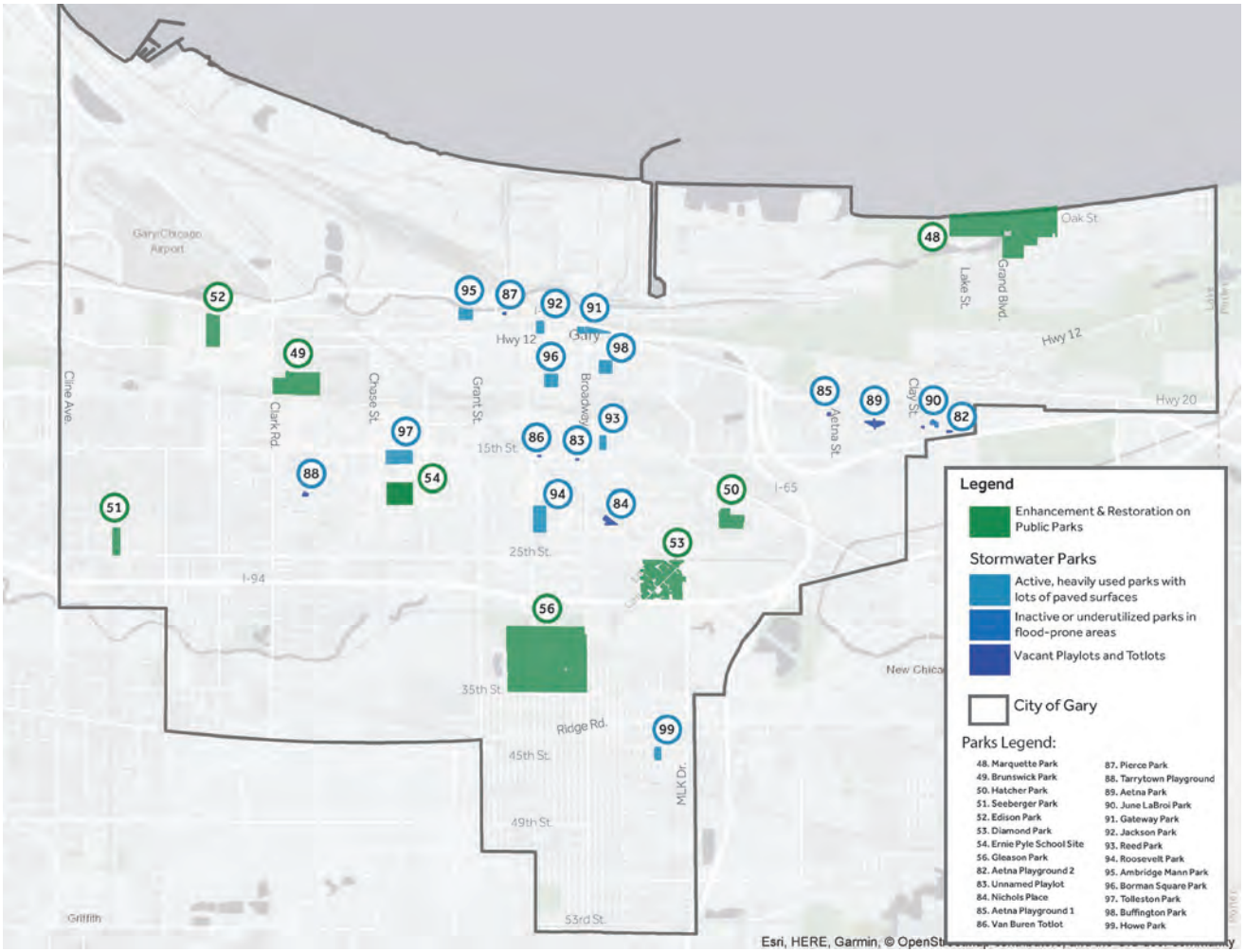


High Priority Green Corridors: Roadways represent a significant source of stormwater runoff as they are concentrations of highly impervious surfaces, many of which are surrounded by commercial properties that contain large areas of impervious surfaces. They also are entirely publicly-owned, meaning they are logical opportunity areas for green infrastructure. The integration of engineered stormwater green infrastructure along major roads would assist with stormwater management, in addition to enhancing corridor aesthetics. Through input for municipal, community, and transportation stakeholders, the following Priority Green Corridors were identified.

Figure14: High Priority Green Corridors Areas Map

- **Principal Arterials:** Airport Rd, Broadway, Ridge Road, US 12, US 20
- **Minor Arterials:** Chase St, Grant St, Martin Luther King Blvd, 15th Ave, 45th Ave
- **Major Collectors:** Chase St, Clark Rd, Clay St, Grand Blvd, Lake St, 25th Ave, 35th Ave
- **Minor Collectors:** Aetna St, 35th Ave[34]

Conservation & Stormwater Parks



Conservation Parks: Many parks possess conservation assets that could be enhanced to benefit residents and the environment. These parks were identified using the Conservation Index of the GGIT, and stakeholder input.

Stormwater Parks: Many parks (whether actively utilized, under-utilized or vacant) could be retrofitted with green infrastructure to improve stormwater management and reduce flooding. These parks were identified using the Stormwater Index of the GGIT, and the Parks Department's maintenance plan.

Figure 15: Conservation and Stormwater Parks Map

Conservation Parks: (48) Marquette Park, (49) Brunswick Park, (50) Hatcher Park, (51) Seeberger Park, (52) Edison Park, (53) Diamond Park, (54) Ernie Pyle School Site, (56) Gleason Park

Stormwater Parks: (82) Aetna Playground 2, (83) Unnamed Playlot, (84) Nichols Place, (85) Aetna Playground 1, (86) Van Buren Totlot, (87) Pierce Park, (88) Tarrytown Playground, (89) Aetna Park, (90) June LaBroi Park, (91) Gateway Park, (92) Jackson Park, (93) Reed Park, (94) Roosevelt Park, (95) Ambridge Mann Park, (96) Borman Square Park, (97) Tolleston Park, (98) Buffington Park, (99) Howe Park

Sub Area Map: Northwest

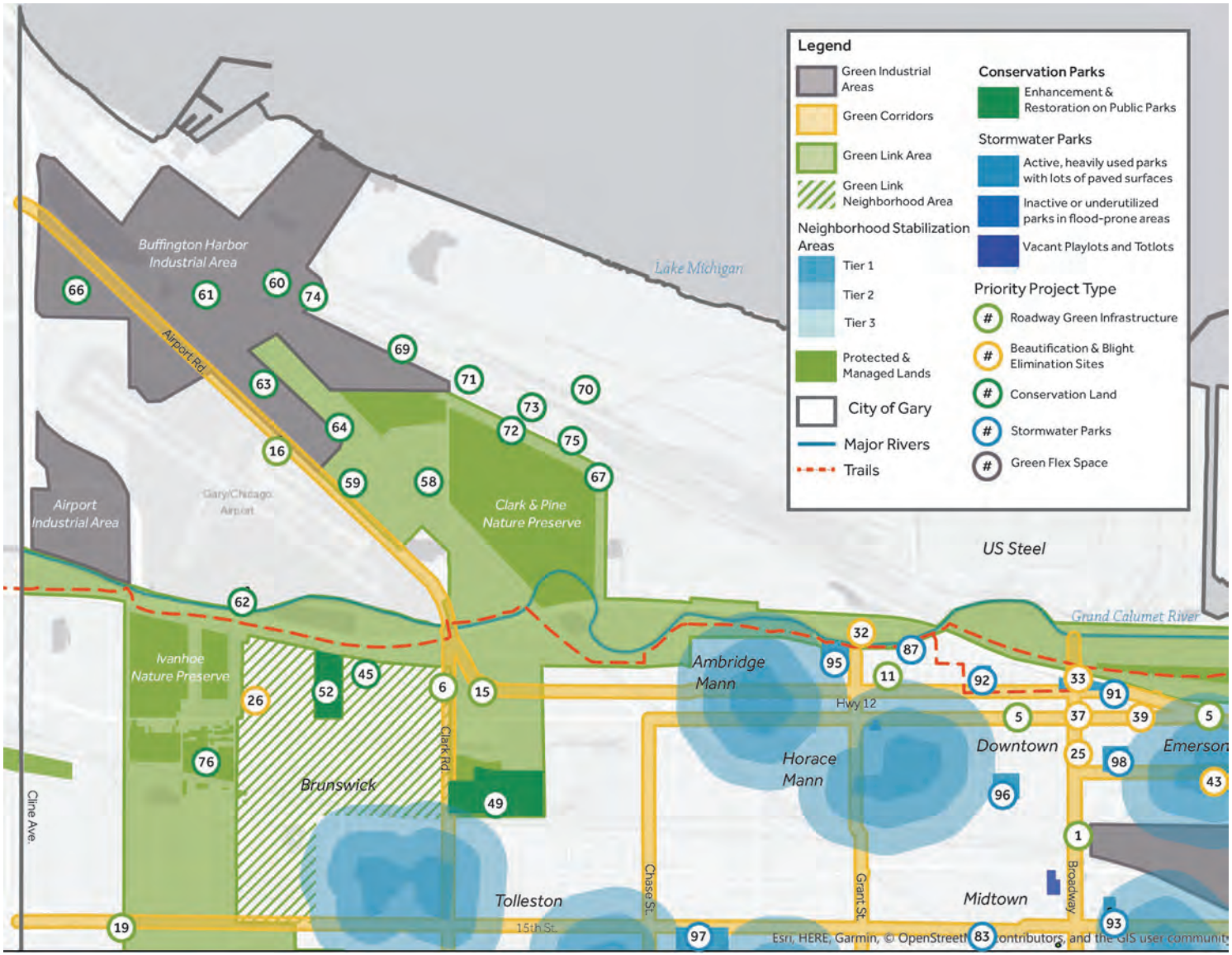


Figure 16: Northwest Section of Framework Map (See Page 55-56 for Priority Project Legend)

Sub Area Map: Southwest

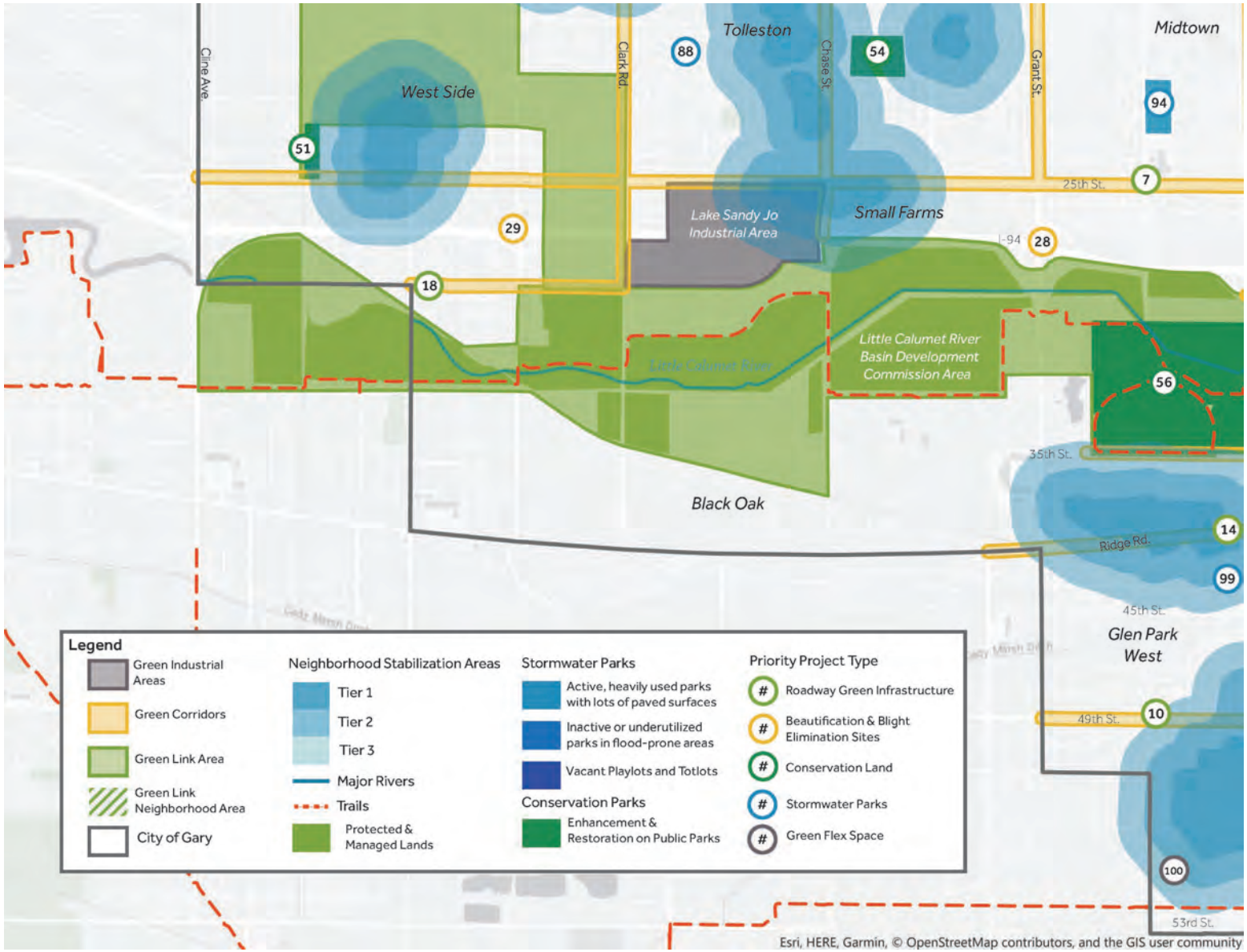


Figure 17: Southwest Section of Framework Map. See Page 55-56 for Priority Project Legend

Sub Area Map: Northeast

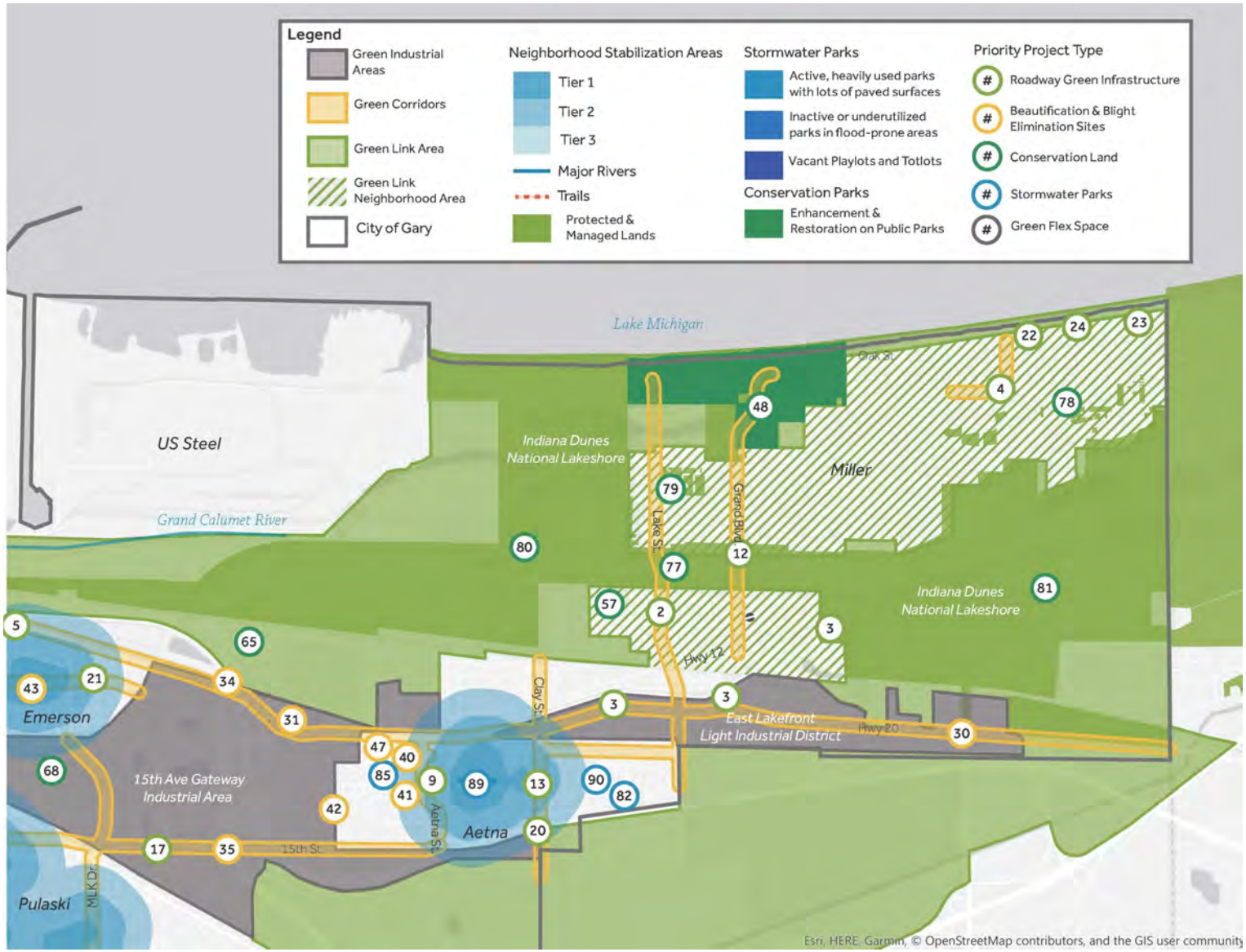


Figure 18: Northeast Section of Framework Map (See Page 55-56 for Priority Project Legend)

Sub Area Map: Southeast

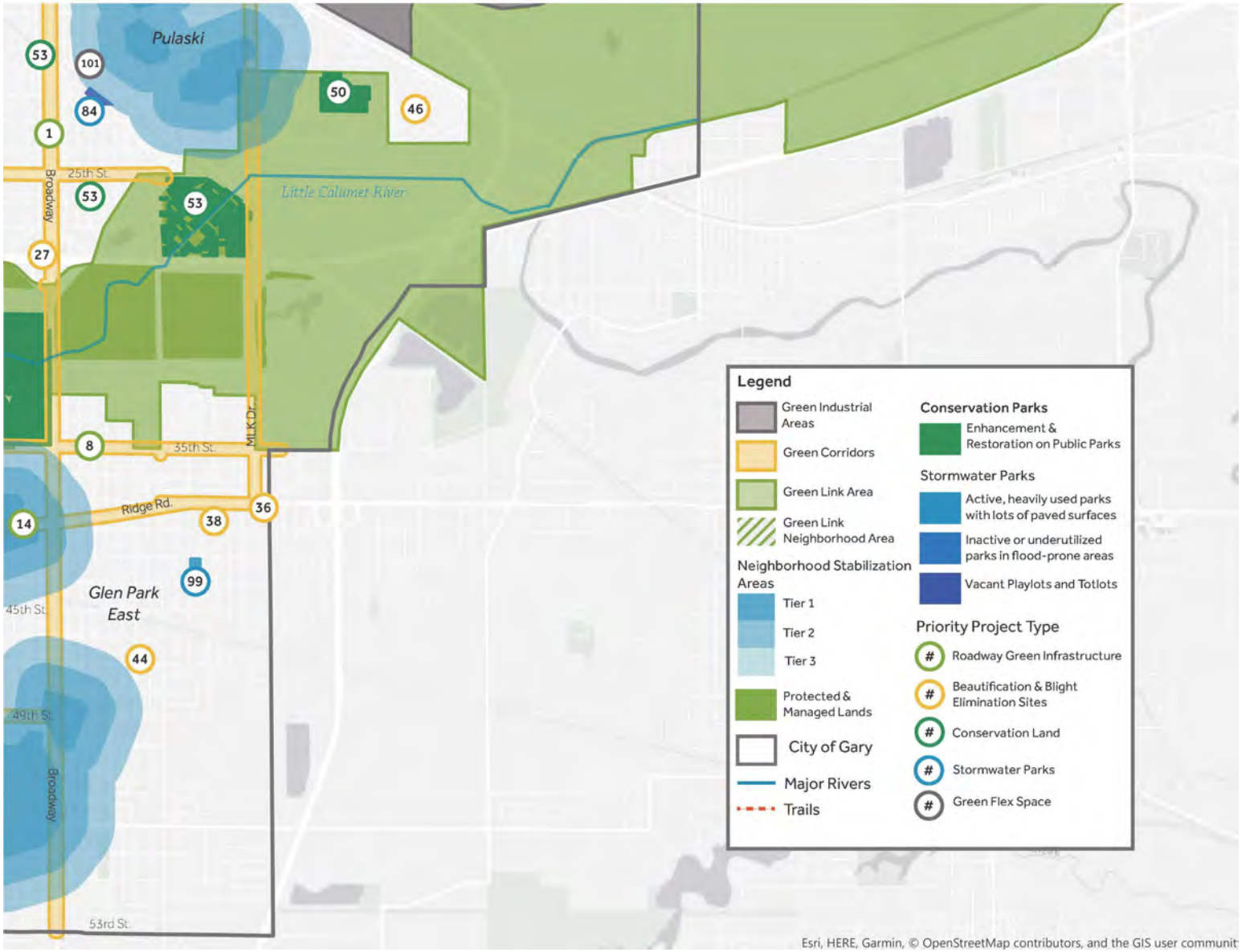


Figure 19: Southheast Section of Framework Map (See Page 55-56 for Priority Project Legend)

MODEL ZONING & PERMITTING GUIDELINES

Gary Airport Area

VIII. MODEL ZONING & PERMITTING GUIDELINES

While publicly-led installation projects, funding programs, and land use policies are all effective methods for implementing green infrastructure, zoning and permitting guidelines can also serve as an effective tool for producing green infrastructure on privately-owned properties, by regulating the character of development projects. Beginning in Spring 2017, Delta Institute and the Alliance for the Great Lakes worked with the City's Departments of Planning & Redevelopment, Green Urbanism & Environmental Affairs, Zoning, and the Gary Sanitary District on developing a model green infrastructure ordinance and permitting process that includes the following:

- Stormwater management requirements for properties across all land use types, with specific green infrastructure strategies and guidance that help property owners meet those requirements
- Defined Stormwater Impact Areas, where managing runoff is most critical, and in turn, the requirements are the greatest.
- Protections for natural areas that abut developed land or land slated for redevelopment, along with flexible buffer guidelines for property owners to meet those requirements
- Defined Conservation Impact Areas, where the buffering requirements are specifically applied.

Ameriplex Plaza (Portage, Indiana)

Regulatory tools like zoning and permitting guidelines are critical component for driving the reductions in stormwater runoff that have contributed heavily to Gary's CSO and MS4-related water quality problems. In turn, zoning and permitting will play a critical role in helping the City meet the goals of its future Long Term Control Plan and Stormwater Master Plan.

Similarly, in a context where vacant industrial land sits adjacent to rare, protected wetlands, proactive and prescriptive guidelines for mitigating development-related impacts through green infrastructure can provide developers with a clearer path for approval from permitting agencies than currently exists. Since these sorts of guidelines do not currently exist in the City's codes, the city's Site Plan Review Committee currently lacks the regulatory language necessary to require a developer to include green infrastructure in the project,

as a means of managing stormwater or beautifying their site. The Site Plan Review Committee is comprised of all of city departments that oversee permitting, including the Planning, Zoning, the Stormwater Management District, the Sanitary District, Buildings, Code Enforcement, Public Works, and the Fire Department. This committee has generally found that developers are less willing to invest in "non-income generating site improvements" in weak market like Gary, and so site improvements like green infrastructure often are negotiated in a one-off basis. In addition to providing the public sector with specific regulatory language, these guidelines can also help standardize green infrastructure as just another site improvement for developers (like parking lots and lighting), by providing deliberate, city-wide standards, versus being an output project-specific negotiations, making development more equitable in the city.

Importantly, the Green Infrastructure Overlay and Permitting Guidelines is a model ordinance, to be adapted and included in the broader overhaul of the City of Gary's Zoning Ordinance, which is planned to be completed after the adoption of its Comprehensive Plan. If the framework by which city regulates land uses and development changes with this general ordinance overhaul, the structure of this model green infrastructure ordinance naturally should change as well.

Green Infrastructure Overlay

These guidelines were developed through an extensive review of existing City zoning ordinances and permitting documents (including stormwater, buildings, etc.), an assessment of the Site Plan Review process, meetings with key city staff, as well as a review of existing guidelines from different cities across the country. This included post-industrial shrinking cities (like Buffalo, NY), post-industrial growing cities (like Grand Rapids, MI), and rapidly growing cities that have prioritized green infrastructure (like Ann Arbor, MI). In particular, this review was heavily informed by best practices from Camden, New Jersey's 2012 Green Infrastructure Ordinance, due to the similar population size, land use patterns and economic conditions that Camden shares with Gary.

The Green Infrastructure Ordinance Overlay specifically establishes the following:

1. Consolidated Zoning Classifications
2. Stormwater Standards, Impact Areas, and Permitting Process
3. Conservation Impact Areas and Buffer Guidelines
4. Green Infrastructure Strategies by Land Use.

The full document is included in Appendix A.

Consolidated Zoning Classifications

To coherently regulate stormwater runoff and on-site conservation by land use type, these guidelines consolidated the city's numerous zoning classifications, with the recognition that a development's footprint and subsequent impacts often vary only by a little from one single family residential zone to the next, but can vary tremendously from one land use type to other (industrial and residential, for

example). With industrial land in particular, the designation between light industrial and heavy manufacturing is significant, with the guidelines around light industrial bearing more similarity to commercial zones, based on their comparable activities and environmental impacts. The guidelines are also bifurcated by Partial or Full Development. With Partial Development, new "net" footprint of impervious surfaces are required to comply with the regulation, while with Full Development, the regulation is applicable to the entirety of the site. The spatial guidelines for each zone and development classifications are illustrated below:

		Residential		Commercial	Industrial	
		Small Scale	Large Scale	All Commercial	Light Industrial	Heavy Industrial
Area Designation		New buildings <500 sqft, Lots < 10,000 sqft	Lots > 10,000 sqft	Any square footage	Any square footage	Any square footage
Current Code Equivalent		R-1 Single Family through R-4 Two Family	R-5 through R-7 Multiple Family	B-1 Limited Retail through B-5 Wholesale	M-1 Limited Manufacturing, M-2 General Manufacturing	M-3 Heavy Industrial
Partial Development	Expansion of Existing Structure	N/A	**APPLIES WHEN** <500 sqft	**APPLIES WHEN** <750 sqft	**APPLIES WHEN** <750 sqft	**APPLIES WHEN** <1,500 sqft
Partial Development	New Installations	N/A	**APPLIES WHEN** At least 250 sqft of new impervious surface	**APPLIES WHEN** At least 250 sqft of new impervious surface	**APPLIES WHEN** At least 250 sqft of new impervious surface	**APPLIES WHEN** At least 500 sqft of new impervious surface
Full Development	Expansion of Existing Structure	N/A	**APPLIES WHEN** > 500 sqft	**APPLIES WHEN** > 750 sqft	**APPLIES WHEN** > 750 sqft	**APPLIES WHEN** > 1,500 sqft
Full Development	New Installations	N/A	**APPLIES WHEN** New or major redevelopment of structures with footprints exceeding 750 sqft	**APPLIES WHEN** New or major redevelopment of structures with footprints exceeding 750 sqft	**APPLIES WHEN** New or major redevelopment of structures with footprints exceeding 750 sqft	**APPLIES WHEN** New or major redevelopment of structures with footprints exceeding 1,500 sqft

Figure 20: Green Infrastructure Zoning Classification Table

Additionally, the consolidated zoning guidelines address green infrastructure in Planned Unit Developments (PUDs) and Mixed Use Districts (MUDs). PUDs, which often are the size of an entire subdivision, are regulated by their specific use type, as identified in Figure 19. A specific benefit of PUDs in the City's ordinance is flexibility around where structures and improvements can be arranged on site, and through these guidelines, which continues to be the case with where a PUD's green infrastructure and their impervious surfaces are located. It is worth noting that large-scale residential PUDs (over 10,000 square feet) are regulated by commercial land use guidelines, because their footprint and impervious surfaces bear more similarity to commercial districts than residential neighborhoods. MUDs, which often possess a mixture of residential and commercial development, are regulated by their percentage of each land use type. For example, if 80% of the footprint in a development is residential, and 20% is commercial, 80% of the MUD's square footage will be regulated with residential green infrastructure requirements, and 20% will be regulated with commercial green infrastructure requirements. Similar to PUDs, this structure provides flexibility for where green infrastructure and impervious surfaces can be located.

Stormwater Performance Standards, Impact Areas & Permitting Process

Based a national review of best practices, guidelines, and staff input, the following standards are included for on-site runoff management:

- **City-Wide Standard:** Properties manage first 1" of rainfall.
- ***Stormwater Impact Areas Standard:*** Manage first 1.5" of rainfall.

As explained in the ordinance, ***Stormwater Impact Areas*** are the city's areas of greatest concern, regarding chronic flooding and potential negative impacts on water quality. As listed in Section XXX-II-3 of the ordinance, they are defined by the highest scoring stormwater index parcels in the GGIT, as well as the existing MS4 locations. Upon completion of the Long Term Control, it will also include parcels located in problematic CSO sewersheds. As it currently exists, much of the Stormwater Impact Area is comprised of Downtown, Horace Mann, Emerson, the Broadway Corridor, the Little Calumet River Corridor, Aetna, and Glen Park.

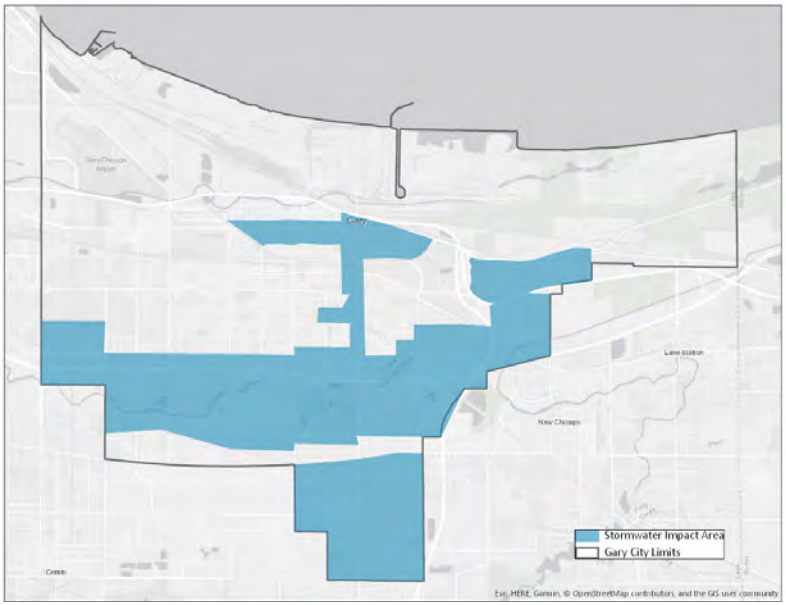


Figure 20: Stormwater Impact Area Map

Through these guidelines, stormwater impact assessments and prescriptive green infrastructure guidelines have been integrated into the City's existing permitting process. As illustrated in the flowchart below, an online permitting portal (and an accompanying analogue permitting process) can be created, where developers who are

overseeing a project (excluding residential developments under 3 units), would complete a Stormwater Pre-Check Form, which gathers information on location, land use, anticipated structures, and anticipated impervious surfaces from the development. After completion of the form, the developer will receive a Stormwater Guidance Report from the City, illustrating whether their development falls in the Stormwater Impact Area, the area of impervious surface on-site where runoff must be managed, on-site runoff requirements, and preferred green infrastructure methods for managing runoff. In turn, the developer must submit preliminary stormwater management calculations and accompanying green infrastructure designs and maintenance plans to the Gary Stormwater Management District for review and approval. Once the developer's project receives permits, ongoing inspections will occur after construction, as part of the ongoing process of maintaining permits.

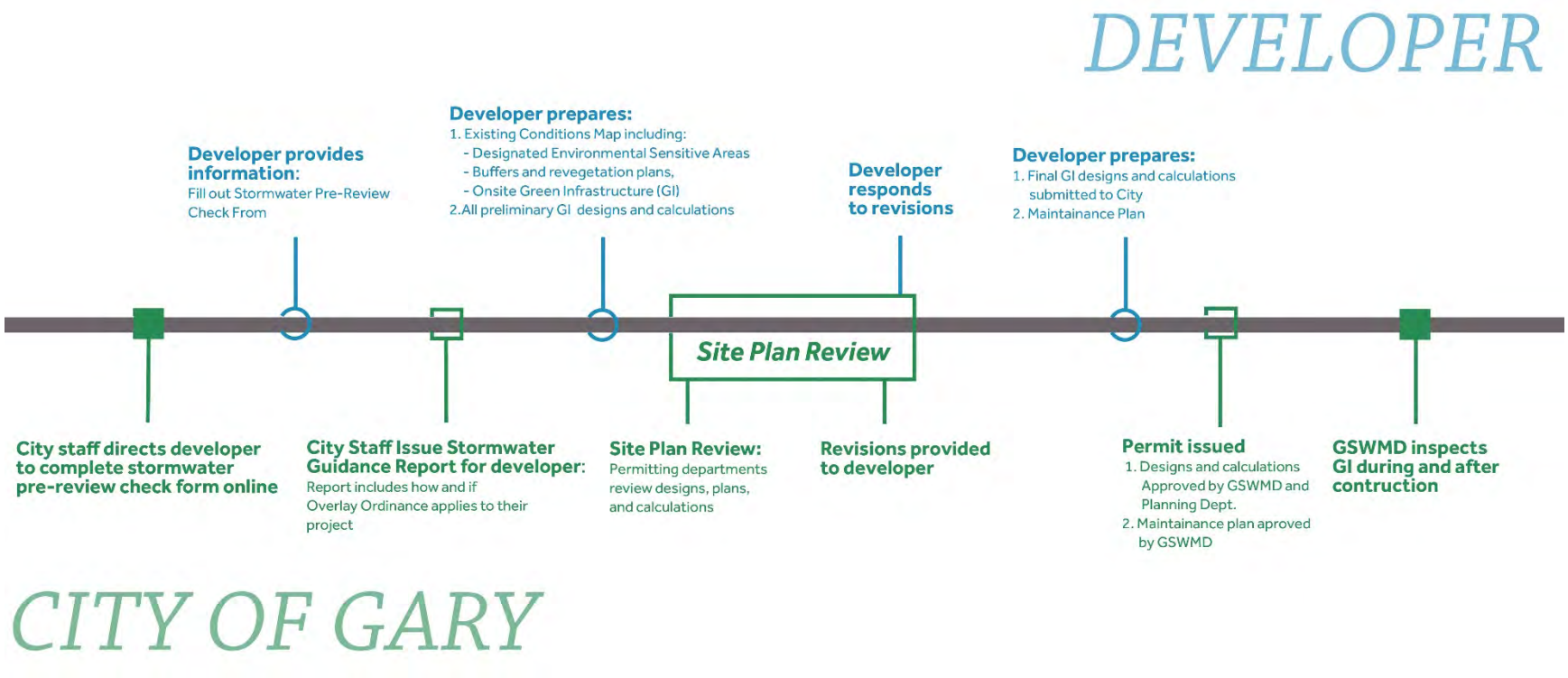


Figure 21: Green Infrastructure Permitting Process Flowchart

Conservation Impact Areas & Vegetated Buffer Guidelines

Similar to the Stormwater Impact Area, the Conservation Impact Area identifies environmentally-sensitive areas, protects them through vegetated buffering guidelines, and integrates these guidelines into the permitting process. The Conservation Impact Area uses the corridor identified in the Gary Green Link Plan, which includes existing conservation land and unprotected environmentally-sensitive areas. For unprotected environmentally-sensitive areas that attract development, the ordinance establishes a process for identifying critical ecological features on-site, buffer requirements for protecting those features, and use restrictions within those protected areas.

The identification process includes a First Pass Ecological Assessment (Appendix A), a simple score sheet that developers submit to the Site Plan Review Committee for review, as part of the development process. This assessment helps to determine the existence of critical ecological features on site. If the site scores below the requisite threshold determined by the city, then the project can advance without special buffering guidelines. If it the site scores above the threshold, then a Floristic Quality Assessment (Appendix A) must be conducted, to determine the existence of rare or endangered species along with confirmed wetland features on site. While these assessments require review time from the developer, they cost significantly less and take less time than a wetland delineation report, and represent a cheap and quick method for gathering findings in advance of meeting more significant regulatory requirements from IDEM and USACE. If a portion of the property includes or abuts an environmentally-sensitive area, one of three buffer types will take effect: wetland, riparian, and conservation. The buffer guidelines are illustrated in the table below. Importantly, they are mixture of best practices from federal agencies, including wetland and conservation buffer guidelines come from the US Department of Agriculture and best practices from peer cities (riparian buffer guidelines).

	Vegetated Buffer Widths			
	Heavy Industrial	Light Industrial	Commercial	Residential
Riverine Buffer From river, stream, tributary, or Lake Michigan edge. Extends either from within same or adjacent parcel.	100 ft	50 ft	50 ft	25 ft
Wetland Buffer From wetland, pond, or lagoon edge. Extends either from within same or adjacent parcel.	35 ft			
Conservation Buffer When adjacent parcel is conserved (no street between). Also applies from edge of high quality ecosystem present within to-be-developed parcel.	50 ft	25 ft	25 ft	10 ft

Figure 23: Vegetated Buffer Guidelines

An important feature of these guidelines is the opportunities for buffer size reduction, through native prairie revegetation, native reforestation, and wetland restoration. The reduction guidelines are illustrated in the table below. The ordinance also includes use restrictions and requirements within buffer areas.

	Buffer	Wetland Vegetated Buffer Widths			
		Heavy Industrial	Light Industrial	Commercial	Residential
	Wetland Buffer From wetland edge. Both within same or adjacent parcel.	35 ft			
Allowed Buffer Reductions	**Revegetation: Native Prairie/Understory** Where impervious surface within the buffer is revegetated utilizing native prairie or understory herbaceous species, the required wetland buffer width can be reduced by five (5) feet to thirty (30) feet. *Developer must sign a maintenance agreement to maintain the native revegetated buffer for at least five years.	30 ft (5 ft width reduction)			
	Revegetation: Native Reforestation Where impervious surface within the buffer is revegetated utilizing native species reforestation (i.e. appropriate native tree and understory herbaceous species), the required wetland buffer width can be reduced by ten (10) feet to twenty-five (25) feet. *Developer must sign a maintenance agreement to maintain the native revegetated buffer for at least five years.	25 ft (10 ft width reduction)			
	Wetland Restoration The buffer can be reduced in area by the equivalent acreage of wetlands restored or enhanced by the developer up to a maximum reduction of fifteen (15) feet to twenty (20) feet width. *The reduction is applied uniformly, meaning that all wetland buffer must be the same width. Applies only to the wetlands protected by the buffer. Developer must sign a maintenance agreement to maintain the wetland for at least five years.	35 ft - 20 ft (Potential of up to 15 ft width reduction)			

Figure 24: Buffer Reduction Guidelines Table

For permitted approval for the development, a developer within the Conservation Impact Area must submit designs and a maintenance plan for an approved buffer, under this ordinance. As with all green infrastructure, ongoing inspections will occur after construction, as part of the permitting process.

Testing the Buffers: Two Case Studies

As part of the process of establishing the buffer guidelines, they were tested on 15 different sites throughout Gary. This included industrial, light industrial, commercial, mixed use, and residential properties, some of which were located in close proximity to known conservation land, wetlands, and rivers, and some in dense areas with lots of impervious surfaces. A full summation of the case studies are located in Appendix E. The following are two examples of how the guidelines would work on relevant sites:

1000-1100 N Clark: Wetland Buffer

Standing at just under 40 acres, and situated to the north of the Gary Chicago International Airport, 1000-1100 N Clark Road is a vacant brownfield site that could potentially be redeveloped for light industrial use, particularly since the property is publicly-owned. That said, the site also sits to the south and to the west of the Clark & Pine Nature Preserve, a state-protected wetland area holding globally-rare dune and swale features. 1000-1100 N Clark Road holds a portion of this dune and swale wetland, as illustrated in the table below, roughly 37.9% of the site, or 14.5 acres. To ensure that wetland protection and redevelopment could feasible co-exist on site, these guidelines would institute a 35-foot buffer around the wetland areas, a linear strip that stands at 2.9 acres in total, representing 7.4% of the total site area. When including a small portion of buildable area at the northeast end of the site with a large contiguous area, that leaves nearly 21 acres (51.7% of the site as buildable). That said, under the guidelines, if wetland restoration is included in the redevelopment of the site, the buffer could be reduced to 1.7 acres (4.4% of the total site), effectively adding another acre to the buildable lot size. While reducing buildable area on site is never desirable from a developer's perspective, these guidelines assist the development in so far that they strengthen its ability to gain approval from permitting agencies, by installing best management practices that reduce impacts from development on wetlands.

Case Study Feature	Area (Sq Ft)	Area (Acres)	Percentage
Total Parcel	1,667,919	38.3	100.0%
Wetlands on Parcel	631,187	14.5	37.9%
Wetland Buffer (35 feet)	124,146	2.9	7.4%
Buildable Area (isolated)	123,891	2.8	7.4%
Buildable Area (contiguous)	788,695	18.1	47.3%

Figure 25: Case Study 2 Summary Table

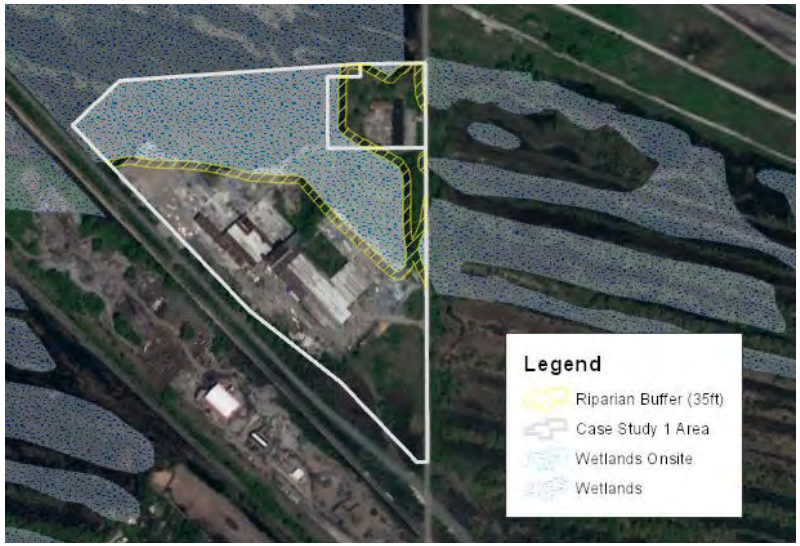


Figure 26: Case Study 2 Map

Edison Park: Conservation Buffer

Standing at almost 21 acres, just north of US 20 in the Brunswick neighborhood, the vacant Edison School and Park site has the potential to be redeveloped for commercial or light industrial use, particularly since the property is publicly-owned. That said, the site possesses 4 acres of native prairie and woodlands on its northern end, representing almost 20% of the site. Conserving these features not only strengthens the natural resources in the Brunswick neighborhood, but the redevelopment of large vacant property on a major arterial, with the jobs and tax base that that brings, is also a critical priority for Gary. To ensure that conservation and redevelopment can feasibly co-exist on site, these guidelines would institute a 10 foot buffer around the natural areas, a linear strip that stands at 0.5 acres in total, representing about 2% of the total site area. Excluding a small portion of inaccessible buildable area at the northwest end of the site from a large contiguous area, that leaves nearly 15 acres (70.8% of the site as buildable). While reducing buildable area is never desirable from a developer's perspective, these guidelines assist development in so far that they strengthen the ability to gain approval from permitting agencies, and build good will with adjacent property owners, by restoring a natural area in their community.

Case Study Feature	Area (Sq Ft)	Area (Acres)	Percentage
Total Parcel	910,843	20.9	100.0%
High Quality Habitat	177,290	4.1	19.5%
Conservation Buffer (10 feet)	19,602	0.5	2.2%
Buildable Area (isolated)	69,261	1.6	7.6%
Buildable Area (contiguous)	644,691	14.8	70.8%

Figure 26: Edison Park Case Study Table

Figure 27: Case Study - 5400 W 5th Avenue (Edison School) Map

Green Infrastructure Strategies by Land Use

Specifically, nine green infrastructure strategies are included in the ordinance, as well as recommended pairings by land use, maintenance guidance, and placement preferences. These strategies, along with additional green infrastructure techniques, are defined in Section IX.

Strategy	Compatible Land Uses				Information
	Heavy Industrial	Light Industrial	Commercial	Residential	
Cisterns	x				Definition Required Maintenance Tasks Suggested Maintenance Tasks Initial Responsible Parties Long Term Responsible Parties Placement Preferences
Constructed Wetlands	x	x			
Bioswales		x	x		
Parking Lot Bioretention Islands		x	x		
Rain Gardens		x	x	x	
Stormwater Trees		x	x	x	
Non-Living Permeable Surfaces			x	x	
Downspout Disconnection				x	
Rain Barrels				x	

Figure 28: Green Infrastructure Strategies Table

GREEN INFRASTRUCTURE STRATEGIES

Aetna Vacant to Vibrant Site

IX. GREEN INFRASTRUCTURE STRATEGIES

There are numerous strategies for municipal departments, public agencies, and property owners to drive stormwater management, conservation, and beautification through green infrastructure. The following is standard list of green infrastructure categories and techniques:

Roadway Green Infrastructure (for Stormwater Management) [35]

Bioswales/Hybrid Ditches: A linear ditch that runs along the edge or the center of a roadway, bioswales/hybrid ditches function similarly to conventional grass ditch, where rainwater runoff flows across the crown of a road and can enter into the ditch at any point along its length. The main difference between the two is that a bioswale will have native plantings and a hybrid ditch will have grass. This feature slopes with the road to act as a conveyance channel, which connects to an existing conventional ditch, surface water, or storm sewer. It fits best in areas with chronic flooding problems, with available land in and around the right of way, and oftentimes on streets without sidewalks (though they can be retrofitted into sidewalks). They can also be added to parks or properties for stormwater management.

Box Tree Filters: Box tree filters take in curbside runoff and treat it through physical and biological methods before discharging it into existing storm sewer infrastructure. As a result, water that enters the storm sewers is cleaner, while trees and microbial communities uptake nutrients that would otherwise be washed away. This technique is essentially useful on any type of roadway, but particularly in areas with problematic CSOs and MS4s.

Boulevard Trees: Though their capacity to manage stormwater runoff is not as high as box tree filters, general boulevard trees can provide a similar function by assisting with stormwater management and beautification, and are oftentimes a more practical technique to deploy, when a roadway lacks a sidewalk, curb, and gutter.

Permeable Pavement: Permeable pavement allows the infiltration of rainwater through the jointing material placed in the spaces between the pavers. It can also come in the form of scarified asphalt. Permeable pavers are ideal for right-of-way applications, such as parallel parking lanes or gutter retrofits. This technique can also be used for green alley applications or in parking lots. Permeable pavement is most commonly found in commercial and mixed use districts.

Perforated Pipe: Perforated piping is an underground green infrastructure solution that assists communities with stormwater management, through a combination of pipe storage and gravel storage, to provide detention and promote infiltration. It is a solution that naturally can be incorporated into sewer main replacement and road reconstruction projects.

Stormwater Planters: A linear infiltration basin that typically sits between a street and a sidewalk in the right-of-way, surrounded by vertical curbing. Rainwater runoff flows to the gutter in the street and drains into the stormwater planter through openings in the curbing. This feature is particularly appropriate on major commercial streets and neighborhood scale intersections.

Green Instructure for Private and Public Properties (for Stormwater Management)[36]

Constructed Wetlands: Wetlands constructed as pollution reduction or flow control facilities. These serve as more environmentally-friendly alternatives to conventional retention or detention ponds, for their superior ability to treat runoff, due to filtering capacity of the plant communities they hold. These are applicable in campuses and on industrial facilities.

Cisterns/Underground Storage: Cisterns and underground storage can be effective at managing large storage volumes of rainwater, from roof runoff, localized flooding and combined sewer overflow areas. Generally, runoff enters the system and fills up a stone base beneath the chambers. Once the voids in the stone base are filled, then the open area of the chamber acts as efficient open storage, holding a high volume of water per unit of footprint.

Green Roofs: A green roof transforms an otherwise impervious surface into one capable of retaining and filtering stormwater. A substrate or growing layer is planted with vegetation and absorbs stormwater that would otherwise flow through a traditional system of gutters and sewers. By retaining the stormwater, green roofs allow for natural processes like evaporation and transpiration to occur, slowly releasing water to the atmosphere. They are most applicable on roofs with a greater load bearing capacity and for property owners that have the capacity to maintain them.

Parking Lot Bioretention Islands: Similar to stormwater planters, bioretention islands are lowered infiltration basins with curbing that includes openings where runoff can enter. They can be located in the middle or on the edges of parking lots, most commonly attached to commercial, institutional, or multi-family residential buildings.

Rain Gardens: Rain gardens act like a bowl in the low spot of a property that fills up with rainwater and then drains slowly to the native soil or an engineered underdrain system. When paired with decorative landscaping, these features can assist with property beautification and block stabilization. They have been a core component of the Vacant to Vibrant program in Gary.

Conservation Strategies

Natural buffer in Emerson, separating industrial and residential land

Land Buffers: Whether through disposition of properties to conservation entities or through regulatory tools like easements, the establishment of land buffers should serve as a key strategy in the City's long range planning. Land buffers are effective at reducing the impacts of development on water bodies and natural areas, mitigating flooding from water bodies and wetlands in developed areas, and balancing incompatible land uses (i.e., reducing the impact of industrial areas on residential areas). Land buffers can help achieve this balance through installation of plants that reduce runoff, mitigate flooding, improve air quality, and assist with visual screening.[37]

Wetland enhancement project near industrial facility in Texas (The Nature Conservancy)

Wetland Mitigation, Enhancement & Restoration: Mitigation refers to the restoration, creation, or enhancement of wetlands, to compensate for permitted wetland losses. In addition to newly constructed wetlands, many wetland restoration and enhancement opportunities exist in Gary. This includes both enhancement and restoration of wetland features on public and privately-owned lands, as well establishing special "wetland mitigation banks" that sell offset credits to developers, which assist economic development projects with permitting, and ensure high quality mitigation activities in exchange. Specifically, restoration focuses on improvements that return the natural functions of a former or degraded wetland, through re-establishment and rehabilitation, while enhancement focuses on changes or improvements to a wetland's core functions, with the purpose of improving water quality, flood water retention, habitat, etc.[38]

Conservation Easements: Under a conservation easement, a legally-binding agreement is reached between a public agency or a land trust and a private landowner that limits or prevents development on a portion or on the entirety of a parcel, serving to protect existing natural areas on privately-held land. With the enactment of the easement, stewardship of the natural area can be undertaken by the participating agency or trust, and in exchange, the private landowner typically receives a tax benefit (local property, federal income, etc.), or some other incentive for participation. Given the existing deficit in Gary's operating revenues, decreasing the footprint of taxable land has its consequences, and so conservation easements (which reduce the taxable footprint of a property) may not always be the best strategy for conservation in the city. That said, particularly in instances where establishing an easement on valuable habitat does not present a significant loss in potential property tax revenue, and where a conservation easement would serve as a critical land buffer in flood-prone areas or between incompatible land uses, the technique should be considered.[39]

Green Flex Space Strategies

Junedale Fields Phyto Farm in Glen Park

Phytoremediation Farms: To address soil quality issues on vacant and abandoned brownfield sites, certain types of plants can be installed that extract contaminants from soil (like heavy metals and volatile organic compounds) over a period of time of up to 15 years. These plants include cottonwood trees (typically hybrid poplar), willow trees, and switchgrass. Phytoremediation pilots are being explored in Gary as an interim land use on properties like the Bear Brands Stocking Factory site and the Junedale Fields site. This interim strategy assists in remediating the soil, helping to lay the groundwork for future redevelopment. Phytoremediation also holds the potential to be included in a land buffering strategy with industrial property.[40]

Faith CDC Farms in Emerson

Orchards & Urban Agriculture: Orchards and urban agriculture can transform vacant land into community assets that engage residents, provide educational opportunities, and improve public health and food resiliency in neighborhoods. Particularly in Gary, local churches have used urban agriculture as a strategy for stabilizing their blocks and engaging their congregants. The caveat is that on many vacant lots, what sits in the ground may not be clean native soil, but rather urban fill. Existing urban fill can often contain contaminants or solid materials that threaten the safety of eating produce grown directly from the soil. In turn, raised growing beds or replacement of the existing soil on site with clean fill, will help ensure the safety of any fruits or vegetables grown on site.[41]

PROJECT PRIORITIZATION

Marquette Park Wetland

X. PROJECT PRIORITIZATION

Through two and a half years of stakeholder engagement, public input and technical analysis using the Gary Green Infrastructure Tool, the project team identified 102 specific projects for implementing green infrastructure that advance the City's conservation, beautification, and stormwater management priorities. The projects fall under 5 categories:

1. Roadway Green Infrastructure
2. Beautification & Blight Elimination
3. Conservation Land
4. Stormwater Parks
5. Green Flex Sites

When considering project prioritization, the reality is that the most impactful projects are not always the most feasible, either politically or financially. What constitutes as feasible can change with federal and state administrations, which lead to further changes in grant programs and regulatory requirements. In turn, instead of providing a ranked list of projects in these categories, this Plan provides the following information, which will naturally dictate prioritization as the City and its administrations continue to change and evolve.

- **Cost:** What would be the estimated cost of funding this recommended green infrastructure best practice?
- **Runoff Savings**: What would be the impact of the project be on reducing stormwater runoff?
- **Funding**: Has this project secured funding for planning, design, or implementation?
- **Neighborhood**: Where is the project located? Does it fit the plans and projects of that neighborhood? Are the projects equitably distributed throughout the City's neighborhoods?
- **Sewer Type**: Is the project in a Combined Sewer Area or MS4 area? Typically, green infrastructure is most critical in a city's MS4 areas, because the runoff that enters that system is not treated. However, due to the City's consent decree on CSOs, reduced runoff in the combined sewer area (which is 90% of the city) could be just as important. In advance of the completion of the Long Term Control Plan, it is impossible to fully identify green infrastructure solutions that are tailored to address its CSO problems.
- **In a TIF**: Is this project in a TIF district, meaning that it is in an area designated for redevelopment, where matching funds are available, and where this infrastructure investment can complement existing and emerging redevelopment projects?
- **Existing & Potential Partnerships:** Do partnerships for development, implementation, management, and maintenance exist?

Full project descriptions are provided in Appendix C (Prioritized Projects).

Priority Project Map

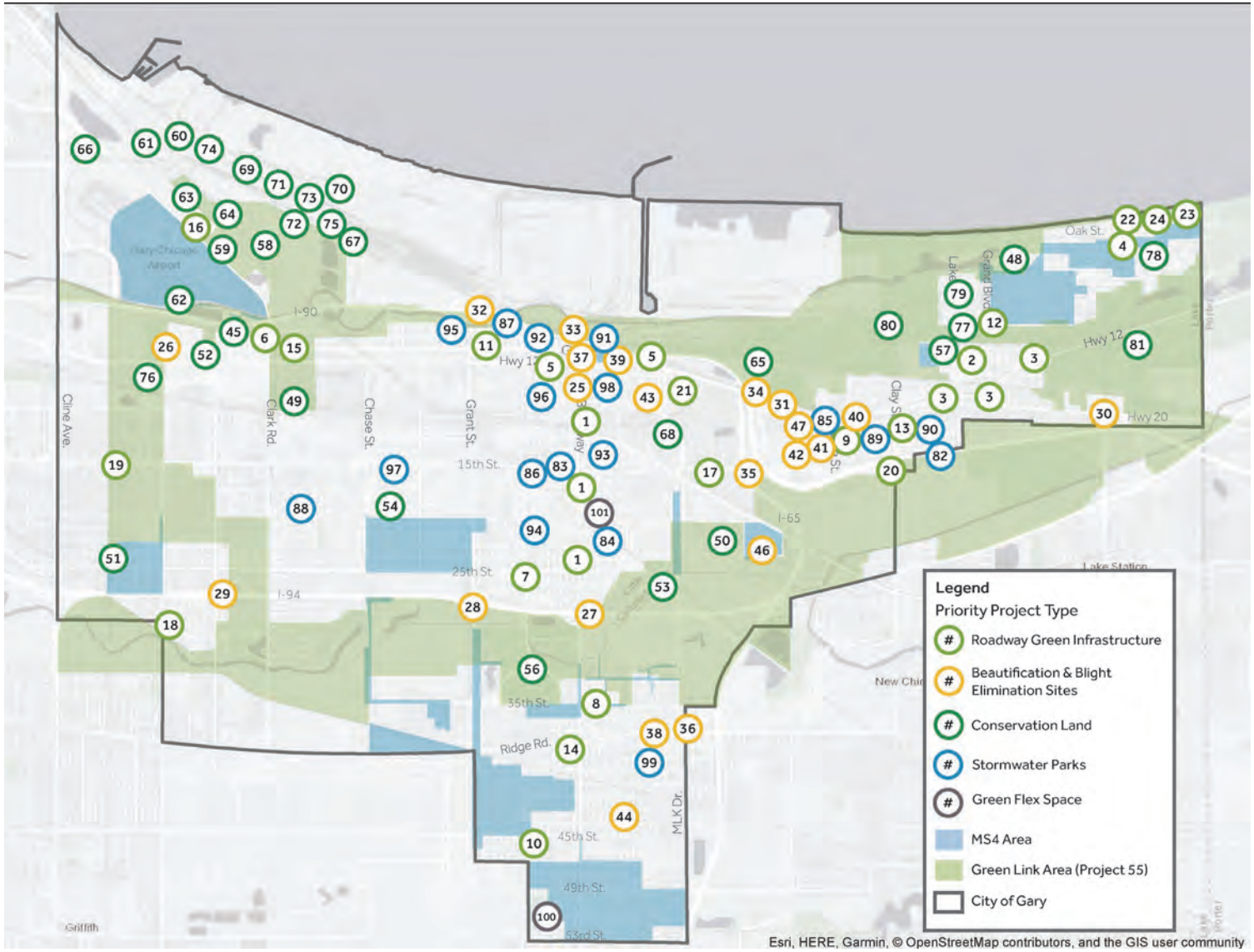


Figure 30: Priority Project Map

PRIORITY PROJECTS

Roadway Green Infrastructure (#)

Sidewalk Green Infrastructure:

1. Livable Broadway: 4th Avenue to 51st Avenue (5.6 miles)
2. Lake Street: US 12 to Lake Street (1.5 miles)
3. US 12 & 20: I-65 to County Line Road (4 miles)
4. Shelby Street & Locust Avenue Intersection
5. 5th Avenue (US 12 & 20): Monroe Street to Virginia Street (.9 miles)
6. Clark Road: Airport Road to 5th Avenue (.4 miles)
7. 25th Avenue: Grant Street to Broadway (1 mile)
8. 35th Avenue: Pierce Street to Martin Luther King Blvd (1.7 miles)
9. Aetna Street: US 12 & 20 to 15th Avenue (0.5 miles)
10. 45th Avenue: Grant Street to Broadway (1 mile)
11. Buchanan Street: 4th Avenue to the GreenLink (0.2 miles)
12. Grand Boulevard: Miller Avenue to Marquette Park (1 mile)
13. Clay Street: US 12 & 20 to 13th Avenue (0.3 miles)
14. Ridge Road: Grant Street to Georgia Street (1.5 miles)

Bioswale/Hybrid Ditches:

15. 4th Avenue: Clark Road to Bigger Street (0.66 miles)
16. Airport Road: Clark Road to Cline Avenue (2.8 miles)
17. 15th Avenue: Martin Luther King Boulevard to I-65 (0.5 miles)
18. 29th Avenue: Stevenson Street to Gerry Street (0.5 miles)
19. 15th Avenue: Cline Avenue to Colfax Avenue (1 mile)
20. Clay Street: 13th Avenue to 15th Avenue (0.25 miles)

Perforated Pipe

21. 7th Avenue: Ohio Street to Alabama Street (0.33 miles)
22. Sullivan & Lakeshore Drive
23. Wayne & Lakeshore Drive
24. Vanderburg & Lakeshore Drive

Beautification & Blight Elimination Sites (#)

Vacant Properties

25. Stumblebum Park: 577-87 Broadway
26. Ivanhoe Preserve Gateway: 4th Avenue & King Street

Gateway Beautification

27. Interstate 80: Broadway – 2 locations
28. Interstate 80: Grant St.– 2 locations
29. Interstate 80: Burr St.– 2 locations
30. Interstate 80: Ripley St.– 1 locations
31. Interstate 90: Dunes Highway (US 12 & 20) – 2 locations
32. Interstate 90: Grant St. – 1 location
33. Interstate 90: Broadway – 1 location
34. Interstate 65, 5th Ave. – 1 location
35. Interstate 65, 15th Ave.– 2 locations
36. Ridge Road – 1 location

Occupied Properties:

37. City Hall Parking Lot Rain Garden
38. United Steelworkers Union Hall: 2 locations
39. US Steel Yard Plaza

Vacant to Vibrant Projects

40. 1035 Oklahoma St. (Completed)
41. 1200 Oklahoma St.(Completed)
42. 1252 Dakota St. (Completed)
43. 743-753 Vermont St. (Planned)
44. 4261 Virginia St. (Planned)
45. 5210 W 3rd St. (Planned)
46. 2432 Marshalltown Ln. (Planned)
47. 3534 E 10th Ave. (Planned)

PRIORITY PROJECTS

Conservation Land (#)

Enhancement & Restoration On Public Parks & School Sites

48. Marquette Park
49. Brunswick Park
50. Hatcher Park
51. Seeberger Park
52. Edison Park
53. Diamond Park: 25th Avenue & Prospect Street
54. Ernie Pyle School site: 19th Avenue & Taney Street
55. Green Link Corridor
56. Little Calumet River & Gleason Park wetland restoration

Enhancement & Restoration on Publicly-Owned Vacant Land

57. 5400 E 5th Avenue
58. 1000 & 1100 N Clark Road
59. 5212-56 Industrial Highway
60. 6200 Industrial APPR
61. 300 N Mount
62. Gary Chicago International Airport property
63. 6011 Industrial Highway

Private Enhancement & Restoration

64. 120 N Clark Road
65. NIPSCO Utility Corridors, Interstate 65/US 20 Intersection
66. NIPSCO Utility Corridors, 7151 Industrial Highway
67. NIPSCO Utility Corridors, Clark & Pine substation
68. NIPSCO Utility Corridors, 1480 E 15th Avenue
69. US Steel Parcels, 200 N Clark APPR Street
70. US Steel Parcels, 300 N Whitcomb Street
71. EJ&E Parcels, 410 N Williams APPR
72. EJ&E Parcels, 3378 Burr Street
73. EJ&E Parcels,350 N Morton Street
74. EJ&E Parcels, 600 N Tompkins APPR
75. Pen Central Transportation Co., 400 N Baker Street

Acquisition & Consolidation

76. Shirley Heinz Land Trust adjacent properties, Ivanhoe South
77. Shirley Heinz Land Trust adjacent properties, Miller Woods
78. Shirley Heinz Land Trust adjacent properties, Bayless Dune
79. Shirley Heinz Land Trust adjacent properties, Lake Street & Cypress Ave.
80. Marquette Trail Extension
81. Inland Manor

Stormwater Parks (#)

Vacant Playlots and Totlots

82. Aetna Playground 2: 13th Place & Greene Street
83. Unnamed Playlot: 16th Avenue & Washington Street
84. Nichols Place: 220 Nichols Place
85. Aetna Playground 1: 10th Avenue & Wyoming Street
86. Van Buren Totlot: 16th Avenue & Van Buren Street
87. Pierce Park: 200 Pierce Street
88. Tarrytown Playground: 2039 Lane Street

Inactive Or Underutilized Parks In Flood-prone Areas

89. Aetna Park: 1200 Allen Street
90. June LaBroi Park: 110 Fayette Street

Active, Heavily Used Parks

91. Gateway Park: 300 Broadway
92. Jackson Park: 300 Jackson Street
93. Reed Park: 1500 Connecticut Street
94. Roosevelt Park: 2200 Harrison Street
95. Ambridge Mann Park: 200 Garfield Street
96. Borman Square Park: 700 Madison Street
97. Tolleston Park: 1500 Rutledge Street
98. Buffington Park: 636 Connecticut Street
99. Howe Park: 3901 Vermont Street

Green Flex Sites (#)

100. Junedale Fields: 51st Avenue & Madison Street
101. Bear Brands: 205 E 21st Avenue

Roadway Green Infrastructure: 24 projects (#1-24)

Roadways are a classic target for installing green infrastructure. In any city, they represent significant amounts of publicly-owned impervious surfaces, specifically 793 miles of roadways in the City of Gary. According to the Gary Green Infrastructure Tool, the areas with the greatest stormwater runoff problems are also the areas with the densest street networks. Roadway green infrastructure typically falls into 3 categories: sidewalk green infrastructure, non-sidewalk green infrastructure, and perforated pipe projects.

Lake Street in the Miller neighborhood

Sidewalk Green Infrastructure: 14 projects
This includes stormwater planters, box tree filters, and permeable pavement, which assist with stormwater management along the sidewalk, enhancing the pedestrian experience through beautification, plus visual and spatial separation from the road.

Non-Sidewalk Green Infrastructure: 26 projects
This includes bioswales, hybrid ditches, and boulevard trees which assist with stormwater management and beautification along road corridors that lack sidewalks, in addition to creating visual and spatial separation from the road. They are most appropriate for lower density areas, with high traffic speeds.

Perforated Pipe: 4 projects
This is an underground green infrastructure solution that assists communities with stormwater management, through a combination of pipe storage and gravel storage, to provide detention and promote infiltration. The Gary Sanitary District has identified priority corridors and intersections for this technique.

Projects were identified through an existing plan review, interviews with municipal departments, transportation and environmental agencies, public engagement, and modelling in the Gary Green Infrastructure Tool.

Key Partners: City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Northwestern Indiana Regional Planning Commission, Indiana Dept. of Transportation

Roadway Green Infrastructure

Full project descriptions included in Appendix C. Planned, fully-funded, or partially-funded projects in bold.

No	Project	Extent	Miles	Strategy	Est. Capital Cost Range	Runoff Reduction (Gallons)	Sewer	TIF (Y/N)
1	**Livable Broadway**	**4th Ave to 51st Ave**	**5.6**	**Sidewalk Green Infrastructure** Stormwater Planters Box Tree Filters Permeable Pavement	**$ 20,840 – 64,840**	**86,170**	**CS**	**YES**
2	**Lake St**	**US12 to Lake St**	**1.5**		**$ 83,200 – 208,000**	**861,700**	**CS**	**NO**
3	**US 12 & 20**	**I-65 to County Line Rd**	**4**		**$ 2,718,082 – 3,122,477**	**4,131,930**	**CS**	**NO**
4	**Shelby St**	**Locust Ave Intersection**	**-**		**$ 27,888 – 30,707**	**26,860**	**MS4**	**NO**
5	5th Ave	Monroe St to Virginia St	0.9		$ 20,800 – 65,600	430,850	CS	YES
6	Clark Road	Airport Rd to 5th Ave	0.4		$ 5,200 – 23,200	215,420	CS	NO
7	25th Ave	Grant St to Broadway	1.0		$ 20,800 – 65,600	430,850	CS	NO
8	35th Ave	Pierce St to MLK Blvd	1.7		$ 105,300 – 255,600	969,410	MS4	NO
9	Aetna St	US12 & 20 to 5th Ave	0.5		$ 5,200 – 23,200	215,420	CS	NO
10	45th Ave	Grant St to Broadway	1.0		$ 20,800 - 65,600	430,850	MS4	NO
11	**Buchanan St**	**4th Ave to GreenLink**	**0.2**		**$ 5,200 – 23,200**	**215,420**	**CS**	**NO**
12	Grand Blvd	Miller Ave to Marquette Park	1.0		$ 20,800 – 65,600	430,850	MS4	NO
13	Clay St	US12 & 20 to 13th Ave	0.3		$ 47,089 – 94,669	456,120	CS	NO
14	Ridge Rd	Grant St to Georgia St	1.5		$ 2,432,082 – 2,526,477	1,334,420	CS	NO
15	4th Ave	Clark Rd to Bigger St	0.7	**Non-Sidewalk Green Infrastructure** Bioswales Hybrid Ditches Boulevard Trees	$ 16,640 - 57,920	344,680	CS	NO
16	**Airport Rd**	**Clark Rd to Cline Ave**	**2.8**		**$ 130,000 – 308,000**	**1,077,120**	**MS4**	**NO**
17	**15th Ave**	**MLK Blvd to I-65**	**0.5**		**$ 20,800 – 65,600**	**430,850**	**CS**	**YES**
18	29th Ave	Stevenson St to Gerry St	0.5		$ 20,800 - 65,600	430,850	CS	NO
19	15th Ave	Cline Ave to Colfax Ave	1.0		$ 83,200 - 20,8000	861,700	CS	NO
20	Clay St	13th Ave to 15th Ave	0.25		$ 5,200 – 23,200	215,420	CS	NO
21	7th Ave	Ohio St – Alabama St	0.3	**Perforated Pipe**	Not Modeled	-	CS	NO
22	Sullivan St	Lakeshore Dr Intersection	-		Not Modeled	-	CS	NO
23	Wayne St	Lakeshore Dr Intersection	-		Not Modeled	-	CS	NO
24	Vanderburg St	Lakeshore Dr Intersection	-		Not Modeled	-	CS	NO

Figure 31: Roadway Green Infrastructure Project List

Beautification & Blight Elimination: 31 projects (#25-46)

Beautification on vacant and occupied properties includes native landscaping and rain gardens, which can assist communities with managing stormwater, and can help stabilize and beautify vacant sites on a block or in a neighborhood, through the development of maintained, intentional open space. Projects include publicly-owned vacant lot retrofits (such as Vacant to Vibrant), private and occupied public property retrofits, and gateway beautification off of highway exits.

Vacant to Vibrant Lot Rendering

Vacant Property Projects: 2 projects
Gateway Beautification: 10 intersections (14 projects)
Occupied Property Projects: 3 projects
Vacant to Vibrant Program Projects: 8 projects

Projects were identified through interviews with municipal departments, environmental agencies, public engagement through the Vacant to Vibrant process, and modelling in the Gary Green Infrastructure Tool.

City Hall Parking Lot Rain Garden

Key Partners: City Departments (Planning & Redevelopment, Green Urbanism), Gary Sanitary District, Gary Housing Authority, Nature Conservancy, Vacant to Vibrant Advisory Committee, Private Property Owners

Beautification & Blight Elimination

Full project descriptions included in Appendix C. Planned, fully-funded, or partially-funded projects in bold.

No	Project	Neighborhood	Acres	Strategy	Cost	Runoff Reduction (Gallons)	Sewer	TIF
25	**Stumblebum Park**	**Downtown East**	**0.25**	Native Landscaping & Rain Gardens	**$ 25,875 – 39,627**	**20,130**	**CS**	**YES**
26	**Ivanhoe Preserve Gateway**	**Brunswick**	**0.5**		**$ 58,806 – 78,262**	**6,650**	**CS**	**NO**
27	Interstate 80: Broadway	Central	44.6	Gateway Beautification	$ 599,824 – 692,713	20,206,690	CS	YES
28	Interstate 80: Grant	Black Oak	48.8		$ 599,824 – 692,713	20,206,690	CS	YES
29	Interstate 80: Burr	Black Oak	24.4		$ 479,506 – 556,973	16,153,450	CS	NO
30	Interstate 80: Ripley	Miller	3.4		$ 294,031 – 347,129	990,520	CS	NO
31	Interstate 90: US 12 & 20	Aetna	9.6		$ 282,270 – 333,786	9,509,030	None	NO
32	Interstate 90: Grant	Horace Mann	25.7		$ 755,072 – 867,577	25,436,640	CS	NO
33	Interstate 90: Broadway	Downtown East	1.6		$ 38,345 – 55,901	46,580	CS	NO
34	Interstate 65: 5th	Aetna	3.1		$ 90,238 – 114,636	3,039,910	CS	NO
35	Interstate 65: 15th	Downtown East	4.2		$ 124,316 – 153,808	4,187,920	CS	NO
36	Interstate 65: Ridge	None	1.6		$ 88,770 – 106,496	98,620	CS	NO
37	**City Hall parking lot**	**Downtown East**	**0.7**	Public Property Rain Gardens	**$ 551,982 – 580,567**	**1,571,280**	**CS**	**YES**
38	Union Hall GI	Glen Park East	1.8		$ 130,929 – 166,346	156,820	CS	NO
39	US Steel Yard Plaza	Downtown East	1.5		$ 83,380 – 100,367	115,680	MS4	YES
40	**1035 Oklahoma Street**	**Aetna**	**0.3**	Vacant to Vibrant (Planned and Built)	**$ 52,926 – 71,417**	**6,350**	**CS**	**NO**
41	**1200 Oklahoma Street**	**Aetna**	**0.3**		**$ 52,926 – 71,417**	**6,350**	**CS**	**NO**
42	**1252 Dakota Street**	**Aetna**	**0.3**		**$ 52,926 – 71,417**	**6,350**	**CS**	**NO**
43	**743-753 Vermont Street**	**Downtown East**	**0.5**		**$ 88,209 – 112,297**	**38,970**	**CS**	**NO**
44	**4261 Virginia Street**	**Glen Park East**	**0.3**		**$ 52,926 – 71,417**	**6,350**	**CS**	**NO**
45	**5210 W 3rd Ave**	**Brunswick**	**0.3**		**$ 52,926 – 71,417**	**6,350**	**CS**	**NO**
46	**2432 Marshalltown Lane**	**Pulaski**	**0.3**		**$ 52,926 – 71,417**	**6,350**	**MS4**	**NO**

Figure 32: Beautification & Blight Elimination Priority Project List

Conservation Land: 53 projects (#48-80)

In addition the conservation land owned by the National Park Service, Shirley Heinze Land Trust, and the Nature Conservancy, enhancing and restoring unmanaged habitat are significant opportunities on the following city-owned sites (including parks, schools, and vacant properties), as well as natural restoration of privately-owned land. Additionally, there are opportunities to connect fragmented parcels of preserved habitat into larger, interconnected properties, in partnership with public agencies and land trusts.

Seeberger Park

Bayless Dune

Enhancement & Restoration on Public Parks & Schools: 8 projects
Enhancement & Restoration on Public Vacant Land: 7 projects
Enhancement & Restoration on Private Property: 12 projects
Land Acquisition & Consolidation Partnerships: 6 projects

Projects were identified through an existing plan review, interviews with municipal departments, environmental agencies and organizations, public engagement, and modelling in the Gary Green Infrastructure Tool.

Key Partners: City Departments (Parks, Planning & Redevelopment, Green Urbanism), National Parks Service, Indiana Dept. of Natural Resources, Indiana Dept. of Natural Resources, US Army Corps of Engineers, Indiana Dept. of Environmental Management, Northwestern Indiana Regional Planning Commission, Nature Conservancy, Shirley Heinz Land Trust, Save the Dunes, Little Calumet River Basin Commission, NIPSCO, US Steel, Canadian National, Gary Airport Authority, Gary Port Authority, Private Property Owners

Conservation Land

Full project descriptions included in Appendix C. Planned, fully-funded, or partially-funded projects in bold.

No	Project	Neighborhood	Habitat	Acres	Strategy	Owner	TIF
10	**Marquette Park**	**Miller**	**Mixed**	**159.4**	Enhancement & Restoration on Public Parks, Trails & School sites	**COG Parks Dept.**	**NO**
49	**Brunswick Park**	**Brunswick**	**Mixed**	**33.0**		**COG Parks Dept.**	**NO**
50	Hatcher Park	Pulaski	Mixed	12.1		COG Parks Dept.	NO
51	Seeberger Park	Black Oak	Wetland	6.5		COG Parks Dept.	NO
52	Edison Park	Brunswick	Upland	4.0		COG Parks Dept.	NO
53	Diamond Park	Pulaski	Wetland	47.0		COG Parks Dept.	NO
54	Ernie Pyle school	Tolleston	Upland	8.5		City of Gary	NO
56	**Gleason Park**	**University Park**	**Wetland**	**80.0**		**COG Parks Dept.**	**NO**
57	5400 E 5th Avenue	Miller	Mixed	63.0		City of Gary	NO
58	1000 & 1100 N Clark Rd	Airport Area	Wetland	11.0		City of Gary	YES
59	5212 Industrial Hwy	Airport Area	Wetland	29.0		City of Gary	NO
60	6200 Industrial APPR	Airport Area	Wetland	78.0		City of Gary	YES
61	300 N Mount	Airport Area	Wetland	45.0		City of Gary	YES
62	Airport River Wetlands	Airport Area	Wetland	44.0		City of Gary	NO
63	6011 Industrial Hwy	Airport Area	Wetland	7.4		City of Gary	NO
64	120 N Clark Rd	Airport Area	Wetland	36.0		City of Gary	YES
65	**I-65/US 20 exit**	**Airport Area**	**Mixed**	**13.5**	Private Restoration	**NIPSCO**	**NO**
66	**7151 Industrial Hwy**	**Airport Area**	**Mixed**	**24.5**		**NIPSCO**	**NO**
67	**Clark & Pine substation**	**Airport Area**	**Wetland**	**66.0**		**NIPSCO**	**NO**
68	**NIPSCO Operating HQ**	**Downtown East**	**Wetland**	**24.0**		**NIPSCO**	**NO**
69	200 N Clark APPR	Airport Area	Wetland	18.5		US Steel	YES
70	300 Whitcomb St.	Airport Area	Wetland	66.0		US Steel	NO
71	410 N Williams APPR	Airport Area	Mixed	7.5		EJ&E Company	YES
72	3378 Burr Street	Airport Area	Wetland	10.2		EJ&E Company	NO
73	350 N Morton Street	Airport Area	Wetland	5.8		EJ&E Company	YES
74	600 N Tompkins APPR	Airport Area	Wetland	18.7		EJ&E Company	YES
75	400 N Baker Street	Airport Area	Wetland	15.0		Penn Central Railway	YES
76	Ivanhoe South	Brunswick	Mixed	50.0	Acquisition & Consolidation	SHLT & City of Gary	NO
77	Miller Woods	Miller	Mixed	-		SHLT & City of Gary	NO
78-9	Bayless Dune/Green Heron	Miller	Wetland	-		SHLT & City of Gary	NO
80	Marquette Trail	Miller	Mixed	2 miles		Mixed Private Owners	NO
81	Inland Manor	Miller	Wetland	60.0		Mixed Private Owners	NO

Figure 33: Conservation Priority Project List

Stormwater Parks:

Standing as large areas of pervious, publicly-owned land, public parks oftentimes serve as excellent locations for green infrastructure. That said, though absorption and infiltration of stormwater is certainly higher with a turf grass field than with a paved surface, it is markedly less than that of native grasses and forbs, whose deeper root systems take in more water. Green infrastructure also represents an opportunity to reduce the amount acreage needing to be mowed in parks, and since most urban parks are located in around dense neighborhoods (with lots of impervious surfaces), the demand for managing stormwater runoff is high. Of the 57 parks in Gary's system, 21 are currently vacated, and with the Parks District's revenues and operating budget in decline over the last decade, opportunities to lessen their maintenance liabilities on unused parks in the system is a priority. The following parks fall into 3 categories (1) Vacant Playlots & Totlots, (2) Vacant or Underutilized Parks, (3) Large, Active Parks in Dense Areas. They represent the best opportunities for installing green infrastructure to manage stormwater concerns

Pierce Park in Ambridge Mann neighborhood

Vacant Playlots & Totlots: 7 projects
Inactive or Utilized Parks in Flood-Prone Areas: 2 projects
Active, Heavily Used Parks: 8 projects

Projects were identified through an existing plan review, interviews with municipal departments, environmental agencies and organizations, public engagement, and modelling in the Gary Green Infrastructure Tool.

Key Partners: City Departments (Parks, Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Natural Resources

Stormwater Parks

Full project descriptions included in Appendix C. Planned, fully-funded, or partially-funded projects in bold.

No	Park	Neighborhood	Acres	Strategy	Estimated Capital Costs	Runoff Reduction (Gallons)	Sewer	TIF
82	Aetna Playground 2	Aetna	0.3	Vacant Playlots and Totlots	$ 72,920 – 94,633	34,510	CS	NO
83	Unnamed Playlot	Central	0.5		$ 117,612 – 146,118	26,340	CS	YES
84	Nichols Place Pocket	Central	2.6		$ 6,162 – 14,572	850,210	CS	YES
85	Aetna Playground 1	Aetna	0.3		$ 63,511 – 83,728	59,970	CS	NO
86	Van Buren Totlot	Central	0.2		$ 49,397 – 67,301	11,120	CS	NO
87	Pierce Park	Downtown West	0.3	Inactive or underutilized parks in flood-prone areas	$ 72,920 – 94,633	173,830	CS	NO
88	Tarrytown Playground	Tolleston	0.7		$ 164,657 – 199,963	188,940	CS	NO
89	Aetna Park	Aetna	3.5		$ 1,136,822 – 1,366,812	622,510	CS	NO
90	June LaBroi Park	Aetna	1.2		$ 282,270 – 333,786	67,130	CS	NO
91	Gateway Park	Downtown East	4.3	Active, heavily used parks with lots of paved surfaces	$ 352,837 – 413,765	197,680	MS4	NO
92	Jackson Park	Downtown West	4.4		$ 1,392,006 – 1,653,493	473,410	CS	NO
93	Reed Park	Central	4.1		$ 723,317 – 831,831	215,990	CS	YES
94	Roosevelt Park	Central	9.0		$ 137,008 – 273,245	992,5000	CS	NO
95	Ambridge Mann	Ambridge Mann	7.0		$ 705,675 – 811,967	65,170	CS	NO
96	Borman Square Park	Downtown West	8.6		$ 249,926 – 297,064	1,683,880	CS	NO
97	Tolleston Park	Tolleston	17.6		$ 65,863 – 86,457	1,109,380	CS	NO
98	Buffington Park	Downtown East	8.6		$ 122,023 – 151,178	82,2140	CS	YES
99	Howe Park	Glen Park East	3.5		$ 396,942 – 463,672	177,790	CS	NO

Figure 34: Stormwater Parks Priority Project List

Green Flex Sites: 2 projects

Green flex sites are areas where interim green infrastructure measures can be applied on large, vacant parcels, in advance of larger scale redevelopment occurring on those sites. Properties can include both brownfield sites and vacant public spaces, like parks. Currently, two such projects exist in Gary.

Junedale Fields Tree Farm in West Glen Park

Projects were identified through an existing plan review, interviews with municipal departments, environmental agencies and organizations, public engagement, and modelling in the Gary Green Infrastructure Tool.

Key Partners: City Departments (Parks, Planning & Redevelopment, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Private or Nonprofit Land Mangers

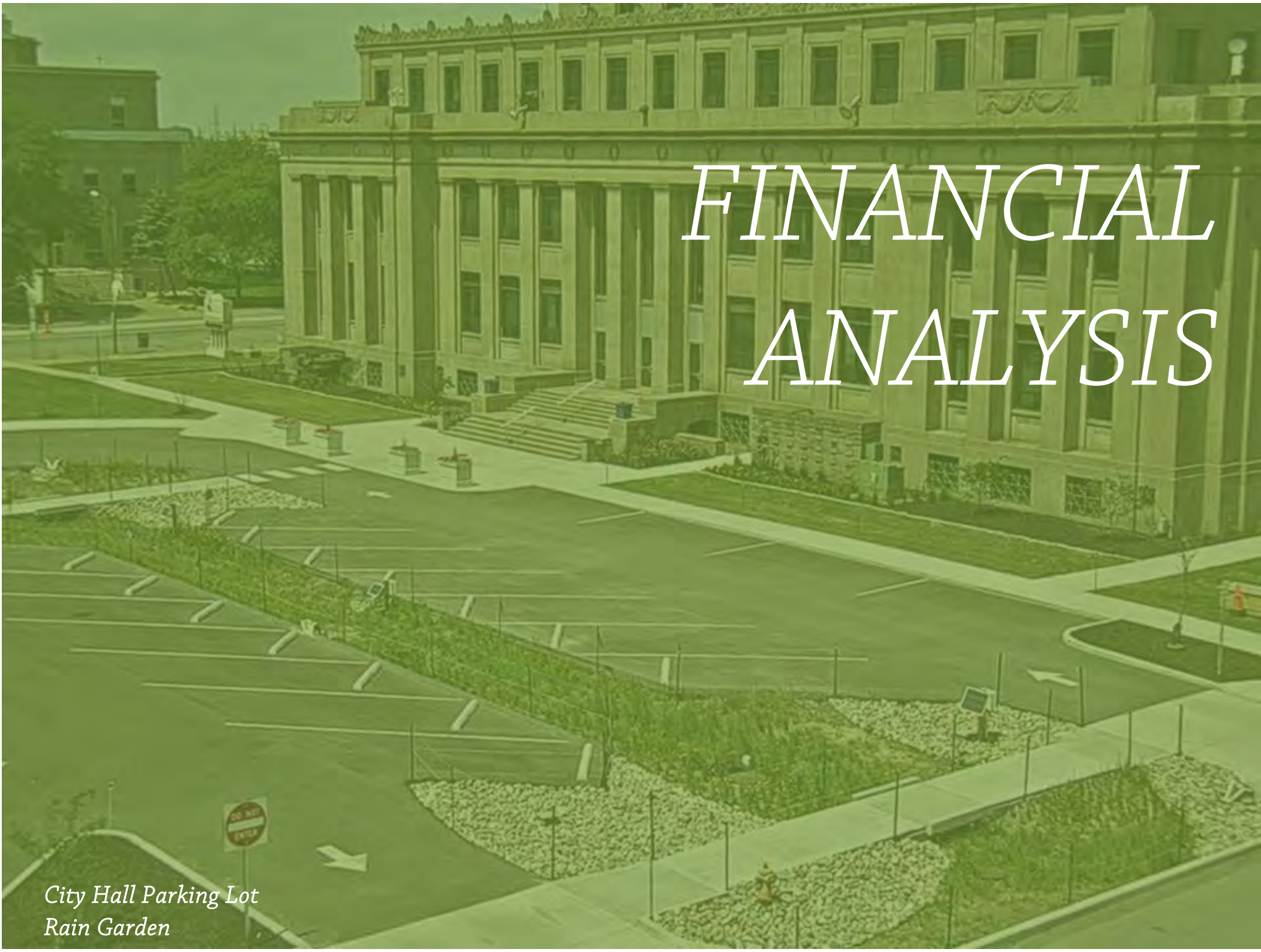
Green Flex Sites:

Full project descriptions included in Appendix C. Planned, fully-funded, or partially-funded projects in bold.

No.	Project	Neighborhood	Acres	Strategy	Impact	Owner	Sewer	TIF
100	**Junedale Fields**	**Glen Park West**	**5.5**	**Flex Space**	**$ 0 - $ 0**	**0**	**MS4**	**NO**
101	**Bear Brands**	**Central**	**4.9**	**Flex Space**	**$ 0 - $ 0**	**0**	**CS**	**YES**

Figure 35: Green Flex Sites Priority Projects

FINANCIAL ANALYSIS



City Hall Parking Lot Rain Garden

IX. FINANCIAL ANALYSIS

An analysis on the implementation Priority Project was conducted to provide in-depth insight on individual project as well as a comprehensive cost benefit of Priority Project implementation city wide. Three different tools were used to generate estimates for project capital costs, maintenance cost (per year), and run off reductions (gallons/ year). The section below outlines each of the tools and how they were used for the analysis and summary of the modeled scenarios outputs:

EPA's National Stormwater Calculator (EPA SWC) - EPA's SWC is a software application that estimates the annual amount of rainwater and frequency of runoff from a specific site. Estimates are based on local soil conditions, land cover, and historical rainfall records which are pulled from national datasets. The EPA SWC was used to model runoff reductions in terms of gallons/ year for each project modeled. Priority Projects included Rain Gardens, Porous Pavement/ Permeable Pavers, and Street Planters, and Infiltration Basins. The size of each green infrastructure installation modeled was determined by the lots existing use, practicality, and feasibility. For example, green infrastructure installation included in Priority ProjectS on large parks that currently contain actively used amenities might comprise less than 10% of the site versus green infrastructure installations that were on small residential plots might take up 30% of the lot. The EPA SWC also outputs estimated maintenance costs (both and high and low estimate) that were included in the analysis[42]

NYC Green Infrastructure Co-Benefits Calculator- The NYC Green Infrastructure Co-Benefits calculator identifies and quantifies the cost and benefits of engineered stormwater green infrastructure in a comprehensive manor. Given basic information about the green infrastructure installation, the tool provides environmental and economic benefit metrics. The NYC Green Infrastructure Co-Benefits Calculator was used to model runoff reductions in terms of gallons/ year for each project modeled. Priority Projects included large rain gardens and roadway ioswales. The size of each green infrastructure installation modeled was determined by the lots existing use, practicality, and feasibility. The NYC Green Infrastructure Calculator also outputs estimated maintenance costs that were included in the analysis.[43]

Note: Projects that were modeled using the EPA SWC have both high and low estimate for maintenance costs, but projects modeled using the NYC Green Infrastructure Co-Benefits Calculator only have an average maintenance cost. This is a result of the outputs that each model provides

Delta Institute's Green Infrastructure Designs Guide - Developed by the Delta Institute in partnership with Guidon Design, the Green Infrastructure practical toolkit which features scalable tools and design templates. The tool kit includes detailed cost information individualized for each stormwater green infrastructure installation included in the priority project list. The cost information included in the tool kit are based on project experience, bid tabs, and information from the RS Means Building Construction Cost Data (2012 Edition). These tables were used to provide both low and high construction costs for Priority

Projects. The low estimate includes the minimum requirement for each green infrastructure installation and the lower cost options when provided (Example: Using plugs instead of gallons for plantings). The high construction cost estimate include the higher cost option when provided (Example: Using gallons instead of plugs for planting) and includes customizable options like underdrainage, overflow pipes, and connection to existing storm sewer networks.[44]

Results

61 of the 100 Priority Projects were modeled using the tools outlined above. Project that did not involve engineered stormwater green infrastructure (primarily conservation and restoration projects) were not included in this analysis.

- Implementation of stormwater green infrastructure Priority Projects would results in 13.5 acres of Rain Gardens, 11.2 Acres of Permeable Pavement, 1.06 Acres of Infiltration Basins, .45 Acres of Street Planters, and .24 Acres of Bioswales.
- The cumulative capital costs for the implementation of stormwater green infrastructure Priority Projects is estimated to be between $16.5 million and $20.2 million, factoring in an anticipated lifespan of 25 years for each installation.
- The annual maintenance costs for the implemented projects is estimated to be between $705,000 to $771,000 per year or $17.6 million to $19.2 million cumulatively over the 25 year life span of each installation.
- The implementation of these 61 projects could result in an estimated runoff reduction of 132.1 Million gallons per year.
- The cost per gallon of runoff reduction would range from $0.13 to $0.16 $/gallon for the first year (including capital and maintenance costs).

See Appendix C: All Priority Projects for modeled costs and run off reductions for each individual project.

Stormwater Green Infrastructure	Cum. Sq. Ft Implemented	Cumulative Acres Implemented
Rain Garden	589,584	13.53
Permeable Pavement	479,849	11.02
Infiltration Basins	46,000	1.06
Street Planter	19,689	0.45
Bioswale	10,420	0.24

Figure 36: Green Infrastructure Project Modeling Results

MANAGEMENT, FUNDING, & FINANCING STRUCTURES

Faith CDC Farms

XI. MANAGEMENT, FUNDING & FINANCING STRUCTURES

The following section identifies the existing internal municipal powers and systems, potential partnerships, as well as funding and financing tools to effectively implement, manage, and maintain the Priority Projects listed in Section X.

Municipal Systems

While much of Gary's challenges in managing infrastructure derive from its lack of financial resources, there are a number of existing processes and strategies that could be expanded upon or further developed, as well as new strategies that will greatly increase the City's ability to effectively maintain green infrastructure.

Capital Improvement Planning & Procurement

By overseeing the capital improvement process for municipal infrastructure, the City has the ability to include priority green infrastructure projects into a 5 or 10 year Capital Improvement Program, which commits funding toward construction and maintenance of a particular improvement. Particularly for road infrastructure projects, the City can also establish green infrastructure specifications for consultants and contractors during the RFP and bid process. The City can also utilize the procurement process as an opportunity to increase the green infrastructure design, construction, and maintenance capacity of local contractors, providing a strong opportunity for green infrastructure workforce development.

Gary Urban Conservation Team (Gary Nature Proiect)

Workforce Development: Urban Conservation Team & Green Gary Team

For the last few years, the City's Department of Green Urbanism and Environmental Affairs, General Services, and the Gary Parks District have overseen the Urban Conservation Team, a municipal landscaping team that includes plant and soil experts who maintain decorative landscaping and green infrastructure through the city, including downtown, throughout the city's parks, and at the existing Vacant to Vibrant sites in Aetna. The Urban Conservation Team originally grew out of the City's "Gary for Jobs" initiative, which focused on workforce development for the city's "re-entry" population. Oversight, expansion, and continued development of the Urban Conservation Team will increase the City's ability to effectively manage green infrastructure, by advancing the training of a local green infrastructure workforce in Gary. Over the long term, the City's focus on green infrastructure workforce development, through the Urban Conservation Team, will also increase the capacity of local contractors. As new participants come through Gary for Jobs, and new employees come through the Urban Conservation Team, they will develop skills that could potentially serve as the basis for running or working at successful green infrastructure and landscaping businesses. With a similar focus on the long term, the City partnered with the US Forest Service and the Student Conservation Association in 2017 to launch the Gary Green Team, comprised of youths who are being groomed to do urban conservation work.

In a resource-constrained government like Gary, the success of an initiative like the Urban Conservation team depends on leveraging existing partnerships and building new ones. Opportunities for increasing staff and trainings of the Urban Conservation Team through philanthropic support and future public grants should be prioritized.

Public Private Partnership Structures

In various cities and regions across the country, public-private partnerships (P3s) for stormwater management have begun to emerge as a solution to the problems that municipalities and stormwater management districts face when implementing and maintaining their infrastructure.

Havingexsted in the United States as a vehicle for financing and maintaining transportation infrastructure and housing projects, P3s can address common problems that public agencies face, including upfront capital costs and cash flow constraints, by providing access to private investment capital. These resources have historically gone towards financing a diverse array of activities, including construction, pre-development activities (planning, engineering, etc.), and operations. Specifically in Gary, P3s have been formed around the Gary Chicago International Airport and the Indiana Toll Road.

Stormwater Public-Private Partnerships

Stormwater-focused P3s, which can exist on either the municipal or stormwater utility level, are performance-based contracts between the public sector and the private sector, focused on design, construction, financing, operation, and maintenance of public infrastructure (including green infrastructure). When properly undertaken, they are an effective vehicle for procurement and risk management. In these partnerships, the private partner pledges upfront investment for specific activities, and the public agency (and occasionally a third party) pledges an existing revenue source to repay the private partner's upfront investment, with interest. While this structure in some ways is similar to a municipal bond (with debt paid for by municipal revenues), the long term nature of these partnerships mean that it functions as much like a line item in an annual municipal operating budget.[45]

Could a Stormwater P3 work in Gary?

There is certainly potential for a Stormwater Public Private Partnership in Gary, as numerous assets and opportunities exist to leverage in city, though clear challenges also must be overcome for such an effort to be successful.

Assets & Opportunities:

One of Gary's greatest challenges is an odd source of strength for a Stormwater P3: vacant and underutilized land. With over 6,000 publicly-owned parcels in the City, there is no shortage of available property for green infrastructure installations in the city, particularly in dense areas with lots of impervious surfaces.

Additionally, through this Plan, as well as the city's future Comprehensive Plan, Stormwater Master Plan, Long Term Control Plan, and updated Zoning Ordinance, the city will have:

1. Clear policies on what stormwater management strategies fit in its various sub areas and neighborhoods
2. A prioritized list of green infrastructures projects (along with projected costs and runoff reduction impacts)
3. Regulatory requirements that are necessary for driving the private development market to produce green infrastructure

This planning and policy work would give a P3 a clear blueprint for green and gray infrastructure development throughout the city. Additionally, the City's existing stormwater fee provides a standing revenue source that could be pledged towards a P3. Other revenue sources overseen by GSD and City, as well as potential partnerships with private utilities like Indiana American Water and NIPSCO also could produce matching revenues to be pledged as part of a P3 agreement.

Challenges:
As Gary's population and tax base have declined, so have the revenues that it collects. All revenue sources in the City face many obligations (whether financial or programmatic), and as this decline continues in the near term, these fiscal challenges are only expected to become more severe. In turn, for a Stormwater P3 to be successful in Gary, it may have to begin at a modest scale, be at the expense of making other expenditures, and be partially supported by non-municipal revenue sources. Additionally, Gary currently stands as a weak market for investment in general. As a result, a Stormwater P3 would need to attract a private partner that is comfortable with the risks associated with investing in a weak market.

Land Trust & Public Agency Partnerships

NeighborSpace Model: An Urban Land Trust
A potential strategy for the City of Gary to pursue, that would support residents in the management of Vacant to Vibrant installations is the model followed by NeighborSpace, a Chicago-based non-profit urban land trust. Established in 1996 and supported through a partnership by City of Chicago, Chicago Park District, and Forest Preserve District of Cook County, NeighborSpace preserves and sustains 109 gardens throughout the city, on behalf of dedicated community groups. As in Gary, many of these gardens are on converted vacant lots, with the goal of stabilizing blocks and creating vibrant, open space. Specifically, NeighborSpace assists community groups with basic site management needs, including access to insurance, water and utilities, and with partnership building. They also oversee soil and wood chip delivery, and provide a tool library for participating groups.

Through their model, NeighborSpace acquires vacant, abandoned, or underutilized lots from a willing seller, either through sale or donation. As in Gary, many of these lots are either city or county-owned, having been acquired through the tax foreclosure process. Potential participants submit an application through the NeighborSpace website, and if approved, then an Online Partnership Agreement is established between NeighborSpace and the community group, that provides contact information on all of the potential garden's partners, and establishes the partnership's procedures, responsibilities, and resources.

Once a lot is acquired by NeighborSpace it becomes tax exempt, given their non-profit, 501(c)(3) status. While increasing the footprint of tax exempt land in Gary is not desirable, it is also the case that most participating Vacant to Vibrant sites are tax-exempt publicly-owned properties, meaning that disposition of these small, residential lots to a dedicated non-profit would not represent a reduction in taxable land. Additionally, it is likely that installation of a successful neighborhood garden, tax-exempt or not, would have a more beneficial economic impact on the adjacent properties than if no improvements were to be made at all.

Throughout Round 2 of Vacant to Vibrant, a NeighborSpace-style technical advisory committee was organized, composed of Gary, Northwest Indiana, and Chicagoland-based environmental organizations and agencies, to support participating community groups, by providing plant and soil expertise. As with NeighborSpace, maintaining this advisory committee will be critical in helping community groups with resource procurement, and administrative responsibilities.[46]

Conservation Partnerships

Irrespective of the habitat type, public agencies (like the Indiana Dunes National Lakeshore and the Indiana Dept. of Natural Resources) and nonprofit land trusts (like Shirley Heinz Land Trust and the Nature Conservancy) are the primary stewards of conservation land in Gary, overseeing land management, restoration and enhancement activities in the city's natural areas (including wetlands). In addition to oversight of their existing land holdings, the acquisition of valuable, unprotected natural areas is a primary focus of these organizations and agencies. In particular, acquisition of parcels that connect and consolidate fragmented habitat into a cohesive property is a primary focus. Partnerships between the City and these public agencies and land trusts will increases habitat for wildlife, and in many instances, expands well-maintained, publicly accessible natural areas for residents.

Funding Programs & Innovative Financing

To successfully scale green infrastructure throughout Gary, matching public and philanthropic resources with dedicated sources of local match is critical. Using existing local funding sources (from GSD, GSWMD, Redevelopment, Parks, etc.) to leverage outside grants will in turn augment the City's ability to attract innovative financing mechanisms, like Environmental Impact Bonds, that assist with upfront capital costs, and risk management. In Figure 37 below is a comprehensive list of grant programs, the activities they fund, and their typical award amounts, as well as the recommended local match sources. The funding priorities, and the programs themselves, are always subject to change and the list below will need to be revisited annually.

Program	Agency	Eligible GI Activities	Amount
Public-Private Partnership			
Five Star Urban Restoration	National Fish & Wildlife Foundation (NFWF)	Habitat restoration	$20,000-50,000
Sustain Our Great Lakes		Habitat restoration, construction of Stormwater BMPs	$100,000-1,000,000
Chi-Cal Rivers		Green infrastructure, habitat restoration, public access	$100,000-300,000

Grant Program	Healthy Watersheds Consortium	Green infrastructure, watershed restoration	$50,000-250,000
Research grants	Illinois Indiana Sea Grant	Planning, research	Up to $180,000
Bicentennial Nature Trust	IDNR & Lilly Foundation	Conservation and land acquisition	$100,000
Direct Federal			
Great Lakes Restoration Initiative (GLRI)	EPA-USFS-USDA-NPS-DOT-NOAA-USGS-USACE-NRCS	Habitat restoration, remediation, invasive species removal, non-point source pollution reduction	Up to $30 million Median award: $192,258
Great Lakes Fish & Wildlife Restoration Program	FWS	Habitat restoration	Up to $2,000,000
Community-based Restoration Program	NOAA	Habitat restoration	$300,000-1,500,000
Hazard Mitigation Grant Program	FEMA	Land acquisition, Stormwater BMPs	Mean award: $150,000
Urban Waters Small Grants	EPA	Planning, education, outreach	Up to $60,000
Urban & Community Forestry Program	USFS	Planning and technical assistance	$150,000-350,000
WIFIA	EPA	Stormwater BMPs	Project-specific, min award is $20 million, plus interest
TIGER	USDOT	Road or trail project with green infrastructure	$3,000,000-105,000,000
Federal through Indiana Agencies			
Nonpoint Source Grants (Section 319)	EPA & ACE via IDEM	Construction of Stormwater BMPs	Mean award: $44,000
Lake Michigan Coastal Program	NOAA via IDNR	Planning, land acquisition, habitat restoration, green infrastructure	Acquisition: $150,000 Construction: $100,000
Surface Transportation Program	FHWA via INDOT & NIRPC	Road or trail project with green infrastructure	Project-specific, awards typically range from $50,000-5,000,000
Congestion Mitigation & Air Quality			
Transportation Alternatives		Green infrastructure on trails	
Indiana			
Lake and River Enhancement (LARE)	IDNR	Habitat restoration, construction of Stormwater BMPs	Up to $100,000
Green Project Reserve Sustainability Incentive	IDEM & IFA – State Revolving Loan Fund	Construction of Stormwater BMPs, Green Infrastructure	Project-specific, awards can exceed $100,000, with quarterly-adjusted interest rate
Philanthropic			
Chicago Area Land Conservation Grants	Gaylord & Dorothy Donnelly Foundation	Planning, operations, engagement	$10,000-130,000
Local			

Local Matching Sources	Department	Eligible GI Activities
Section 319 Apportionment	Sanitary District	Sewer and stormwater management improvements
Stormwater Fee	Stormwater Management District	
Tax Increment Financing	Redevelopment	Infrastructure for development projects, blight elimination
Community Development Block Grants	Community Development	

Figure 37: Green Infrastructure Funding Table

To augment federal, state, and local resources, private financing tools and innovative market structures have begun to emerge in a number of cities, including:

Environmental Impact Bonds (EIB)

Environmental Impact Bonds are a financial instrument that can be used to finance a P3 or a conventional municipal bond. EIB functions as a debt security issued to finance capital expenditures. Similar to other bonds, it is backed by the payer with regular payments of interest and full repayment of principal at the end of the term, with the interest rate paid by investors tied to a specific performance measure. In 2017, Washington, DC became the first municipality to issue an Environmental Impact Bond, to fund green stormwater infrastructure improvements throughout the district. The bond operated under a three-tier structure, with the installations that yielded the greatest reductions in runoff producing the highest yield. Environmental Impact Bonds usually involve a 3rd party advisor coordinating deals between an investor and a public partner.[47]

Stormwater Credit Trading

Like carbon offset trading and wetland banking, stormwater credit trading programs enable property owners who are subject to an on-site stormwater retention requirements to meet a portion of their requirements by buying stormwater "credits" from other property owners, rather than building the required green or gray infrastructure on their own property. Zoning and permitting regulations that set requirements for stormwater management and green infrastructure play a significant role in creating the need for this credit trading market. For heavily-urbanized areas, credit trading provides opportunities for overcoming the spatial limitations in areas of dense development, and the capital limitations of funding and financing infrastructure in less centrally-located areas of a city, while serving to reduce stormwater runoff and increasing pervious surfaces on the watershed scale. Paired with their environmental impact bond, Washington, DC has overseen the first stormwater credit trading market, which has included 83 projects and 43 trades since 2014. These have largely focused on shifting the on-site stormwater management requirements for downtown properties in the combined sewer area to finance and construct green infrastructure in the lower density, lower-income portion of the city that is served by an MS4 system, which serves to have a positive impact of water quality and reinvestment.[48]

CONCLUSION

Miller Woods

XI. CONCLUSION

Gary, Indiana is a city in transition, and as the city moves deeper into the 21st century, its land use and development patterns will continue to evolve and reveal itself. Gary will constantly be re-shaped by technological innovation, global commerce, regional economic development trends, interstate fiscal dynamics, demographic and cultural changes, and of course, climate change. In turn, the findings and recommendations of this Plan should serve as a flexible guide for how to incorporate environmental improvements into the city's ongoing land use planning and redevelopment projects, as a means of improving environmental health, quality of life, balancing land uses, and satisfying regulatory requirements.

Beyond this planning effort however, persisting questions remain that will shape and change what types of policies and projects get prioritized. Future documents like GSD's Long Term Control Plan, GSWMD's Stormwater Master Plan, and the City's Comprehensive Plan and Parks Master Plan will heavily dictate where and how green infrastructure is deployed to manage stormwater runoff and how it balances with economic development efforts, etc. While the policies of these future documents will heavily dictate where green infrastructure can and should go, this planning effort will naturally inform those plans as well: by illustrating clear project concepts, by providing a methodology for identifying what types of green infrastructure are most suitable throughout different areas of the city, and by clearly articulating what benefits these strategies can reasonably deliver.

Ernie Pyle School site in Tolleston neighborhood

Additionally, while projects and priorities may continue to change as time passes, the city's hydrological conditions, hardscapes, and soil conditions are not likely not change dramatically, which gives a lasting relevance to much of this Plan's research, stakeholder input, and recommendations.,

As Gary moves deeper into the 21st century, what is certain to change however is the increased urgency to protect freshwater resources, to redevelop well-located urban land, and to reduce the strain on public infrastructure and resources, all of which will be driven by climate change and the shifting economic forces that accompany it. This will only create a greater need for green infrastructure and the benefits it can bring: like reducing flooding on roads and in neighborhoods, decreasing polluted runoff and overflows that end up in the Little Calumet River and Lake Michigan, buffering wetlands that function as critical floodplain and habitat but sit next to redevelopment sites, and providing beautification and open space throughout neighborhoods that are in need of it, helping to make them more livable.

Gary's future remains uncertain, but that future must include green infrastructure, in its various forms, for it to be one that is healthy, vibrant, and equitable.

APPENDICES

Horace Mann Neighborhood

APPENDIX A: GARY GREEN INFRASTRUCTURE OVERLAY ORDINANCE

Code: Placeholder for Review and Changes

CHAPTER XXX GREEN INFRASTRUCTURE OVERLAY

ARTICLE I IN GENERAL

Sec. XXX-I-1. Intent and Purpose

(a) The Green Infrastructure Overlay (Overlay) is a zoning regulatory tool to guide development and redevelopment through special provisions throughout the City and within specific geographic boundaries designated as Impact Areas.

(b) **RECOMMENDED GUIDANCE**: Narrative description of the purpose of the GI Overlay, what it is comprised of and how the residential, commercial and industrial impact areas will be affected. This should tie to the City's need and authority to regulate for the health, safety, and welfare of residents. If possible, articulate the negative impacts of new development (to human health, the environment, and municipal budget) that these regulations mean to avoid. Requiring new development to internalize the costs and/or spill over effects of their development on adjacent properties, residents and the environment is within the City's regulatory authority.

Sec. XXX-I-2. Applicability and exemptions

(a) This chapter shall regulate development and redevelopment occurring within City boundaries and the Stormwater Impact Areas or Conservation Impact Areas comprised of the Green Infrastructure Overlay District. Subsequent regulations shall apply to new development, major redevelopment (renovation excepting the framed structure or foundation), partial-development, driveway or parking lot construction for parcels within the

(1) Industrial Stormwater Impact Areas or Industrial Conservation Impact Areas as seen in the figures Map 1 and Map 2 in section Sec. XXX-2-1.

(2) Commercial Stormwater Impact Areas or Commercial Conservation Impact Areas as seen in the figures Map 1 and Map 2 in section Sec. XXX-2-1.

(3) Residential Stormwater Impact Areas or Residential Conservation Impact Area as seen in the figures Map 1 and Map 2 in section Sec. XXX-2-1.

(4) Planned Unit Development in the Industrial Stormwater or Conservation Impact Areas as seen in the figures Map 1 and Map 2 in section Sec. XXX-2-1.

Sec. XXX-I-3. Background

(a) Refer to the Long Term Control Plan as part of the original impetus of the ordinance, but don't lean too heavily on it as the LTC will eventually be historical.

(b) This may also be a section to detail the negative impacts / costs / externalities / spill over effects of development on public goods (streams, public health, municipal budgets). Will want to focus more on how developers integrating green infrastructure strategies into their design and engineering mitigates the impact of the overall development, internalizing the externalities. Focus less on the public benefits provided by green infrastructure.

Sec. XXX-I-4. Abbreviations and Definitions

(a) Activity – Any land disturbance, including any development for which an application for development is necessary.

(b) Best management practice (BMP) – Best management practice, or BMP, means structural or nonstructural measures, practices, techniques or devices employed to reduce peak flows and minimize sediment or pollutants carried in runoff.

(c) Bioretention – A bioretentation area is an excavated area that is back-filled with a prepared or amended soil mixture, covered with a mulch layer and planted with a diversity of woody or herbaceous vegetation to which stormwater is directed to promote infiltration and evapotranspiration. Also, see Rain Garden.

(d) Bioswale – Bioswale means a vegetated, mulched or xeriscaped channel that provides treatment and retention as it moves stormwater from one plate to another.

(e) Buffer – an area within a property or site, generally adjacent to a property line or landscape feature that is to be buffered, either consisting of natural existing vegetation or created by the use of trees, shrubs, grasses, and herbaceous undergrowth designed to physically separate potential adverse impacts from neighboring land uses.

(f) Cistern – a roof runoff collection system that detains water in above-ground or under-ground storage tanks with a capacity of at least 100 gallons.

(g) Constructed wetlands – Wetlands constructed as pollution reduction or flow control facilities.

(h) Critical habitat – often globally rare or unique ecosystems identified as important to the City of Gary, its residents, and to the functioning of the greater regional ecosystems.

(i) Disconnected downspouts – Downspout disconnection means the rerouting of rooftop drainage pipes that are connected to storm sewers or that drain to impervious areas in order to drain rainwater to rain barrels, cisterns or permeable areas.

(j) Green infrastructure – Green infrastructure refers to those methods of stormwater treatment and control that use the natural capacities of soil and vegetation to prevent or reduce stormwater runoff and associated nonpoint source pollution. Green infrastructure methods often are combined with conventional or structural stormwater treatment systems, such as separators, ponds or underground systems, to create stormwater "treatment trains" that enhance stormwater treatment and water quality.

(k) Impervious surface – Any pavement or structural element with a runoff coefficient of 90 or greater that prevents rain, surface water runoff or melting snow from infiltrating into the ground, including, but not limited to roofs and paved roads, driveways and parking lots.

(l) Infiltration – The percolation of water into the ground.

(m) Major redevelopment – Any development that requires demolition or complete removal of existing structures or impervious surfaces at a site and replacement with new impervious surfaces.

(n) New development – installation of a structure on a previously unimproved parcel.

(o) Parking lot - The area of a site devoted to the temporary or permanent storage, maneuvering, or circulation of motor vehicles. Parking areas do not include driveways or areas devoted exclusively to non-passenger loading.

(p) Parking lot island – A section of a parking area that is not designated for use of motor vehicles which often contains landscaping contained by a raised curb.

(q) Partial-development – Any development that includes the partial demolition or removal of existing structures or impervious surfaces at a site and a replacement with new impervious surfaces.

(r) Pervious surface – A material or materials and accompanying subsurface treatments designed and installed specifically to allow stormwater to penetrate into it, reducing the volume of stormwater runoff from the surfaced area. Permeable surfacing may include paver blocks, grassy pavers or similar structural support materials and permeable concrete or asphalt.

(s) Planned unit development (PUD)

(t) Planter box – Planter box means a structure with vertical walls and an open or closed bottom that may be attached to a building or structure and is planted with a soil medium and vegetation intended to collect, absorb and treat runoff from impervious surfaces.

(u) Rain barrel – Rain barrels are structures for the collection of roof runoff in containers, typically ranging from 50 to 100 gallons, with subsequent release to landscaped areas.

(v) Rain garden – A bioretention area that is often visually attractive in addition to providing infiltration functions.

(w) Riparian – pertaining to the adjacency of rivers, streams, or wetlands.

(x) Runoff coefficient –the percentage of water that will run off of a surface and not be absorbed by the surface.

(y) Screening – often a tree, shrub, or fence that visually obstructs line-of-sight between two locations.

(z) Small scale development – Pertains to area of lot and structures.

(aa) Stormwater tree – Stormwater trees are trees selected and installed (either with or without an engineered box or structure) as integral components of a stormwater management plan, at points or sites where the tree(s) will have the effect of increasing the coverage of tree canopies to provide stormwater interception and evapotranspiration, stormwater uptake and increased infiltration.

(bb) Wetland – An area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include swamps, marshes, bogs, and similar areas, except those constructed as pollution reduction or flow control facilities.

Sec. XXX-I-5. Responsibility for administration

(a) **RECOMMENDED GUIDANCE**: Gary Storm Water Management District (GSWMD) is charged with oversight of all stormwater facilities including green infrastructure strategies listed in this Ordinance. GSWMD will review and approve all preliminary calculations on proposed green infrastructure prior to Site Plan Review. For more information please see Sec. XXX-III-2.

ARTICLE II Impact Areas

Sec. XXX-II-1. Purpose

(a) Impact Areas described in this chapter comprise of parcels that have undue impact on water resources, public health, municipal infrastructure investments, or conserved land. Building permit applicants must review whether their parcel is within an impact area and whether the type of anticipated development activity is covered by these regulations. See Sec. XXX-III-2-a-a-b-1-a for determining regulation applicability.

(b) **City-Wide Policy - All Runoff Treated On-Site**– **RECOMMENDED LANGUAGE**: Development, redevelopment, or partial development of parcels that are not within either Stormwater Impact Areas or Conservation Impact Areas will be regulated through this ordinance to reduce negative impacts caused by runoff from impervious surfaces like localized flooding and combined sewer outfall events. The entire City of Gary has adopted a city-wide policy, requiring that for all applicable private and public parcels all runoff from impervious surfaces be treated on-site through green infrastructure practices.

(c) **Stormwater Impact Areas** – **RECOMMENDED LANGUAGE**: Development, redevelopment, or partial development of parcels within Stormwater Impact Areas will be regulated through this ordinance to reduce negative impacts caused by stormwater like localized flooding and combined sewer outfall events. Stormwater Impact Areas have been identified through data analysis and stakeholder input incorporated in GSWMD's Long Term Control Plan, Gary Green Infrastructure Plan, and Gary Comprehensive Plan. See the Findings section within Article I for more information.

(d) **Conservation Impact Areas** – **RECOMMENDED LANGUAGE**: Development or redevelopment of parcels within Conservation Impact Areas will be regulated through this ordinance to reduce negative impacts on nearby conservation parcels and critical habitat areas. Negative impacts can include non-point source runoff pollution that can degrade neighboring habitat. Runoff flows can create erosion and spread invasive species to threaten and degrade critical habitat areas. Air pollution from neighboring land uses can threaten both plants and wildlife.

Include Map 1: Stormwater Impact Areas

Include Map 2: Conservation Impact Areas

Sec. XXX-II-2. Zoning Districts and Scales of Applications

(a) See Figure 1 for more information on when the regulations in this chapter apply to specific development activities by type and scale for various land uses.

		Residential		Commercial	Industrial	
		Small Scale	Large Scale	All Commercial	Light Industrial	Heavy Industrial
Area Designation		New buildings <500 sqft, Lots < 10,000 sqft	Lots > 10,000 sqft	Any square footage	Any square footage	Any square footage
Current Code Equivalent		R-1 Single Family through R-4 Two Family	R-5 through R-7 Multiple Family	B-1 Limited Retail through B-5 Wholesale	M-1 Limited Manufacturing, M-2 General Manufacturing	M-3 Heavy Industrial
Partial Development	Expansion of Existing Structure	N/A	**APPLIES WHEN** <500 sqft	**APPLIES WHEN** <750 sqft	**APPLIES WHEN** <750 sqft	**APPLIES WHEN** <1,500 sqft
Partial Development	New Installations	N/A	**APPLIES WHEN** At least 250 sqft of new impervious surface	**APPLIES WHEN** At least 250 sqft of new impervious surface	**APPLIES WHEN** At least 250 sqft of new impervious surface	**APPLIES WHEN** At least 500 sqft of new impervious surface
Full Development	Expansion of Existing Structure	N/A	**APPLIES WHEN** > 500 sqft	**APPLIES WHEN** > 750 sqft	**APPLIES WHEN** > 750 sqft	**APPLIES WHEN** > 1,500 sqft
Full Development	New Installations	N/A	**APPLIES WHEN** New or major redevelopment of structures with footprints exceeding 750 sqft	**APPLIES WHEN** New or major redevelopment of structures with footprints exceeding 750 sqft	**APPLIES WHEN** New or major redevelopment of structures with footprints exceeding 750 sqft	**APPLIES WHEN** New or major redevelopment of structures with footprints exceeding 1,500 sqft

Figure 1: Green Infrastructure Zoning Table

(b) *Planned Unit Developments (PUDs)* designation located in the Impact Overlays will apply to parcels or groupings of parcels to be developed through the PUD regulatory process.

(1) Single Land Use: PUDs composed of a single zoning use (i.e. residential or commercial) within an Impact Area will apply the Overlay regulations of its zoning use. For example, a PUD to develop a 20,000 square feet lot for retail will be subject to the same regulations described for Commercial parcels of its relevant impact area.

(a) Residential PUDs with a total lot area of 10,000 square feet or less shall be regulated as Large-Scale Residential designation.

(b) Residential PUDs with a total lot area exceeding 10,000 square feet shall be subject to the regulations described for Commercial parcels for its relevant impact area. Residential developments of this size are more similar in structures, parking lot and driveway surfacing, community space and other characteristics than to single- or multi-family buildings zoned in R-1 through R-7 in current zoning code.

(2) Mixed Land Use: PUDs composed of mixed zoning uses (i.e. residential and commercial) within an Impact Area will be subject to ~~interpret~~ the Overlay regulations relevant to each zoning use (i.e. residential, industrial, or commercial). PUD developers should interpret the GI Overlay to apply to the entire parcel. Structures within a PUD that have multiple uses (i.e. street level space is intended for retail whereas upper floors are intended for residential) will have relevant Impact Area regulations apply as described in each zoning designation as a percentage of total square feet of structure basis. For example, if a 1,000 square feet of a 5,000 square feet building is designated for commercial use and the remaining 4,000 square feet is designated for residential use then 20% of the building and runoff from its impervious surface will be subject to the corresponding GI Overlay regulations for Commercial land use and 80% of the building and runoff from its impervious surface will be subject to regulations for Large-Scale Residential land use.

(a) PUDs containing mixed land uses and structures have the flexibility of meeting on-site management of runoff requirements (see Sec. XXX-IV-3) for the entire lot in aggregate.

Sec. XXX-II-3. Process for Selection of Impact Areas

(a) Stormwater Impact Areas

(1) Step 1: Identify parcels scoring in top 5% (or maybe 10% depending how it shapes out) of "Highest Impact Land" according to the GSTADS tool.

(2) Step 2: identify areas with contiguous/ high density in top 5% scored parcels.

(3) Step 3: Buffer top scored parcels – GSTADTS SIA Parcels

(4) Step 4: Identify parcels located within CSO problematic sewersheds identified in Gary's Long Term Control Plan – Labeled LTC Parcels

(5) Step 5: Identify Green Industrial Areas – future industrial corridors previously zoned and developed as other landuses – Labeled GIA Parcels
(6) Step 6: Combine GSTADS SIA Parcels, LTC parcels, and GIA Parcels for Stormwater Impact Areas
(7) Step 7: Share and iterate.

(b) Conservation Impact Areas
(1) Step 1: Buffer nature preserves, national parks/lakeshore, and existing conservation areas identify nearby parcels – labeled Conserved Parcels
(2) Step 2: Buffer rivers – labeled River Parcels
(3) Step 3: Combine Conserved and River Parcels
(4) Step 4: Remove redundant parcels also identified in Stormwater Impact Areas
(5) Step 5: Share and iterate

ARTICLE III ADMINISTRATION AND ENFORCEMENT

Sec. XXX-III-1. Generally [Pull heavily from Stormwater Management chapter]
(a) [Language from Chapter 119 Stormwater Management]
(b) Compliance with this chapter
(c) Penalties for violations

Sec. XXX-III-2. Permit & Approvals
(a) On-site stormwater management permit
(1) Review Process **RECOMMENDED LANGUAGE**: Installations of any Green Infrastructure practice, including for the purpose of satisfying regulations on Maximum Impervious Surface Area or On-Site Management of Runoff described in Article 5, must submit engineering designs and calculations (Stormwater Calculations) and a maintenance plan to GSWMD for review and approval prior to Site Plan Review.
(1) Approval of green infrastructure is provided by GSWMD and Gary Planning Department.
(b) Prior to Site Plan Review
(1) Determine your Parcel's Green Infrastructure Requirements
(a) Step 1: Applicant must submit a Stormwater Pre-Review Check (SPRC) at www.XXXXXXX.gov prior to Site Plan Review. See "Flowchart for Developers" in Appendix ##. The following information is required for the SPRC:
a. Auto-Prompt:
i. Are you renovating or constructing a residential one to three (1-3) unit building?

ii. Dropdown Choices:
iii. Yes
iv. No

b. Parcel(s) addresss(es)
c. Parcel(s) square footage
d. Current Conditions
    i. Dropdown Choices:
    ii. Structures
    iii. No Structures
e. Anticipated development activities
    i. Dropdown Choices:
    ii. New structure(s) development
    iii. Redevelopment of existing structure(s)
    iv. (Re)constructing impervious surfaces
    v. Expanding footprint of existing impervious surfaces
    vi. Second Dropdown Choices regardless of options ii-v selected:
    vii. Square footage of new structure
    viii. Square footage of existing structure
    ix. Square footage of new net impervious structure
f. Structure(s) footprint square footage
g. Anticipated land use
    i. Dropdown Choices:
    ii. Residential
    iii. Commercial
    iv. Light Industrial
    v. Heavy Industrial
    vi. Mixed-Use: Residential and Commercial
    vii. Mixed-Use: Commercial and Industrial

(b) Step 2: Receive a Stormwater Guidance report. GSWMD has 7 days to send a Stormwater Guidance report, which will include

a. Whether parcel(s) are within a GI Overlay Impact Area
b. Area of impervious surface area which runoff must be managed on-site
c. On-Site Runoff Management requirements
d. Preferred Green Infrastructure Strategies

(c) Step 3: Provide Stormwater Management Calculations to GSWMD
   a. If parcel is to utilize any GI strategies, whether for on-site runoff management or otherwise, then stormwater management calculations must be submitted to GSWMD prior to Site Plan Review.
      i. The calculation methods as well as the type, sizing, and placement of all storm water facilities shall meet the design criteria, standards, and specifications outlined in The City of Gary Design Standards Manual.
      ii. If GI is designed to satisfy on-site runoff management or impervious surface regulations of an Impact Area, then calculations should describe how they do so.
      iii. Maintenance Plan must be provided for GSWMD's review and approval. See Sec. XXX-VII-5 for more information on maintenance.

(d) Step 4: Receive Approval from GSWMD to bring development project before Site Plan Review Committee
   a. GSWMD will respond within 14 days with approval or recommendations for revisions.

(e) Step 5: After Site Plan Review Committee approves the project, the developer must submit a Stormwater Polution Prevent Plan to GSWMD for approval. Any changes to stormwater management designs must be approved by GSWMD and Planning staff.
   a. All green infrastructure is considered storm water quality facilities by GSWMD. GSWMD must approve green infrastructure maintenance plans prior to receiving a building permit.
   b. GI Practices must be inspected during construction by GSWMD to adhere to Gary Storm Water Management Ordinance requirements on erosion and sediment control.
   c. GI Practices must be inspected after construction by GSWMD to determine whether it meets approved design specifications prior to receiving a Certification of Occupancy.

(2) Delineate environmentally sensitive areas and buffers

(a) Describe in Sheet Two of Existing Site Conditions for Site Plan Review
   a. In addition to the landscape features already required to be described (Trees on site; Watercourses, bodies of water, wetlands and limits of flood plain), areas identified as Designated Environmentally Sensitive shall be described and boundaries delineated.

b. All vegetated buffers (See Article VI) shall be described and boundaries delineated.

Sec. XXX-III-3. Off-Site Mitigation Option

(a) Developers unable to adhere to regulations in this Ordinance pertaining to maximum impervious surface area, on-site runoff management, or buffers required may have the option of wetland mitigation.

(1) Mitigation Ratio – For every square foot of noncompliant impervious surface shedding un-managed runoff, one square foot of high quality wetlands (as determined by a certified wetlands specialist) must be created or restored within the same outfall catchment area (sewershed) or, if not feasible, same HUC 14 river watershed as the developed parcel. All mitigation must take place inside the City of Gary's municipal boundaries.

(2) Ownership and Management: Wetlands must be created or restored by developer or equivalent costs to acquire and create wetlands must be provided to GSWMD. Wetlands may be donated to the City of Gary, another unit of government appoved by GSWMD, or conservation entity, for ownership and permanent maintenance providing GSWMD, other governmental unit, or conservation entity is willing to accept such responsibility.

(a) Determining Equivalent Costs – A third party appraisal paid by developer will be produced to determine acquisition estimate of available wetlands within same watershed/sewershed as the developed parcel.

ARTICLE IV Stormwater Runoff

Sec. XXX-IV-1. Purpose

(a) Stormwater runoff from parcels flows into the City of Gary's separated and combined stormwater systems. Managing and reducing the flow of runoff from impervious surfaces in parcels is necessary to mitigate the negative impacts like flooding, water impairments, and combined-sewer overflow events that can arise from too much stormwater runoff from parcels flowing into the stormwater systems.

Sec. XXX-IV-2. Applicability, enforcement, and exemptions

(a) This article shall apply to restrictions on the flow of runoff on properties for the entire city and within Stormwater Impact Areas or Conservation Impact Areas.

(b) This article will require adherence to designated maximum percentage of impervious surface area for lots.

Sec. XXX-IV-3. Maximum impervious surface area

(a) Permitting Process

(1) Parcels with required on-site management of runoff must receive an On-site Stormwater Management Permit approval from GSWMD. See Sec. XXX-III-2-a for more information on permitting process.

(2) On-site stormwater management permit approval must be obtained prior to review by Site Plan Committee.

(b) Application

(1) See Figure 1 in Sec. XXX-II-2 for descriptions on which parcels, development activities, and land use type apply to this regulation. Categories where "APPLIES WHEN" accurately describes a project must adhere to the regulation in this section.

(2) Partial Development

(a) For applicable parcels, Partial-Development may not contribute runoff directly into the stormwater system as a result of new net impervious surfaces. Surfaces within the Partial-Development affected area with runoff coefficient equal to or greater than 90% (impervious) must be constructed with on-site green infrastructure to manage its runoff. See Sec. XXX-VII-2 for preferred green infrastructure strategies based on land use type and applicable exemptions for utilizing non-preferred green infrastructure strategies. The on-site stormwater management capacity requirements of the green infrastructure will be described in Sec. XXX-IV-4.

(3) Full-Development

(a) For applicable parcels, Full-Development of the site may not contribute runoff directly into the stormwater system from impervious surfaces. All surfaces with runoff coefficient equal to or greater than 90% (impervious) in the parcel must be constructed with on-site green infrastructure to manage its runoff. See Sec. XXX-VII-2 for preferred green infrastructure strategies based on land use type. The on-site stormwater management capacity requirements of the green infrastructure will be described in Sec. XXX-IV-4.

Sec. XXX-IV-4. On-site management of runoff

(a) Permitting Process

(1) On-site stormwater management review and approval must be obtained prior to review by Site Plan Committee.

(2) Parcels with required on-site management of runoff must receive a pre-stormwater permit approval by GSWMD. See Sec. XXX-III-2 for more information on permitting process.

(b) City-Wide No-Runoff Standard

(1) This regulation applies to all parcels within the City except for those identified within Stormwater Impact Areas.

(a) Partial-Development

(1) Runoff from the footprint of the partial-development activity (i.e. new parking lot, structural addition, etc.) must be managed with on-site green infrastructure. The on-site runoff management green infrastructure must manage the first inch (1") of rainfall within a 24-hour period. A system to direct overflow into the City's stormwater infrastructure must be installed on all on-site green infrastructure designed to meet the City-Wide No-Runoff Standard. See Sec. XXX-VII-2 for preferred green infrastructure strategies based on land use type.

(b) Full-Development

(1) On-site green infrastructure must manage all runoff from the lot. The on-site runoff management green infrastructure must manage the first inch (1") of rainfall within a 24-hour period. A system to direct overflow into the City's stormwater infrastructure must be installed on all on-site green infrastructure designed to meet the City-Wide No-Runoff Standard. See Sec. XXX-VII-2 for preferred green infrastructure strategies based on land use type.

(2) Exemptions

(a) Parcels with or adjacent to an existing stormwater detention basin may utilize it to manage the first inch (1") of rainfall within a 24 hour period.

(b) Areas within a parcel with a stormwater runoff coefficient of below 90% (including wetlands, ponds, and other areas with standing water) shall be considered exempted from contributing to runoff and should not contribute to the overall capacity requirements of on-site green infrastructure.

(c) Stormwater Impact Areas

(1) This regulation applies to all parcels identified within Stormwater Impact Areas.

(a) Partial-Development

(1) Runoff from the footprint of the partial-development activity (i.e. new parking lot, structural addition, etc.) must be managed with on-site green infrastructure. The on-site runoff management green infrastructure must manage the first inch and a half (1.5") of rainfall within a 24-hour period. A system to direct overflow into the City's stormwater infrastructure must be installed on all on-site green infrastructure designed to meet the City-Wide No-Runoff Standard. See Article VI for preferred green infrastructure strategies based on land use type.

(b) Full-Development

(1) On-site green infrastructure must manage all runoff from the lot. The on-site runoff management green infrastructure must manage the first inch and a half (1.5") of rainfall within a 24-hour period. A system to direct overflow into the City's stormwater infrastructure must be installed on all on-site green infrastructure designed to meet the City-Wide No-Runoff Standard. See Article VI for preferred green infrastructure strategies based on land use type.

(2) Exemptions

(a) Parcels with or adjacent to an existing stormwater detention basin may utilize it to manage the first inch and a half (1.5") of rainfall within a 24 hour period.

(b) Areas within a parcel with a stormwater runoff coefficient of below 90% (including wetlands, ponds, and other areas with standing water) shall be considered exempted from contributing to runoff and should not contribute to the overall capacity requirements of on-site green infrastructure.

ARTICLE V Designated Environmentally Sensitive Areas

Sec. XXX-V-1. Purpose

(a) Environmentally Sensitive Areas are important to the City of Gary and to the quality of life of its residents. Gary is home to one of the most ecologically diverse landscapes in the United States. This is evidenced by the Federal, State, and land trust properties conserving high quality ecosystems in and around the City of Gary.

(b) This regulation is designed to identify critical habitat like currently conserved land, wetland and riparian areas, and high quality ecosystems as Designated Environmentally Sensitive Areas.

(c) This regulation restricts specific uses and development activities from occurring on Designated Environmentally Sensitive Areas which would negatively impact them.

(d) Conservation Buffers are applied between development activities and Designated Environmentally Sensitive Areas.

Sec. XXX-V-2. Applicability, enforcement, and exemptions

(a) Applicability

(1) This article shall apply to restrictions on the uses and alterations of areas considered Environmentally Sensitive Areas.

Sec. XXX-V-3. Uses

(a) The following land uses are prohibited for Designated Environmentally Sensitive Areas:

(1) Construction. There shall be no structures of any kind.

(2) Dredging or Dumping. There shall be no drilling, filling, dredging, or dumping of soil, spoils, liquid, or solid materials, except for non-commercial composting of uncontaminated natural materials, and except as permitted under this chapter.

(3) Roads or Driveways. There shall be no roads or driveways permitted in riparian and/or wetland setback area, except as permitted under this chapter.

(4) Motorized Vehicles. There shall be no use of motorized vehicles, except as permitted under this chapter.

(5) Disturbance of Natural Vegetation. There shall be no disturbance, including mowing, of the natural vegetation, except for conservation maintenance necessary to control noxious weeds or invasive species; for plantings that are consistent with this regulation; for disturbances that are approved under this chapter; and for the passive enjoyment, access, and maintenance of landscaping or lawns existing at the time of passage of this regulation as provided in the chapter.

(6) Parking Lots. There shall be no parking lots or other human-made impervious cover, except as permitted under this chapter.

(7) New Surface and/or Subsurface Sewage Disposal or Treatment Areas. Riparian and wetland setbacks shall not be used for the disposal or treatment of sewage except under local county Board of Health regulations in effect at the time of application of this regulation.

(8) Crossings. Crossings of designated riparian and wetland setbacks by publicly and privately owned sewer and/or water lines and small public and small private utility transmission lines in accordance with a permit or regulatory exemption issued by, or under the regulations of, the US Army Corps of Engineers and the IDEM.

(9) Other permits and approvals. Nothing in this chapter shall be construed as exempting any person from obtaining other permits by other agencies that may be required, including permits from the US Army Corps of Engineers and/or the IDEM under the federal and state Clean Water Acts.

(b) The following development activities are prohibited for Designated Environmentally Sensitive Areas:

(1) Logging, clear cutting, sand harvesting, or use for staging or construction footprint.

(c) The following activities are approved for Designated Environmentally Sensitive Areas:

(1) Passive recreational use activity, as otherwise legally permitted by federal, state, and local laws, such as hiking, swimming, fishing, hunting, picnicking, and similar uses.

Sec. XXX-V-4. Identifying Designated Environmentally Sensitive Areas

(a) Applicable Areas

(1) Water-based landscapes with existing protections

(a) Watercourses, tributaries, bodies of water, and wetlands are all protected by Federal and State regulations and are considered Designated Environmentally Sensitive Areas

(2) Other critical landscapes and ecosystems

(a) The City of Gary possesses a diverse ecological landscape with a number of environmentally sensitive areas that are not defined by the presence of water. Landscapes like the dunes, oak savanna, and prairies, and the threatened and endangered species that can be home to them like Karner blue butterfly or Mead's Milkweed are critical to the City of Gary. These landscapes within the Conservation Impact Area are to be considered Designated Environmentally Sensitive Areas.

(1) There is a two-step process for identification of these landscapes within the Conservation Impact Area.

(a) Step 1: All vegetated areas without the presence of standing or running water (i.e. wetlands, ponds, water courses) must be evaluated with a First Pass Ecological Assessment (FPEA). Vegetated areas with a FPEA score below ## shall not be considered Designated Environmentally Sensitive Areas. Vegetated areas with FPEA scores at or above ## require a Floristic Quality Assessment to be performed. See Appendix ## for

more information on acceptable First Pass Environmentally Sensitive Areas and Floristic Quality Assessment protocols.

(b) Step 2: A Floristic Quality Assessment shall be performed by a trained professional (see Appendix ## for examples) for all areas with a FPEA score at or above ## and a copy of the original FQI report is to be provided to the Site Plan Review Committee upon project presentation. Areas with an FQI score above ## are to be considered as a Designated Environmentally Sensitive Area.

ARTICLE VI Vegetated Buffers

Sec. XXX-VI-1. Purpose

(a) Buffers are to be implemented to protect critical habitat like currently conserved land, wetland, and riparian areas, and Designated Sensitive Areas.

Sec. XXX-VI-2. Applicability, enforcement, and exemptions

(a) This article shall apply to restrictions on the uses, vegetation, and dimensions of buffers.

(b) Review and Enforcement

(1) Site Plan Review

(a) Sheet Three - Proposed Site and Landscape Plan. Buffers must be described and boundaries delineated including:

(1) Existing vegetation within the buffer areas

(2) For buffer areas with impervious surfaces (i.e. asphalt, roof) or turf grass, a revegetation plan must be described.

(3) Proposed uses to occur within buffers must be described.

Sec. XXX-VI-3. Permitting

(a) During Site Plan Review, Gary Storm Water Management District (GSWMD) and Planning Department must review and approve of the buffer delineations, revegetation plan if required, and planned construction activities and future uses.

(b) Proposals brought before Site Plan Review with inadequate buffer delineations or revegetation plans must be resubmitted.

Sec. XXX-VI-4. Boundaries

(a) Application

(1) Overlapping Buffer Types

(a) Overlapping buffer types are not added to each other (i.e. a residential parcel adjacent to a conserved wetland parcel would have a 35ft wetland buffer and a 10ft conservation buffer along the same adjacent side for a total buffer width of 35ft) but rather the total width is determined by the wider buffer. However, whichever buffer type is stricter will determine the allowable uses within overlapping buffer types.

(2) Compounding Allowed Wetland Buffer Reductions

(a) Revegetation and wetland restoration buffer reductions in wetland buffer width may be compounded. For instance, if a developer restores a few acres of wetlands and revegetates the wetland buffer area with forest and understory native plants then the wetland buffer may be reduced from thirty-five (35) feet by ten (10) feet due to reforestation and then an additional fifteen (15) feet due to wetland restoration to a new total wetland buffer width of ten (10) feet.

(b) See Figure 2 for a description of dedicated buffer widths depending on the parcel's land use and the area to be buffered.

	Vegetated Buffer Widths			
	Heavy Industrial	Light Industrial	Commercial	Residential
Riverine Buffer From river, stream, tributary, or Lake Michigan edge. Extends either from within same or adjacent parcel.	100 ft	50 ft	50 ft	25 ft
Wetland Buffer From wetland, pond, or lagoon edge. Extends either from within same or adjacent parcel.	35 ft			
Conservation Buffer When adjacent parcel is conserved (no street between). Also applies from edge of high quality ecosystem present within to-be-developed parcel.	50 ft	25 ft	25 ft	10 ft

Figure 2: Vegetated Buffer Widths

(c) Buffer Types

(1) Riverine Buffer: These buffers extend from the edge of watercourses areas (i.e. river, tributary, or Lake Michigan) and are applied within the entire City of Gary.

(2) Wetland Buffer: These buffers extend from the edge of wetlands areas (i.e. wetlands, ponds, pools) identified through national wetland inventory and/or site assessment and are applied within the entire City of Gary.

(3) Conservation Zone Buffer: These buffers extend from the edge of an adjacent parcel placed in conservation or from the edge of Designated Environmentally Sensitive areas within the to-be-developed parcel. These buffers are only applied to parcels within the Conservation Impact Area.

(d) Wetland Buffer Reductions

(1) The Wetland Buffer can be reduced in width depending upon practices both within the buffer and the wetland it is buffering. See Figure 3: Wetland Vegetated Buffer Widths for more information.

(2) Revegetation of the buffer will only count toward a reduced buffer width requirement if the buffer area is currently a) impervious surface, b) clean fill, c) of sufficient degraded quality by invasive species (i.e. phragmites), d) turf grass, or e) similar in spirit to a-d.

(3) Buffer reductions can be combined for an even narrower buffer. For instance, a reforested buffer adjacent to a restored wetland area might be applicable to be only 10 ft. wide – reduced by 10 ft. for reforestation and reduced up to an additional 15 ft. for wetland restoration. However, revegetation practices cannot be combined for additional width reductions – a buffer revegetated with an understory and native trees will have the Native Reforestation reduction application of 25 ft. wide.

(4) Wetland Restoration Exemption: A conservation easement must be established for restored wetlands and held by a City of Gary, Lake County, or land trust entity. A management plan must be created by and agreed to by the conservation holding entity and land owner. Conservation easement holding entity will be obligated to enforce management of the wetlands to ensure continuity of restoration quality.

	Buffer	Wetland Vegetated Buffer Widths			
		Heavy Industrial	Light Industrial	Commercial	Residential
	Wetland Buffer From wetland edge. Both within same or adjacent parcel.	35 ft			
Allowed Buffer Reductions	**Revegetation: Native Prairie/Understory** Where impervious surface within the buffer is revegetated utilizing native prairie or understory herbaceous species, the required wetland buffer width can be reduced by five (5) feet to thirty (30) feet. *Developer must sign a maintenance agreement to maintain the native revegetated buffer for at least five years.	30 ft (5 ft width reduction)			
	Revegetation: Native Reforestation Where impervious surface within the buffer is revegetated utilizing native species reforestation (i.e. appropriate native tree and understory herbaceous species), the required wetland buffer width can be reduced by ten (10) feet to twenty-five (25) feet. *Developer must sign a maintenance agreement to maintain the native revegetated buffer for at least five years.	25 ft (10 ft width reduction)			
	Wetland Restoration The buffer can be reduced in area by the equivalent acreage of wetlands restored or enhanced by the developer up to a maximum reduction of fifteen (15) feet to twenty (20) feet width. *The reduction is applied uniformly, meaning that all wetland buffer must be the same width. Applies only to the wetlands protected by the buffer. Developer must sign a maintenance agreement to maintain the wetland for at least five years.	35 ft - 20 ft (Potential of up to 15 ft width reduction)			

Figure 3: Allowed Wetland Buffer Reductions

(e) Exemptions

(1) Conservation Buffers are not to be applied when roads are located between a to-be-developed parcel and a conservation parcel.

Sec. XXX-VI-5. Uses

(a) The following uses are prohibited within Vegetated Buffers

(1) Same activities as described in Sec. XXX-V-3-a.

(b) The following uses are allowed in Riverine Buffers

(1) Passive recreational use activity, as otherwise legally permitted by federal, state, and local laws, such as hiking, swimming, fishing, hunting, picnicking, and similar uses.

(c) The following uses are allowed within Conservation Buffers

(1) All of the allowable uses for Riverine Buffers.

(2) Construction site footprint may extend into pre-revegetated buffer, but affected soil must be restored and revegetated with native plants post-construction. See Appendix ## for soil restoration practices and guidelines.

(3) Installation of green infrastructure strategies utilizing vegetation - specifically rain gardens, stormwater trees, bioswales, or wetlands.

(4) Passive recreation trails composed of permeable surfaces (i.e. wood chips or permeable asphalt).

Sec. XXX-VI-6. Required Vegetation or Revegetation

(a) Excluding impervious surfaces or mowed turf grass, existing vegetation within the buffer should be left untouched unless otherwise restored.

(b) Revegetation of impervious surfaces or mowed turf grasses should create a linear vegetative screening at least three feet (3') in height composed of non-invasive species with preference to native species.

(c) Landscaping Plant Choices

(1) Native Plants: For all references of native plants, please review the native species list found here www.#######.com to identify native species appropriate for the landscape.

(2) Invasive Plants: For all references of invasive plants, please review the invasive species list found here https://www.in.gov/dnr/naturepreserve/6346.htm.

(3) Monoculture Avoidance

(a) Green Infrastructure or buffers utilizing plants should take care to not install monocultures. At least ## different plant species should be included in any green infrastructure practice, screening, or buffer utilizing native plants.

ARTICLE VII Green Infrastructure Strategies

Sec. XXX-VII-1. Purpose

(a) Green Infrastructure (GI) mimics natural water management. GI provides benefits to the City of Gary and residents through on-site management of stormwater, reduction in flow contributions to the combined and separated stormwater infrastructure system, improved habitat for critical plants and wildlife, and improved quality of life.

Sec. XXX-VII-2. Applicability, enforcement, and exemptions

(a) All parcels within the City of Gary that are not within a Stormwater or Conservation Impact area are allowed to implement green infrastructure practices outlined in this Article. Any green infrastructure practices to be implemented are subject to the same review and approval process outlined in Sec. XXX-III-2-a-1-c.

(b) Permitting

(1) The calculation methods as well as the type, sizing, and placement of all storm water facilities shall meet the design criteria, standards, and specifications outlined in The City of Gary Design Standards Manual.

(2) If GI is designed to satisfy on-site runoff management or impervious surface regulations of an Impact Area, then GI designs, calculations, and description should be submitted to GSWMD for review and approval.
(3) GSD must provide written approval before the project can be brought before Site Plan Review.
(4) Green infrastructure designs, calculations, and maintenance plans must be approved by GSWMD via Stormwater Pollution Prevention Plan (SWPPP) prior to receiving building permits.

(c) Green Infrastructure (GI) Preferences
(1) The City of Gary has designated specific GI strategies as preferred for specific land uses and impact areas to maximize the benefits the GI provides to the City's stormwater management and residents' quality of life. GI to address on-site stormwater management must utilize preferred GI for the to-be-developed parcel.
(2) Exemptions
(a) Use of non-preferred GI strategies to manage stormwater on-site must be approved by GSWMD and Planning Department. A written explanation as to why any of the below exemptions are applicable must accompany stormwater calculations when sent to GSWMD Stormwater Engineer and Planning Department prior to Site Plan Review.
(b) Exemptions
(1) Preferred GI strategies for the parcel and development activity would be unable to meet on-site stormwater management capacity requirements.
(2) Preferred placement of GI strategies would have negative impacts on water quality due to proximity to conditions such as brownfields, landfills, or erected spill containers.
(3) Preferred placement of GI strategies would have negative impacts on Designated Environmentally Sensitive Areas due to close proximity or within an area with high water table susceptible to ponding.
(4) Preferred GI strategies for the parcel would be cost-prohibitive in excess of 125% that of another GI Strategy listed in Article 7. Stormwater calculations and cost estimate bids to satisfy this exemptions must be provided to GSWMD and Planning Department for review.

Sec. XXX-VII-3. Green Infrastructure Practices

(a) Bioswales
(1) Ideal for infiltration, sedimentation, and filtering out pollutants through slowing down stormwater on its way to stormwater pipes.
(2) Maintenance Plan Specifications & Considerations
(a) Required Tasks

(1) Check for any water that does not properly drain after heavy storm events.
(2) Check for trash and debris collected around the bioswale as needed, spring, and fall.
(3) Check for and remove any materials that may cause clogging after heavy storm events.
(4) Check for bare areas, exposed roots, and cracks in soil in spring and fall.
(5) Remove and replace any dead and diseased plants in spring and fall.

(b) Suggested Tasks
(1) Prune or trim vegetation in spring and fall.

(c) Initial Responsible Parties: Developer is responsible for the first 3 years of maintenance. Developer must contract with a landscaping company or provide evidence that staff have experience in maintaining green infrastructure.

(3) Long-term Responsible Parties: Parcel owner is responsible for maintenance after first 3 years.

(b) Cisterns
(1) Ideal for temporary detention of stormwater. Best suited for management of roof runoff from larger building or parking lot footprints and often used for commercial and industrial properties.
(2) Maintenance Plan Specifications & Considerations
(a) Required Tasks
(1) Inspect and remove blockages from gutter or rain barrels spring and fall.
(2) Check for visible damage, leaks, or repair as needed.

(b) Suggested Tasks
(1) Inspect after large rain storm events, spring, and fall.
(2) Drain and clean before winter

(c) Initial Responsible Parties: Developer is responsible for the first 3 years of maintenance. Developer must contract with a landscaping company or provide evidence that staff have experience in maintaining green infrastructure.

(d) Long-term Responsible Parties: Parcel owner is responsible for maintenance after first 3 years.

(c) Constructed Wetlands
(1) Ideal for infiltration, sedimentation and filtering out of pollutants while providing potentially significant habitat benefits. Best suited for stormwater management of large parcels and often paired with a sedimentation pond to settle sediment before flows reach the wetlands.
(2) Maintenance Plan Specifications & Considerations
(a) Required Tasks
(1) Check and remove litter and plant debris as needed, spring, and fall.

(2) Remove and replace any dead and diseased plants in spring and fall.
(3) Remove invasive species and weed in spring and fall.
(b) Suggested Tasks
(1) Check soil performance and quality to determine if exposure to pollutants is affecting vegetation as needed, spring, and fall.
(c) Initial Responsible Parties: Developer is responsible for the first 3 years of maintenance. Developer must contract with a landscaping company or provide evidence that staff have experience in maintaining green infrastructure. Maintenance staff must be able to correctly identify native and intentionally installed plants from invasives or weeds.
(d) Long-term Responsible Parties: Parcel owner is responsible for maintenance after first 3 years. Wetlands may be donated to the City of Gary, another unit of government appoved by GSWMD, or conservation entity, for ownership and permanent maintenance providing GSWMD, other governmental unit, or conservation entity is willing to accept such responsibility.

(d) Downspout Disconnection
(1) Best suited for infiltration and sedimentation of roof runoff from residential properties or other smaller building footprints. Often paired with bioswales.
(2) Maintenance Plan Specifications & Considerations
(a) Required Tasks
(1) Inspect and remove blockages from gutter, downspout, and diverter in spring and fall.
(2) Inspect after large rain storm events and annually.
(b) Initial Responsible Parties: Parcel owner is responsible for maintenance.
(c) Long-term Responsible Parties: Parcel owner is responsible for maintenance.

(e) Non-living permeable surfaces
(1) Permeable surfaces like pavers and permeable asphalt or concrete are ideal for infiltration and filtration of stormwater runoff. Permeable surfaces also provide important value to businesses as sidewalks for pedestrian or bicycle traffic or as strips along parking lot areas where heavier weight vehicles are not an issue.
(2) Maintenance Plan Specifications & Considerations
(a) Required Tasks
(1) Follow maintenance instructions provided by manufacturer of permeable surface product.
(b) Suggested Tasks
(1) Check for and remove leaves, grass clippings, mulch, sediment and trash after heavy storm events.

(2) Inspect pavement for any sunken, damaged, or missing units/sections and replace as needed annually.

(c) Initial Responsible Parties: Developer is responsible for the first 3 years of maintenance. Developer must contract with a landscaping company or provide evidence that staff have experience in maintaining green infrastructure.

(d) Long-term Responsible Parties: Parcel owner is responsible for maintenance after first 3 years.

(f) Parking lot bioretention islands

(1) Ideal for infiltration, sedimentation and filtering out of pollutants while providing potentially significant habitat benefits. Best suited for stormwater management of large parcels and often paired with a sedimentation pond to settle sediment before flows reach the wetlands.

(2) Maintenance Plan Specifications & Considerations

(a) Required Tasks

(1) Water plants as needed and in summer.

(2) Check and remove litter and plant debris as needed, spring, and fall.

(3) Thin crowding vegetation as needed, spring, and fall.

(4) Remove and replace any dead and diseased plants in spring and fall.

(5) Remove invasive species and weed in spring and fall.

(b) Suggested Tasks

(1) Add new mulch if appropriate in spring.

(2) Check soil performance and quality to determine if exposure to pollutants is affecting vegetation as needed, spring, and fall.

(c) Initial Responsible Parties: Developer is responsible for the first 3 years of maintenance. Developer must contract with a landscaping company or provide evidence that staff have experience in maintaining green infrastructure.

(d) Long-term Responsible Parties: Parcel owner is responsible for maintenance after first 3 years.

(g) Rain barrels

(1) Ideal for low-cost temporary detention of stormwater and for reuse for watering. Best suited for management of roof runoff from smaller building footprints and often used for residential properties.

(2) Maintenance Plan Specifications & Considerations

(a) Required Tasks

(1) Inspect and remove blockages from gutter or rain barrels spring and fall.

(2) Check for visible damage, leaks, or repair as needed.

(b) Suggested Tasks

(1) Inspect after large rain storm events, spring, and fall.
(2) Drain and clean before winter
(3) Empty rain barrels if rain predicted

(c) Initial Responsible Parties: Parcel owner is responsible for maintenance.
(d) Long-term Responsible Parties: Parcel owner is responsible for maintenance.

(h) Rain gardens
(1) Ideal for infiltration, sedimentation, and filtering out pollutants while providing significant aesthetic beautification. Best suited for smaller parcels or in a series for larger ones.
(2) Maintenance Plan Specifications & Considerations
(a) Required Tasks
(1) Water plants as needed and in summer.
(2) Check and remove litter and plant debris as needed, spring, and fall.
(3) Thin crowding vegetation as needed, spring, and fall.
(4) Remove and replace any dead and diseased plants in spring and fall.
(5) Remove invasive species and weed in spring and fall.
(b) Suggested Tasks
(1) Add new mulch if appropriate in spring.
(2) Check and correct any erosion in the rain garden as needed.
(3) Check soil performance and quality to determine if exposure to pollutants is affecting vegetation as needed, spring, and fall.
(c) Initial Responsible Parties: Developer is responsible for the first 3 years of maintenance. Developer must contract with a landscaping company or provide evidence that staff have experience in maintaining green infrastructure. Maintenance staff must be able to correctly identify native and intentionally installed plants from invasives or weeds.
(d) Long-term Responsible Parties: Parcel owner is responsible for maintenance after first 3 years.

(i) Stormwater trees
(1) Best suited for management of driveway, parking lot, and roof runoff from commercial and industrial properties. Stormwater trees should be strategically placed in or near street right-of-ways to enhance neighborhood beautification. Landscape or lot designs that place stormwater trees elsewhere than in or near street right-of-ways must provide a written explanation to and seek written approval from GSD.
(2) Maintenance Plan Specifications & Considerations

(a) Required Tasks
  (1) Check for exposed roots, clumps or grass, and leaning in fall and spring
  (2) Dispose of leaves in fall
  (3) Regular watering as instructed by plant provider (nursery).
(b) Suggested Tasks
  (1) Trim branches to remove dead, broken, or obstructionary branches annually.
(c) Initial Responsible Parties: Developer is responsible for the first 3 years of maintenance. Developer must contract with a landscaping company or provide evidence that staff have experience in maintaining green infrastructure.
(1) Long-term Responsible Parties: Parcel owner is responsible for maintenance after first 3 years.

Sec. XXX-VII-4. Application

(a) Heavy Industrial Land Uses
  (1) Preferred GI and Site Placements
    (a) Constructed Wetlands – placement preference is away from the street and adjacent to any natural areas (i.e. forest, vegetated buffer, etc.) in or adjacent to the parcel.
    (b) Cisterns – no placement preference for cisterns or other underground storage.
(b) Light Industrial Land Uses
  (1) Preferred GI and Site Placements
    (a) Stormwater Trees – placement preference is along streets and adjacent to right-of-way where tree overhang can provide shade to pedestrians on the sidewalk.
    (b) Rain Gardens – placement preference is along streets and adjacent to right-of-way.
    (c) Parking Lot Bioretention islands – placement preference is along the edge of the parking lot adjacent to the street right-of-way or within parking lots.
    (d) Bioswales – placement preference is along streets and adjacent to right-of-way.
    (e) Constructed Wetlands – placement preference is away from the street and adjacent to any natural areas (i.e. forest, vegetated buffer, etc.) in or adjacent to the parcel.
(c) Commercial Land Uses
  (1) Preferred GI and Site Placements
    (a) Stormwater Trees – placement preference is along streets and adjacent to right-of-way where tree overhang can provide shade to pedestrians on the sidewalk.

(b) Rain Gardens – placement preference is along streets and adjacent to right-of-way.
(c) Parking Lot Bioretention islands – placement preference is along the edge of the parking lot adjacent to the street right-of-way or within parking lots.
(d) Bioswales – placement preference is along streets and adjacent to right-of-way.

(d) Residential Land Uses
(1) Preferred GI and Site Placements
(a) Stormwater Trees – placement preference is along streets and adjacent to right-of-way where tree overhang can provide shade to pedestrians on the sidewalk.
(b) Rain Gardens – placement preference is along streets and adjacent to right-of-way.
(c) Rain Barrels – no placement preference.
(d) Downspout Disconnection – placement preference is such that flow is directed into pervious swale.

Sec. XXX-VII-5. Maintenance
(1) Parcels implementing green infrastructure strategies must submit and adhere to maintenance plans with SWPPP. Maintenance plans which are not adhered to are subject to the same penalties for violations and corrective actions described in Chapter eight (8) of the City of Gary Storm Water Management Ordinance. See Sec. XXX-VI-3 for more information on maintenance plan considerations for each GI strategy.
(2) Please see City of Gary Storm Water Management Ordinance for more information on maintenance requirements.

APPENDIX B: GREEN INFRASTRUCTURE TOOL INDEX FRAMEWORK

Major Index	Search Radius (density)	Sub Index	Sub Index Weighting	Variable	Variable Weighting
Conservation	50 ft. increment up to 200 ft.	Site Readiness (most Available)	20%	no structure public ownership	4
				no structure tax sale	1.5
				is structure tax sale	1
				vacant structure public ownership	3
		External factors (highest impact)	80%	National Park or Nature Preserve	2
				Other managed Land	1.5
				Restoration Priority Area	1
Rec and Beautification	.25 miles/ 1320 ft.	Site Readiness (most Available)	20%	no structure public ownership	4
				no structure tax sale	1.5
				is structure tax sale	1
				vacant structure public ownership	3
		External factors (highest impact)	80%	Community Anchors	2
				Green Anchors	0.5
				Residential Population Density	4
				Business Anchors	1.5
Stormwater Management	550	Site Readiness (most Available)	20%	no structure public ownership	4
				no structure tax sale	1.5
				is structure tax sale	1
				vacant structure public ownership	3
		External factors (highest impact)	80%	impervious surface density	3
				Soil Drainage	2
				Flood Reports	1

APPENDIX C: ALL PRIORITY PROJECTS

Roadway Green Infrastructure

Sidewalk Green Infrastructure:

1. **Livable Broadway:** 4th Avenue to 51st Avenue (20 stations across 5.6 miles)

   In 2014, the Gary Public Transportation Corporation (GPTC) received a grant to implement rapid bus transportation service with new bus shelters along the Broadway corridor, through Gary, Merrillville, and Crown Point. In Gary specifically, 20 new stations have been installed on the northbound and southbound side of Broadway. To enhance rider experience, GPTC has identified stormwater planters as an effective tool for beautification and stormwater management at bus stations. They are located at the intersections of 5th Avenue, 11th Avenue, 15th Avenue, 19th Avenue, 25th Avenue, 35th Avenue, Ridge Road, 45th Avenue, and 53rd Avenue. Additionally, with the proliferation of the invasive emerald ash borer beetle many of the corridor's ash trees have died, and are in need of replacement. Replacement of these trees with box tree filters that incorporate a diverse array of native species will assist with stormwater management, blight elimination, and greater resiliency along the corridor towards invasive species.

   - ***Modeled Scenario Description:*** *20 Box Tree Filters, each 4ft. x 3 ft. and containing one tree (cumulative Sq. ft. for all 20 is 80 sq. ft.)*
   - ***Estimated Runoff Reduction (Gallons Managed):*** 86,170 gallons/ year
   - ***Estimated Construction Costs (Low-High):*** $20,840 - 64,840
   - ***Estimated Annual Maintenances Costs:*** $502
   - ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

2. **Lake Street:** US 12 to Lake Street (1.5 miles)

   Through support from the Northwest Indiana Regional Development Authority and the Indiana Department of Transportation, the Lake Street Complete Streets project will produce a pedestrian and bicycle friendly corridor that connects Miller Station, the Lake Street commercial district, the Douglas Center, and Lake Street beach. Stormwater planters, box tree filters, and permeable pavement have been identified as sidewalk green infrastructure that can

complement the planned addition of bike lanes and other sidewalk improvements. The stormwater benefits these techniques will bring will also support the Lake Street sewer upgrade currently is being undertaken by the Gary Sanitary District.

- ***Modeled Scenario Description:*** 8 Bioswales, each 5ft by 20ft along 1.5 mile section of Lake Street (cumulative Sq. Ft. for all 8 is 800 Sq. Ft.)
- ***Estimated Runoff Reduction (Gallons Managed):*** 861,696 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $83,200 - 208,000
- ***Estimated Annual Maintenances Costs:*** $5,016
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, National Park Service, Indiana Dept. of Transportation, Northern Indiana Commuter Transportation District, Northwestern Indiana Regional Planning Commission

3. **US 12 & 20:** I-65 to County Line Road (4 miles)

As identified in the city's East Lakefront Plan, there are significant infrastructure improvements planned for US 12 & 20, intended to drive transit-oriented development and economic development in the Miller, Aetna, and Glen Ryan neighborhoods. This will include the relinquishment of a portion of US 12, construction of a new "split" of US 12 and 20 at the Lake Street intersection, construction of a second rail line serving the South Shore commuter railroad service, and the creation of a storage area for South Shore trains, that will support express train service from Miller station to Millennium Station. Similar to Lake Street, complete street improvements intended to enhance pedestrian and bicycle access along the corridor are planned, as well as sewer upgrades, and sidewalk green infrastructure like stormwater planters, box tree filters, and permeable pavement.

- ***Modeled Scenario Description:*** 16 Bioswales, each 5ft by 20ft, along 1.5 mile section of Lake Street (cumulative Sq. Ft. for all 8 is 1600 Sq. Ft.) and 3.5 acre parking lot repaved with permeable pavement.
- ***Estimated Runoff Reduction (Gallons Managed):*** 4,131,934 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $2,718,082 - 3,122,477
- ***Estimated Annual Maintenances Costs:*** $157,919
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, National Park Service, Indiana

Dept. of Transportation, Northern Indiana Commuter Transportation District, Northwestern Indiana Regional Planning Commission

4. **Shelby Street & Locust Avenue Intersection**

   To improve stormwater management and enhance the aesthetics at a key commercial center in the Miller neighborhood, over 1,700 feet of permeable pavement was installed in 2017 by the Gary Sanitary District. Continued maintenance and enhancement opportunities for sidewalk green infrastructure should be prioritized.

   - ***Modeled Scenario Description:*** 1,700 sq. ft. of permeable pavement installed in 2017 by the Gary Sanitary District
   - ***Estimated Runoff Reduction (Gallons Managed):*** 26,856 gallons/ year
   - ***Estimated Construction Costs (Low-High):*** $ $27,888 - 30,707
   - ***Estimated Annual Maintenances Costs:*** $1,649
   - ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Miller Spotlight

5. **5th Avenue (US 12 & 20):** Monroe Street to Virginia Street (.9 miles)

   As identified in the City's Livable Center Plan, conversion of the one-way, eastbound highway into a two-way complete street, with traffic calming and sidewalk improvements is a critical for driving successful revitalization in Downtown Gary and along 5th Avenue, by supporting the pedestrian traffic generated by the Gary Metro Center, City Hall, Gary RailCats baseball games, and ArtHouse. Sidewalk green infrastructure like stormwater planters and box tree filters can play an important role in beautifying the corridor, shielding pedestrians, and managing stormwater off of a roadway that is 55 feet in width.

   - ***Modeled Scenario Description:*** 4 Bioswales along 5th ave, each 5x20 ft. (cum. sq. ft. of bioswales is 400 sq. ft.)
   - ***Estimated Runoff Reduction (Gallons Managed):*** 430,848 gallons/ year
   - ***Estimated Construction Costs (Low-High):*** $20,800 - 65,600
   - ***Estimated Annual Maintenances Costs:*** $2,508
   - ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

6. **Clark Road**: Airport Road to 5th Avenue (.4 miles)

   Serving as the principal connector between Airport Road and 5th Avenue, this stretch of Clark Road runs past the Gary Chicago Airport train station, and connects it with GPTC's R1 Lakeshore Shuttle service. Due to its proximity to the Grant Calumet River, the corridor also can experience riverine flooding. Serving as a key connection point between the Airport and US 20, the road is also heavily used by trucks. In turn, sidewalk green infrastructure can assist the City in addressing these various issues on Clark Road by protecting pedestrians from truck traffic, beautifying the corridor, and addressing flooding and stormwater issues.

   - ***Modeled Scenario Description:*** 2 Bioswales along Clark Road, each 5x20 ft. (cum. sq. ft. of bioswales is 200 sq. ft.)
   - ***Estimated Runoff Reduction (Gallons Managed):*** 215,424 gallons/ year
   - ***Estimated Construction Costs (Low-High):*** $5,200 - 23,200
   - ***Estimated Annual Maintenances Costs:*** $1,254
   - ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northern Indiana Commuter Transportation District, Northwestern Indiana Regional Planning Commission

7. **25th Avenue:** Grant Street to Broadway (1 mile)

   This section of 25th Avenue serves to connect Michael Jackson's childhood home and Roosevelt High School with the Grant Street and Broadway exits of Interstate 80. Due to 25th Avenue's proximity to the Little Calumet River, and the large amount of impervious surfaces in the area, stormwater management along the corridor is a key concern. Given the existing pavement condition, Gary Sanitary District has also identified an existing need reconstruct the road. While corridor is not currently a major economic engine for the city, targeted sidewalk green infrastructure can help the existing stormwater concerns, and provide gateway elements to one of the city's main tourist attractions.

   - ***Modeled Scenario Description:*** 4 Bioswales along 25th ave, each 5x20 ft. (cum. sq. ft. of bioswales is 400 sq. ft.)
   - ***Estimated Runoff Reduction (Gallons Managed):*** 430,848 gallons/ year
   - ***Estimated Construction Costs (Low-High):*** $5,200 - 23,200
   - ***Estimated Annual Maintenances Costs:*** $2,508
   - ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

8. **35th Avenue:** Pierce Street to Martin Luther King Blvd (1.7 miles)

   Running east-west through the University Park neighborhood, 35th Avenue serves to connect the Gleason Golf Course, Indiana University Northwest, Broadway, and Ivy Tech. As identified in the Blueprint for Change: A Plan for University Park East, development of 35th Avenue as a complete street corridor, that connects University Park residents, Broadway patrons, and students from the educational institutions is a key component of economic development in the district. Additionally, located only 1/3rd of a mile to the south of the Little Calumet River, 35th Avenue can experience significant flooding issues. In turn, sidewalk green infrastructure can assist in increasing pedestrian traffic along the corridor through beautification, as well assisting with stormwater management.

   - ***Modeled Scenario Description:*** 9 Bioswales along 35th Ave. , each 5x20 ft. (cum. sq. ft. of bioswales is 900 sq. ft.)
   - ***Estimated Runoff Reduction (Gallons Managed):*** 969,408 gallons/ year
   - ***Estimated Construction Costs (Low-High):*** $105,300 - 255,600
   - ***Estimated Annual Maintenances Costs:*** $5,643
   - ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Indiana University Northwest, Northwestern Indiana Regional Planning Commission

9. **Aetna Street:** US 12 & 20 to 15th Avenue (0.5 miles)

   Aetna Street is a north-south corridor experiencing significant flooding, located in the heart of an area undergoing large-scale blight elimination efforts through the City's Hardest Hit program. While the corridor is not currently a major economic engine for the city, the Aetna neighborhood is targeted for redevelopment in the East Lakefront Plan. Additionally, the Gary Sanitary District has targeted Aetna Street for future sewer improvements and road reconstruction, and with its existing sidewalks, techniques like stormwater planters, box tree filters, and permeable pavement could assist with stormwater management and beautification.

   - ***Modeled Scenario Description:*** 2 Bioswales along Aetna St., each 5x20 ft. (cum. sq. ft. of bioswales is 200 sq. ft.)
   - ***Estimated Runoff Reduction (Gallons Managed):*** 215,424 gallons/ year
   - ***Estimated Construction Costs (Low-High):*** $5,200 - 23,200
   - ***Estimated Annual Maintenances Costs:*** $1,254

- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

10. 45th Avenue: Grant Street to Broadway (1 mile)

This corridor is experiencing significant flooding and residential blight. While the corridor is not currently a major economic engine for the city, similar to Aetna Street, the Gary Sanitary District is targeting future sewer improvements and road reconstruction along 45th Avenue, which sidewalk green infrastructure can compliment.

- ***Modeled Scenario Description:*** 4 Bioswales along 45th ave., each 5x20 ft. (cum. sq. ft. of bioswales is 400 sq. ft.).
- ***Estimated Runoff Reduction (Gallons Managed):*** 430,848 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $20,800 - $65,600
- ***Estimated Annual Maintenances Costs:*** $2,508
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

11. Buchanan Street: 4th Avenue to the GreenLink (0.2 miles)

Planned for implementation in 2019, the Gary Stormwater Management District will install sidewalk green infrastructure on Buchanan Street, which will serve as a green gateway to the Gary GreenLink bike path. This will address stormwater runoff near the Grand Calumet River corridor, and assist with beautification in the Ambridge Mann neighborhood, an area with a large number of vacant and blighted properties.

- ***Modeled Scenario Description:*** 4 Bioswales along Buchanan St., each 5x20 ft (cum. sq. ft. of bioswales is 400 sq. ft.)
- ***Estimated Runoff Reduction (Gallons Managed):*** 215,424 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $5,200 - 23,200
- **Estimated Annual Maintenances Costs:** $1,254
- ***Key Partners:*** City Departments (Green Urbanism, Planning & Redevelopment, Public Works), Gary Stormwater Management District, Gary Sanitary District, Gary Public Transportation Corporation, Indiana Dept. of Natural Resources, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

12. Grand Boulevard: Miller Avenue to Marquette Park (1 mile)

Serving as the key north-south connection from Downtown Miller Beach to the Marquette Trail and Marquette Park, the City has identified Grand Boulevard as a potential future complete street project, with bike lanes and sidewalk enhancements. Sidewalk green infrastructure can play a key role in advancing the beautification and active transportation priorities along the corridor, as well as assisting with stormwater management, by removing impervious surfaces on a road that in spots reaches 65 feet wide.

- ***Modeled Scenario Description:*** 4 Bioswales along Grand Blvd., each 5x20 ft. (cum. sq. ft. of bioswales is 400 sq. ft.).
- ***Estimated Runoff Reduction (Gallons Managed):*** 430,848 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $20,800 - 65,600
- ***Estimated Annual Maintenances Costs:*** $2,508
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Stormwater Management District, Gary Sanitary District, Gary Public Transportation Corporation, National Park Service, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

13. Clay Street: US 12 & 20 to 13th Avenue (0.3 miles)

Similar to Aetna Street, Clay Street is a north-south corridor experiencing significant flooding, located in the heart of an area undergoing large-scale blight elimination efforts through the City's Hardest Hit program. While the corridor is not currently a major economic engine for the city, Clay Street falls within the area targeted for transit-oriented development in the East Lakefront Plan. On its existing sidewalks, techniques like stormwater planters, box tree filters, and permeable pavement could assist these broader redevelopment efforts through stormwater management and beautification.

- ***Modeled Scenario Description:*** 4 Bioswales along Clay St., each 5x20 ft. (cum. sq. ft. of bioswales is 400 sq. ft.).
- ***Estimated Runoff Reduction (Gallons Managed):*** 430,848 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $20,800 - 65,600
- ***Estimated Annual Maintenances Costs***: $2,508
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Stormwater Management District, Gary Sanitary District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

14. Ridge Road: Grant Street to Georgia Street (1.5 miles)

Standing as primary east-west arterial connecting communities throughout Northwest Indiana, Ridge Road is high traffic corridor that commonly experiences urban flooding and stormwater runoff issues. Though the corridor is not currently a major economic engine for the city, its heavy traffic volumes, significant road widths (up to 50 feet in areas), and existing sidewalks provide opportunities for techniques like stormwater planters, box tree filters, and permeable pavement to assist with stormwater management and beautification.

- ***Modeled Scenario Description:*** 6 Bioswales along Ridge Road., each 5x20 ft. (cum. sq. ft. of bioswales is 600 sq. ft.) and 1 acre parking lot repaved with permeable pavement.
- ***Estimated Runoff Reduction (Gallons Managed):*** 1,334,422 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $2,432,082 - $2,526,477
- ***Estimated Annual Maintenances Costs:*** $46,015
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Stormwater Management District, Gary Sanitary District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

Bioswale / Hybrid Ditches

15. 4th Avenue: Clark Road to Bigger Street (0.66 miles)

Located just to the south of the Grand Calumet River, and serving as a heavily trucking route that connects Cline Avenue and the airport with the Gary Sanitary District headquarters, this corridor experiences significant issues around flooding, stormwater, and pavement deterioration. 4th Avenue is currently targeted for road reconstruction by GSD, including installation of underground perforated stormwater pipes. Bioswale or hybrid ditch features would assist with stormwater management and beautification along the corridor.

- ***Modeled Scenario Description:*** 4 Bioswales along 4th ave., each 5x20 ft. (cum. sq. ft. of bioswales is 400 sq. ft.).
- ***Estimated Runoff Reduction (Gallons Managed):*** 344,678 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $16,640 - 57,920
- ***Estimated Annual Maintenances Costs:*** $2,006

- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

16. Airport Road: Clark Road to Cline Avenue (2.8 miles)

Located in between the Grand Calumet River and the Clark & Pine Nature Preserve, Airport Road serves as the primary gateway to the Gary Chicago International Airport. Since 2013, over $10 million of investment has been allocated toward road reconstruction and right of way improvements on Airport Road. The corridor experiences both significant flood and large amounts of truck traffic, and with adjacency to both wetlands and the airport property, green infrastructure solutions like bioswales and hybrid ditches can serve buffering techniques for managing stormwater runoff, and beautifying the corridor. The techniques can be paired with rain gardens at the entrance of the airport.

- ***Modeled Scenario Description:*** 10 Bioswales on Airport Rd., each 5x20 ft. (cum. sq. ft. of bioswales is 1000 sq. ft.)
- ***Estimated Runoff Reduction (Gallons Managed):*** 1,077,120 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $130,000 - 308,000
- ***Estimated Annual Maintenances Costs:*** $5,016
- ***Key Partners:*** Gary Chicago International Airport, City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission, Indiana Dept. of Natural Resources

17. 15th Avenue: Martin Luther King Boulevard to I-65 (0.5 miles)

Serving as a key gateway to the city off of Interstate 65, this portion of 15th Avenue will soon serve as the entrance for HMD Trucking's Headquarters, and will experience large increases in truck traffic. The road also sits less than 0.5 miles from the floodplain along the Little Calumet River, and commonly experiences flooding events. Full reconstruction of the road is currently planned, and the inclusion of bioswales or hybrid ditches can assist the city in managing flooding and stormwater runoff along the corridor, as well as providing beautification at a key gateway.

- ***Modeled Scenario Description:*** 4 Bioswales along Airport Rd., each 5x20 ft. (cum. sq. ft. of bioswales is 400 sq. ft.)
- ***Estimated Runoff Reduction (Gallons Managed):*** 430,848 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $20,800 - 65,600

- ***Estimated Annual Maintenances Costs:*** $2,508
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

18. 29th Avenue: Stevenson Street to Gerry Street (0.5 miles)

Serving as a primary east-west corridor in the Black Oak neighborhood, 29th Avenue experiences significant flooding problems, which exacerbates problems around the neighborhood's large amount of septic systems. The corridor is located less than 700 feet from the Little Calumet River, and many of the city's MS4s are located near 29th Avenue. While the corridor is not currently a major economic engine for the city, green infrastructure like bioswales and hybrid ditches would contribute significantly to addressing standing water and stormwater runoff along the road.

- ***Modeled Scenario Description:*** *4 Bioswales along 29th Ave., each 5x20 ft. (cum. sq. ft. of bioswales is 400 sq. ft.)*
- ***Estimated Runoff Reduction (Gallons Managed):*** 430,848 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $20,800 - 65,600
- ***Estimated Annual Maintenances Costs:*** $2,508
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

19. 15th Avenue: Cline Avenue to Colfax Avenue (1 mile)

Standing as a gateway from Cline Avenue to numerous trucking distribution facilities, 15th Avenue is both surrounded by wetlands and industrial uses, and experiences heavy truck traffic. GSD and GSWMD have identified frequent stormwater management issues along the corridor, which has been targeted for industrial redevelopment by the city. In turn, techniques like bioswales and hybrid ditches would assist the city in managing flooding and runoff.

- ***Modeled Scenario Description:*** *8 Bioswales along 15th Ave., each 5x20 ft. (cum. sq. ft. of bioswales is 800 sq. ft.)*
- ***Estimated Runoff Reduction (Gallons Managed):*** 861,696 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $83,200 - 208,000
- ***Estimated Annual Maintenances Costs:*** $5,016

- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

20. Clay Street: 13th Avenue to 15th Avenue (0.25 miles)

South of 13th Avenue, Clay Street experiences similar conditions to those mentioned in the sidewalk green infrastructure section, but its sidewalks do not continue southward. In turn, techniques like bioswales and hybrid ditches would assist the city in managing flooding and runoff along the corridor.

- ***Modeled Scenario Description:*** 2 Bioswales along Clay St., each 5x20 ft. (cum. sq. ft. of bioswales is 200 sq. ft.).
- ***Estimated Runoff Reduction (Gallons Managed):*** 215,424 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $5,200 - 23,200
- ***Estimated Annual Maintenances Costs:*** $1,254
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Public Transportation Corporation, Indiana Dept. of Transportation, Northwestern Indiana Regional Planning Commission

<u>Perforated Pipe</u>

21. 7th Avenue: Ohio Street to Alabama Street (0.33 miles)

An east-west corridor running through the eastern portion of the Emerson neighborhood.

22. Sullivan & Lakeshore Drive

A lakefront, residential intersection in the Miller neighborhood.

23. Wayne & Lakeshore Drive

A lakefront, residential intersection in the Miller neighborhood.

24. Vanderburg & Lakeshore Drive

A lakefront, residential intersection in the Miller neighborhood.

Key Partners: City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District

Beautification and Blight Elimination Sites

Beautification on vacant and occupied properties includes native landscaping and rain gardens, which can assist communities with managing stormwater, and can help stabilize and beautify vacant sites on a block or in a neighborhood, through the development of maintained, intentional open space.

Vacant Properties: 11 locations

25. Stumblebum Park: 577-87 Broadway

A partnership between the City of Gary and the Gary Housing Authority, this vacant, dilapidated lot was re-graded in 2018, and through design assistance from the Art of Institute of Chicago, this site will become a pocket park with green infrastructure that serves the residents of Genesis Towers, located across the street.

- ***Modeled Scenario Description:*** One 1900 sq. ft. Rain Garden on the .25 acre site
- ***Estimated Runoff Reduction (Gallons Managed):*** 20,132 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $25,875 - 39,627
- ***Estimated Annual Maintenances Costs (Low-High):*** $7 - $166
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism, Parks), Gary Sanitary District, Gary Stormwater Management District, Gary Housing Authority

26. Ivanhoe Preserve Gateway: 4th Avenue & King Street

The Nature Conservancy has worked with the City of Gary to clear overgrowth, restore native species, and remove invasive species on six contiguous, city-owned parcels in the Brunswick neighborhood, totaling 0.5 acres in size, and located a ¼ mile from the eastern entrance of the Ivanhoe Nature Preserve. By providing public space and removing blighted overgrowth from the neighborhood, the site will serve as a gateway to the Ivanhoe Preserve.

- ***Modeled Scenario Description:*** *One 4350 sq. ft. Rain Garden on the .5 acre site*
- ***Estimated Runoff Reduction (Gallons Managed):*** 6,653 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $58,806 -78,262
- ***Estimated Annual Maintenances Costs (Low-High):*** $16 - $379

- ***Key Partners:*** The Nature Conservancy, City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Housing Authority, Gary Parks Department

Gateway Beautification

Interstate Highway exits: 15 locations
Entry points are critical components of the image that a city projects. Highway exits are commonly the most heavily trafficked gateways to the city, and in turn, beautification projects around highway exits can make an important visual impact. Blight elimination at gateway locations in the city has been a primary focus of the Mayor's Office, and with 12 highway exit locations in the city, those areas should be primary targets for native landscaping and rain gardens, among other beautification elements.

27. I-80, Broadway – 2 locations

- ***Modeled Scenario Description:*** 44,300 sq. ft. of Rain Garden (multiple) at 1-80 Broadway exits.
- ***Estimated Runoff Reduction (Gallons Managed):*** 20,206,690 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $599,824 - 692,713
- ***Estimated Annual Maintenances Costs (Low-High):*** $64,869
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Transportation

28. I-80, Grant Street – 2 locations

- ***Modeled Scenario Description:*** 44,300 sq. ft. of Rain Garden (multiple) at 1-80 Grant St. exits.
- ***Estimated Runoff Reduction (Gallons Managed):*** 20,206,690 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $599,824 - 692,713
- ***Estimated Annual Maintenances Costs (Low-High):*** $64,869
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Transportation

29. I-80, Burr Street – 2 locations

- ***Modeled Scenario Description:*** 35,500 sq. ft. of Rain Gardens (multiple) at 1-80 Burr St. exits.
- ***Estimated Runoff Reduction (Gallons Managed):*** 16,153,450 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $479,506 - 556,973
- ***Estimated Annual Maintenances Costs (Low-High):*** $51,856
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Transportation

30. I-80 Ripley Street – 1 locations

- ***Modeled Scenario Description:*** 21,700 sq. ft. of Rain Gardens (multiple) at 1-80 Ripley St. exit.
- ***Estimated Runoff Reduction (Gallons Managed):*** 990,520 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $294,031 - 347,129
- ***Estimated Annual Maintenances Costs (Low-High):*** $31,799
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Transportation

31. I-90, Dunes Highway (US 12 & 20) – 2 locations

- ***Modeled Scenario Description:*** 20,900 sq. ft. of Rain Gardens (multiple) at 1-90 Dunes Highway exits.
- ***Estimated Runoff Reduction (Gallons Managed):*** 9,509,033 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $282,270 - 333,786
- ***Estimated Annual Maintenances Costs (Low-High):*** $30,527
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Transportation

32. I-90, Grant Street – 1 location

- ***Modeled Scenario Description:*** 55,900 sq. ft. of Rain Gardens (multiple) at 1-90 Grant St. exit
- ***Estimated Runoff Reduction (Gallons Managed):*** 25,436,638 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $755,072 - 867,577
- ***Estimated Annual Maintenances Costs (Low-High):*** $81,659

- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Transportation

33. I-90, Broadway – 1 location

- ***Modeled Scenario Description:*** 2,900 sq. ft. of Street Planters (multiple) along Broadway at 1-90 Broadway exit.
- ***Estimated Runoff Reduction (Gallons Managed):*** 46,575 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $38,345 - 55,901
- ***Estimated Annual Maintenances Costs (Low-High):*** $8 - 199
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Transportation

34. I-65, 5th Avenue – 1 location

- ***Modeled Scenario Description:*** 6,680 sq. ft. of Rain Gardens (multiple) at 1-65 5th Ave exit.
- ***Estimated Runoff Reduction (Gallons Managed):*** 3,039,913 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $90,238 - 114,636
- ***Estimated Annual Maintenances Costs (Low-High):*** $9,759
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Transportation

35. I-65, 15th – 2 locations

- ***Modeled Scenario Description:*** 9,200 sq. ft. of Rain Gardens (multiple) at 1-65 15th Ave exits.
- ***Estimated Runoff Reduction (Gallons Managed):*** 4,187,924 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $124,316 - 153,808
- ***Estimated Annual Maintenances Costs (Low-High):*** $13,445
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Transportation

36. I-65, Ridge Road – 1 location

- ***Modeled Scenario Description:*** 6,690 sq. ft. of Street Planters (multiple) at 1-65th Ridge Ave exit.
- ***Estimated Runoff Reduction (Gallons Managed):*** 98,625 gallons/ year

- ***Estimated Construction Costs (Low-High):*** $88,770 - $106,496
- ***Estimated Annual Maintenances Costs (Low-High):*** $20 - $474
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Transportation

Occupied Properties: 4 locations

37. City Hall Parking Lot Rain Garden

In 2016, the City of Gary redeveloped the parking lot south of City Hall to include a 5,300 square foot rain garden, incorporating a portion of the lot that had formally housed the vacant, dilapidated Sheraton Hotel building. The project included the removal of impervious cover, installation of structures to redirect runoff from the storm-sewer system and the parking lot into the central rain garden, and the addition of peripheral grassed areas. The city is also planning future phases that will redirect stormwater from downspouts on the City Hall roof to additional rain gardens and include a permeable paver plaza for community events.

- ***Modeled Scenario Description:*** 5300 sq. ft. of Rain Garden and 30,500 sq. ft. parking lot with permeable pavement.
- ***Estimated Runoff Reduction (Gallons Managed):*** 1,571,277 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $551,982 - 580,567
- Estimated Annual Maintenances Costs (Low-High): $37,315
- ***Key Partners:*** City Departments (Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, US Geological Survey

38. United Steelworkers Union Hall: 2 locations

With locations at 1301 Texas Street and 1221 East Ridge Road, members of the steelworkers union have expressed interest installing demonstration rain gardens and street planters, for the purposes highlighting the natural landscape, and assisting with stormwater management. The project represents an opportunity for a public-private partnership.

- ***Modeled Scenario Description:*** 13,000 sq. ft. of Rain Garden and 3,200 sq. ft. of Street Planters on perimeter of parking lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 156,817 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $130,929 - 166,346
- ***Estimated Annual Maintenances Costs (Low-High):*** $56 - 1,353

- ***Key Partners:*** City Departments (Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, United Steelworkers Union

39. US Steel Yard Plaza

As a primary tourism destination in Downtown Gary, US Steel Yard Plaza draws thousands of visitors every summer for Gary Southshore RailCats games. With its heavily trafficked location on 5th Avenue, and the vast amount of impervious surfaces that surround the park, strategically positioned rain gardens represent an opportunity for beautification and stormwater management.

- ***Modeled Scenario Description:*** 6,500 sq. ft. of Street Planters on perimeter of parking lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 115,678 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $83,380 -100,367
- ***Estimated Annual Maintenances Costs (Low-High)****:* $19 – 445
- ***Key Partners:*** City Departments (Planning & Redevelopment, Public Works, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Gary Southshore RailCats

Vacant to Vibrant Program Sites

40. 1035 Oklahoma Street (Completed)

- ***Modeled Scenario Description:*** 3,900 sq. ft. of Rain Garden on .3 acre residential lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 6,354 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $18,000
- ***Estimated Annual Maintenances Costs (Low-High):*** $14 - 339
- ***Key Partners:*** City Departments (Planning & Redevelopment, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Vacant to Vibrant Advisory Committee, Residents

41. 1200 Oklahoma Street (Completed)

- ***Modeled Scenario Description:*** 3,900 sq. ft. of Rain Garden on .3 acre residential lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 6,354 gallons/ year
- ***Estimated Construction Costs (Low-High): $18,000***
- ***Estimated Annual Maintenances Costs (Low-High):*** $14 - 339

- ***Key Partners:*** City Departments (Planning & Redevelopment, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Vacant to Vibrant Advisory Committee, Residents

42. 1252 Dakota Street (Completed)

- ***Modeled Scenario Description:*** 3,900 sq. ft. of Rain Garden on .3 acre residential lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 6,354 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $18,000
- ***Estimated Annual Maintenances Costs (Low-High):*** $14 - 339
- ***Key Partners:*** City Departments (Planning & Redevelopment, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Vacant to Vibrant Advisory Committee, Residents

43. 743-753 Vermont Street (Planned)

- ***Modeled Scenario Description:*** 6,500 sq. ft. of Rain Garden on .5 acre area including two residential lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 38,967 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $18,000
- ***Estimated Annual Maintenances Costs (Low-High):*** $23 - 565
- ***Key Partners:*** City Departments (Planning & Redevelopment, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Vacant to Vibrant Advisory Committee, Residents

44. 4261 Virginia Street (Planned)

- ***Modeled Scenario Description:*** 3,900 sq. ft. of Rain Garden on .3 acre residential lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 6,354 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $18,000
- ***Estimated Annual Maintenances Costs (Low-High):*** $14 - 339
- ***Key Partners:*** City Departments (Planning & Redevelopment, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Vacant to Vibrant Advisory Committee, Residents

45. 5210 W 3rd Street (Planned)

- ***Modeled Scenario Description:*** 3,900 sq. ft. of Rain Garden on .3 acre residential lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 6,354 gallons/ year

- ***Estimated Construction Costs (Low-High):*** $18,000
- ***Estimated Annual Maintenances Costs (Low-High):*** $14 - 339
- ***Key Partners:*** City Departments (Planning & Redevelopment, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Vacant to Vibrant Advisory Committee, Residents

46. 2432 Marshalltown Lane (Planned)

- ***Modeled Scenario Description:*** 3,900 sq. ft. of Rain Garden on .3 acre residential lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 6,354 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $18,000
- ***Estimated Annual Maintenances Costs (Low-High):*** $14 - 339
- ***Key Partners:*** City Departments (Planning & Redevelopment, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Vacant to Vibrant Advisory Committee, Residents

47. 3534 E 10th Avenue (Planned)

- ***Modeled Scenario Description:*** 3,900 sq. ft. of Rain Garden on .3 acre residential lot
- ***Estimated Runoff Reduction (Gallons Managed):*** 6,354 gallons/ year
- ***Estimated Construction Costs (Low-High): $18,000***
- ***Estimated Annual Maintenances Costs (Low-High***): $14 - 339
- ***Key Partners:*** City Departments (Planning & Redevelopment, Green Urbanism), Gary Sanitary District, Gary Stormwater Management District, Vacant to Vibrant Advisory Committee, Residents

Conservation Land

Enhancement & Restoration on Public Parks & School sites

In addition the conservation land owned by the National Park Service, Shirley Heinze Land Trust, and the Nature Conservancy, habitat enhancement and restoration are significant opportunities on the following city-owned sites:

48. Marquette Park

The crown jewel of Gary's park system, and abutting the Indiana Dunes National Lakeshore property, Marquette Park boasts numerous high quality natural features of the Indiana Dunes ecosystem, including sand dunes, lagoons, upland forests, and wetlands. The park underwent a $28 million redevelopment and enhancement in 2010, including restoration

of the dunes, remediation of the lagoons, and installation of wet prairies on the eastern portion of Grand Boulevard. In turn, valuable, well-maintained conservation land already exists in the park. Nonetheless, effective maintenance of the park's coastal features is a critical ongoing need.

- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, National Park Service

49. Brunswick Park

Brunswick possesses 33 acres of remnant black oak savanna, dune and swale, and upland forest. Enhancement and restoration of these features, and establishing a public accessible trail network through the park will elevate Brunswick Park as a critical source of conservation land in Gary's northwest side.

- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Nature Conservancy

50. Hatcher Park

Located in the Pulaski neighborhood, and sitting directly to the north of the wetlands that run along the Little Calumet River corridor, Hatcher Park possesses bottomland forests and the southern portion exists in the floodplain, and the restoration of its woodlands, potential wetland installation, and development of a trail system are opportunities.

- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

51. Seeberger Park

Located on Bell Street and 25th Avenue, Seeberger Park possesses 6.5 acres of wetlands and forests, that include rare and native species. Improvement of the trail access and enhancement of the park's wetlands are an opportunity.

- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment)

52. Edison Park

Located in the Brunswick neighborhood, Edison Park possesses 4 acres of native prairie and woodlands, on the northern portion of a vacant school site. The native features overlap with a section of the park that includes an abandoned pool. While the southern portion of the site presents opportunities for redevelopment as a commercial or light industrial land use, there is an opportunity to preserve and enhance Edison Park's natural features on the north side.

- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), The Nature Conservancy

53. Diamond Park: 25th Avenue & Prospect Street

Located in the Pulaski neighborhood, 47 acres, Diamond Park sits directly to the north of the Little Calumet River, the floodplain, and Little Calumet River Basin Development Commission property. It is almost entirely overgrown and possesses significant wetland features. Disposition to the LCRBDC should be considered.

- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, Little Calumet River Basin Development Commission

54. Ernie Pyle School site: 19th Avenue & Taney Street

In the Tolleston neighborhood, the vacant Ernie Pyle school site holds nearly 8.5 acres of upland woods on a preserved forested dune, with a corridor of black oak trees running perpendicular. With many rare and native species, the site poses significant ecological restoration opportunities, and establishing a publicly-accessible trail network through the park would elevate the site as a critical natural resource on Gary's west side.

- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), The Nature Conservancy, Gary Public School Corporation

55. Green Link Corridor

While the entire 38.25 miles and 9,735 acres of the Gary Green Link remain a visionary project, implementation of this conservation loop remains the priority of the city, including both restoration of habitat and the implementation of the GreenLink's trail infrastructure.

- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Northwestern Indiana Regional Planning Commission, National Park Service, Little Calumet River Basin Development Commission

56. Little Calumet River & Gleason Park wetland restoration (southern corridor)

Running along the Little Calumet River from Cline Avenue to Martin Luther King Boulevard, hundreds of parcels make up this federally-designated floodplain area that is a mixture of wetland, prairie, and woodlands. This wetland corridor is managed by combination of the Little Calumet River Basin Development Commission, the Gary Park District, and Indiana University Northwest. It is highlighted by an 80-acre site that is bisected by the Little Calumet River, west of Broadway, and to the northeast of Gary's Gleason Park and Indiana University Northwest. The northern section also falls within the floodplain. The prairie and wetlands provide a critical buffer between the Little Calumet River and adjacent development during flood events, and represent a prime opportunities for restoration and mitigation on publicly-owned land.

- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, Little Calumet River Basin Development Commission, Indiana University Northwest

Enhancement & Restoration on Publicly-Owned Vacant Land

In addition to Public Park and school sites, there are number of publicly-owned properties that hold valuable ecological features, including forests and wetlands that could be enhanced and restored. Some of these parcels also include vacant land that is more suitable for industrial or commercial development. In those cases, opportunities exist for redevelopment and environmental restoration to occur simultaneously, through implementation of green infrastructure techniques like buffer strips, which assist in balancing conflicting land uses.

57. 5400 E 5th Avenue

In the Miller neighborhood, directly west of Duneland Village and the Lake Street commercial district sits 63 acres of black oak savanna woodland. This land also sits to the south and east of the Indiana Dunes National Lakeshore property. Whether or not this property is ultimately transferred by the City to the National Park Service, the high value ecological features represent key opportunities for preservation and enhancement.

- ***Key Partners:*** City Departments (Green Urbanism, Planning & Redevelopment), National Park Service

58. 1000 & 1100 N Clark Road

Sitting directly to the south and west of Clark and Pine Nature Preserve is 1000 & 1100 N Clark Road, two contiguous vacant industrial parcels that hold nearly 11 acres of dune and swale on the northern end of the site. With its location near the Gary Chicago International Airport, redeveloping a portion of the 36 acre site for light industrial uses is a priority for the City. That said, due to the high value of the wetlands on site, there exists the opportunity for restoring the property's dune and swale, as part of a greater redevelopment project.

- ***Key Partners:*** City Departments (Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Natural Resources, Indiana Dept. of Environmental Management, Gary Economic Development Corporation

59. 5212-56 Industrial Highway

Directly across from the Gary Chicago International Airport exist 29 acres of protected dune and swale, under ownership by the airport authority. The property provides key opportunities for mitigation and enhancement, as well as a critical open space buffer that assists the airport in complying with FAA height restrictions.

- ***Key Partners:*** Gary Chicago International Airport, City Departments (Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Natural Resources, Indiana Dept. of Environmental Management, Gary Economic Development Corporation

60. 6200 Industrial APPR

Located near Buffington Harbor, the majority of this 78 acre site is a vacant brownfield, housing the remains of a former cement factory. That portion, accounting for 2/3rd of the site, is targeted for industrial redevelopment. The eastern portion houses wetlands that provide a restoration and mitigation.

- ***Key Partners:*** Gary Port Authority, City Departments (Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Natural Resources, Indiana Dept. of Environmental Management, Gary Economic Development Corporation

61. 300 N Mount

Located near Buffington Harbor, and split in half by the Norfolk Southern railroad, 300 N Mount holds over 45 acres of high quality dune and swale, providing significant mitigation and enhancement opportunities.

- ***Key Partners:*** Gary Port Authority, City Departments (Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Natural Resources, Indiana Dept. of Environmental Management, Gary Economic Development Corporation

62. Gary Chicago International Airport property

Along the southern portion of the airport property, running along the north side of the Grand Calumet River, exists approximately 44 acres of fresh forested wetland, shrub wetland, and emergent wetland. Mitigation and enhancement of these wetlands represent a prime green infrastructure solution that supports the resiliency the airport's infrastructure towards flooding.

- ***Key Partners:*** Gary Chicago International Airport, City Departments (Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Natural Resources, Indiana Dept. of Environmental Management, Gary Economic Development Corporation

63. 6011 Industrial Highway

Owned by the Gary Chicago Airport Authority, and sitting to the north of the airport property, this 7.4 acre parcel holds both dune and swale and pond features, providing key opportunities for mitigation and enhancement, as well as a critical open space buffer that assists the airport in complying with FAA height restrictions.

- ***Key Partners:*** Gary Chicago International Airport, City Departments (Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Natural Resources, Indiana Dept. of Environmental Management, Gary Economic Development Corporation

Private Enhancement & Restoration

Natural restoration projects on privately-owned land hold similar end goals to natural restoration projects on publicly-owned land, but require partnership building with private property owners, that can be incented through development agreements, tax exemptions, etc. One key difference however is that occasionally these sites include active facilities, meaning green infrastructure planning requires a special layover of coordination, and that depending on the project, the private property may be responsible for maintaining the natural resource.

64. 120 N Clark Road

Sitting to the southeast of 6011 Industrial Highway, this 44 acre parcel holds up to 36 acres of dune and swale and pond features. The property is owned by Fritz Enterprises, a Michigan-based steel manufacturer, who could be a potential partner in enhancing the natural features on site.

- ***Key Partners:*** Gary Chicago International Airport, City Departments (Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Natural Resources, Indiana Dept. of Environmental Management, Gary Economic Development Corporation

NIPSCO Utility Corridors

As restoration of their asset management, the Northern Indiana Public Service Company (NIPSCO) undertakes ecological restoration projects along their utility corridors. This is intended to ensure that their permits are maintained, attract more pollinators, avoid endangering species, and to protect the health of their infrastructure, which can be threatened by environmental problems like flooding and the spread of invasive species. The following locations in Gary are special areas of focus for NIPSCO:

65. **Interstate 65/US 20 Intersection**
    Three contiguous NIPSCO-owned parcels north of the intersection at I-65 and US 20 are a primary area of focus for NIPSCO's restoration efforts. With the recorded addresses of 2600 E 5th Ave, 800 Oregon APPR St, 3300 E 7th Ave R/R APPR, these three parcels comprise 13.5 acres that separate and buffer national park-owned land from two railroad lines (NICTD, Norfolk Southern) and US 20.

66. **7151 Industrial Highway**: NIPSCO Chicago Area Substation
    A triangular site that is located on the northwest corner of the airport, this 24.5 acre property is bordered by Cline Avenue, Airport Road, and the Norfolk Southern railroad. It is east of a critical substation in NIPSCO's network, and includes state-listed endangered plant species, but also requires management of invasive species like Phragmites.

67. **Clark & Pine substation**
    Surrounding the Clark & Pine Nature Preserve, NIPSCO owns over 66 acres of utility corridors, spread across four parcels: 800 N Clark Road APPR (19.5 acres), 100-300 N Wilson APPR Street and 400 N Clark Road (45.6 acres), and 870 N Hobart APPR Street (1 acre). This includes restoration and mitigation of degraded wetlands that surround Clark & Pine's dune and swale.

68. **1480 E 15th Avenue:** NIPSCO operating headquarters
    North of the NIPSCO operating headquarters, near the intersection with Martin Luther King Boulevard, is a 24 acre site where the utility is undertaking wetland mitigation and restoration.
    Key Partners: Northern Indiana Public Service Corporation, City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Natural Resources, Indiana Dept. of Environmental Management, Gary Economic Development Corporation, National Park Service

US Steel Parcels

On the western end of their sprawling Gary Works facility, US Steel owns parcels that possess remnant dune and swale features. These parcels represent opportunities for mitigation, enhancement, and restoration, which can offset impacts from their industrial operations.

69. 200 N Clark APPR Street

Owned by US Steel, this 18.5 acre site sits to the west of Clark Road in between two lines of the Canadian National railroad. It possesses both wetland and pond features, and presents opportunities for restoration and enhancement.

70. 300 N Whitcomb Street

A 66 acre site, a smaller amount of acreage on site possess remnant dune and swale features, demonstrating an opportunity for restoration on site.

Key Partners: US Steel, City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Natural Resources, Indiana Dept. of Environmental Management, Gary Economic Development Corporation

Elgin, Joliet & Eastern (EJ&E) Parcels

Now under ownership of the Canadian National railroad, the EJ&E Railroad Company holds many parcels with wetlands in the airport area, near their Kirk Yard facility. These parcels abut their railroad lines, and represent opportunities for mitigation, enhancement, and restoration, which can offset impacts from upgrades to their infrastructure or redevelopment of industrial sites that their railroad serves.

71. 410 N Williams APPR

A 7.5 acre site on the eastern border of Clark Road, across the street from 200 N Clark APPR Street, this parcel possesses similar wetland and pond features, and represent opportunities for restoration and enhancement.

72. 3378 Burr Street

A slender 10.2 acre site, this property sits in between Clark & Pine Nature Preserve and Kirk Yard, and possesses dune and swale topography and soil characteristics, demonstrating an opportunity for restoration on site.

73. 350 N Morton Street

A triangular, 5.8 acre site, this property sits to the west of Kirk Yard, and possesses dune and swale topography and soil characteristics, demonstrating an opportunity for restoration on site.

74. 600 N Tompkins APPR

An 18.7 acre parcel on the southeast end of 6200 Industrial Highway, this triangular site holds forested/shrub wetlands that pose restoration opportunities.

75. 400 N Baker Street

Owned by the holding company for the Pen Central Transportation Company, this 15 acre site possesses dune and swale topography and soil characteristics, demonstrating an opportunity for restoration on site.

Key Partners: US Steel, City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, Indiana Dept. of Natural Resources, Indiana Dept. of Environmental Management, Gary Economic Development Corporation

Acquisition & Consolidation

For both public and nonprofit conservation land managers, opportunities to connect fragmented parcels of preserved habitat into larger, interconnected properties is a top priority, because it serves to expand the habitat for native plant and animal species. Priority areas for specific land managers are as follows:

Shirley Heinz Land Trust properties: Shirley Heinz Land Trust owns 54 parcels of conservation land in Gary, in four key areas. The focus of SHLT is consolidation and acquisition of property around those preserves. Opportunities between the City of Gary and SHLT to partner on acquisition and consolidation of open space parcels will serve to strengthen the quality of those natural resources, and access to nature in the Miller and Brunswick neighborhoods, where they are located.

76. Ivanhoe South
77. Miller Woods
78. Bayless Dune
79. Lake Street & Cypress Avenue

Key Partners: Shirley Heinz Land Trust, City Departments (Planning & Redevelopment, Green Urbanism), Indiana Dept. of Natural Resources, Residents

80. Marquette Trail Extension

A 2 mile abandoned railroad right-of-way running through Miller Woods, from Grand Boulevard to Interstate 65, the Marquette Trail extension corridor is privately-owned, but entirely surrounded by National Park Service land. Successful acquisition of the right of way will support improving public access to this high value natural area, by enabling NPS to enhance and maintain the trail facility, and will support the continued development of the Green Link Trail visionary corridor.

- ***Key Partners:*** National Park Service, City Departments (Planning & Redevelopment, Green Urbanism), Residents

81. Inland Manor

Inland Manor is small residential subdivision in Miller, bounded by US 12 to the north, Spencer Street to the west, 4th Avenue to the south, and Union Street, and is approximately 60 acres in size. It is entirely surrounded by wetlands that are owned by the Indiana Dunes National Lakeshore, and experiences chronic flooding. The Gary Sanitary District spends significant resources on flood mitigation in the subdivision, which also has a number of vacant and abandoned properties. In turn, the National Park Service is interested in acquiring properties in Inland Manor for environmental restoration, and the City is interested in decommissioning infrastructure that carries a high cost burden and serves increasingly fewer people. Opportunities for land acquisition partnerships, as well as a moratorium on new development, should be explored.

- ***Key Partners:*** National Park Service, City Departments (Planning & Redevelopment, Green Urbanism), Residents

Stormwater Parks

Vacant Playlots and Totlots

Among the varieties of parks in the city, playlots and totlots are particularly well-suited as places for green infrastructure. They are smaller than the standard city park, and tend to be located in dense neighborhoods, surrounded by impervious surfaces like streets, driveways, and buildings. In turn, converting even a portion of playlots and totlots to green infrastructure can make a large impact on neighborhood stormwater management. Additionally, of the 21 vacated parks, 15 are playlots and totlots, meaning there is value for the Gary Park District for finding solutions on how to repurpose these assets. As a result of the Stormwater Parks analysis, the Financial analysis, and based on the input from the Gary Parks Department, to best candidates for stormwater parks are:

82. **Aetna Playground 2:** 13th Place & Greene Street
    Located in the southern end of the Aetna neighborhood, totaling .31 acres, Aetna Playground #2 is currently a vacant lot. It ranks #1 among all parks on the Gary Green Infrastructure Tool's stormwater management index. With its adjacency to 13th Place, Interstate 90 and its proximity to the Little Calumet River, the abandoned park experiences frequent flood events. Aetna has actively participated in the city's Vacant to Vibrant program, and more intentional green infrastructure on site could help with stormwater management and beautification on this lot.
    - ***Modeled Scenario Description:*** 5,400 sq. ft. of Rain Garden on .3 acre lot.
    - ***Estimated Runoff Reduction (Gallons Managed):*** 34,513 gallons/ year
    - ***Estimated Construction Costs (Low-High):*** $72,920 - 94,633
    - ***Estimated Annual Maintenances Costs (Low-High):*** $19 - 467
    - ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

83. **Unnamed Playlot:** 16th Avenue & Washington Street
    Located in the Midtown neighborhood, totalling .5 acre, Unnamed Playlot is completely vacant and still possesses paved over surfaces. Just block west from Broadway and located in an area with a dense street grid, #1 among all parks on the Gary Green Infrastructure Tool's stormwater management index.
    - ***Modeled Scenario Description:*** 8,700 sq. ft. of Rain Garden on .5 acre lot.
    - ***Estimated Runoff Reduction (Gallons Managed):*** 26,340 gallons/ year
    - ***Estimated Construction Costs (Low-High):*** $117,612 - 146,118

- ***Estimated Annual Maintenances Costs (Low-High):*** $31 - 754
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

84. Nichols Place: 220 Nichols Place

Located in the Pulaski neighborhood, totaling 2.64 acres, Nichols Place is a vacated pocket park with a swing set and basketball courts. With its position in a dense street grid, and bordered by the Norfolk Southern railroad to north, its surrounded by impervious surfaces. It ranks 3rd among all parks on the Gary Green Infrastructure Tool's stormwater management index.

- ***Modeled Scenario Description:*** 45,990 sq. ft. of infiltration basin on 2.64 acre lot.
- ***Estimated Runoff Reduction (Gallons Managed): 850,215 gallons/ year***
- ***Estimated Construction Costs (Low-High):*** $6,162 - 14,572
- ***Estimated Annual Maintenances Costs (Low-High):*** $119 - 4,313
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

85. Aetna Playground 1: 10th Avenue & Wyoming Street

Located in the Aetna neighborhood, totaling .27 acres, Aetna Playground #1 is currently a vacated park with a swing set and a slide. It ranks 11 among all parks on the Gary Green Infrastructure Tool's stormwater management index. Much of the lot is pavement, and with its location in a dense urban grid, and proximity to US 20, the area experiences frequent flood events due to impervious surfaces. Aetna has actively participated in the city's Vacant to Vibrant program, and more intentional green infrastructure on site could help with stormwater management and beautification on this lot.

- ***Modeled Scenario Description:*** 4,700 sq. ft. of Rain Garden on .27 acre lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 59,973 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $63,511 - 83,728
- ***Estimated Annual Maintenances Costs (Low-High***): $32 - 769
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

86. Van Buren Totlot: 16th Avenue & Van Buren Street

Located in the Midtown neighborhood, tolling .21 acres in size, Van Buren Totlot is at the dead end of 16th Avenue. It ranks 15th among all parks on the Gary Green Infrastructure Tool's stormwater management index. With its position in a dense street grid, it's surrounded by impervious surfaces.

- ***Modeled Scenario Description:*** 3,650 sq. ft. of Rain Garden on .21 acre lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 11,120 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $49,397 - 67,301
- ***Estimated Annual Maintenances Costs (Low-High):*** $26 - 618
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

87. Pierce Park: 200 Pierce Street

Located in the Ambridge Mann neighborhood, totaling .34 acres in size, Pierce Park is a vacant lot located less than 200 feet south of the Grand Calumet River, and just over 200 feet north of the South Shore railroad. It ranks 13th among all parks on the Gary Green Infrastructure Tool's stormwater management index. Positioned in the dense urban street network, it is surrounded by impervious surfaces.

- ***Modeled Scenario Description:*** 5,400 sq. ft. of Rain Garden on .34 acre lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 173,829 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $72,920 - 94,633
- ***Estimated Annual Maintenances Costs (Low-High):*** $37 - 904
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

88. Tarrytown Playground: 2039 Lane Street

Located in the Tarrytown neighborhood, and totaling .7 acres, Tarrytown Playground includes a basketball court and a paved vacant lot. Given its location in a dense street grid, the paved lot portion would be the ideal location for green infrastructure, to reduce impervious surfaces. It ranks 13th (tied with Peirce Park) among all parks on the Gary Green Infrastructure Tool's stormwater management index.

- ***Modeled Scenario Description:*** 12,200 sq. ft. of Rain Garden on .7 acre lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 188,940 gallons/ year

- ***Estimated Construction Costs (Low-High):*** $164,657 - 199,963
- ***Estimated Annual Maintenances Costs (Low-High):*** $87 - 2,110
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

Inactive or underutilized parks in flood-prone areas

Larger in size than totlots, these parks are not heavily visited by residents and are located in areas that experience lots of flooding and stormwater problems. In some instance they are completely vacant. In turn, they present opportunities for converting significant amounts of square footage to green infrastructure for stormwater management.

89. Aetna Park: 1200 Allen Street

Located in the Aetna neighborhood, totaling 3.5 acres, Aetna Park possesses a series recreational amenities like a baseball field, basketball court, etc. Portions of the park are overgrown, and given the areas flooding and stormwater issues, opportunities for green infrastructure are significant.

- ***Modeled Scenario Description:*** 30,400 sq. ft. of Rain Garden on 3.5 acre lot, and 60,000 sq. ft. parking lot repaved with permeable pavement.
- ***Estimated Runoff Reduction (Gallons Managed):*** 622,514 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $1,136,822 - 1,366,812
- ***Estimated Annual Maintenances Costs (Low-High):*** $3,748 - 22,514
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

90. June LaBroi Park: 110 Fayette Street

Located in the Aetna neighborhood, totaling 1.2 acres, June LaBroi Park possesses a series of artificially constructed berms and a jungle gym. It also is underutilized and exists in an area prone to flooding. Given its topography and location, opportunities for green infrastructure are significant.

- ***Modeled Scenario Description:*** 20,900 sq. ft. of Rain Garden on 1.2 acre lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 67,126 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $282,270 - 333,786
- ***Estimated Annual Maintenances Costs (Low-High):*** **$131 - $3,165**

- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

Active, heavily used parks with lots of paved surfaces

Given their location in commercial districts and neighborhood centers, this category of park benefits from green infrastructure, both as a strategy to address impervious surfaces, and as a means of beautifying recreational areas that are heavily visited.

91. Gateway Park: 300 Broadway

Located in Downtown, just to the east of Gary Metro Center, and north of Gary City Hall and the Lake County Superior Court building. At 4.3 acres in size, it sits at the crossroads of Interstate 90, US 12 & 20, and Broadway. The park's name speaks to its function, it sits at a major gateway area to Gary's downtown, from the highway and from the train station. Throughout the year, it holds numerous public events, and is highly visible. Due to its visibility, the park has a fountain, decorative landscaping, and various monuments. It also is surrounded impervious surface, and so decorative green infrastructure like rain gardens could contribute to both beautification and stormwater management in the park.

- ***Modeled Scenario Description:*** 26,100 sq. ft. of Rain Garden on 4.3 acre lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 197,684 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $352,837 - 413,765
- ***Estimated Annual Maintenances Costs (Low-High):*** $94 - 2,261
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

92. Jackson Park: 300 Jackson Street

Located in Horace Mann, Jackson Park sits west of downtown, north of US 12 & 20. Totaling 4.4 acres, the park holds 600 feet of the Gary GreenLink Trail, as well as a playground, basketball courts, a baseball diamond, and restrooms. There is also a closed pool. Given its recreation assets, which can serve to attract residents, and its location in a dense street network, green infrastructure like bioswales or rain gardens would make large visible impact in a heavily visited-public space in Gary, and address stormwater management issues.

- ***Modeled Scenario Description:*** 40,100 sq. ft. of Rain Garden on 4.4 acre lot, and 80,150 sq. ft. parking lot repaved with permeable pavement.
- ***Estimated Runoff Reduction (Gallons Managed):*** 473,410 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $1,392,006 - 1,653,493
- ***Estimated Annual Maintenances Costs (Low-High):*** $3,730 - 23,059
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

93. Reed Park: 1500 Connecticut Street

Located in the Midtown neighborhood, totaling 4.1 acres, Reed Park holds many recreational amenities including a splash pad, pavilion, baseball field, basketball court, playground equipment, shelter, pool, and locker rooms. The park also holds a rain and butterfly garden, and given its recreational assets and its location as a neighborhood center, opportunities to expand and enhance green infrastructure should be prioritized in this park.

- ***Modeled Scenario Description:*** 53,500 sq. ft. of Rain Garden on 4.1 acre lot
- ***Estimated Runoff Reduction (Gallons Managed):*** 215,986 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $723,317 - 831,831
- ***Estimated Annual Maintenances Costs (Low-High***): $128 - 3,089
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

94. Roosevelt Park: 2200 Harrison Street

Located in the Midtown neighborhood, behind Roosevelt High School, Roosevelt Park stands at just under 9 acres, and boasts a wide array of recreational amenities, including a pavilion, three baseball fields, a swimming pool, tennis courts, playground equipment, basketball courts, and a parking lot. Surrounded by a dense street network and in close proximity to the Little Calumet River, the area experiences a great deal of stormwater and flooding problems, and given its large size, green infrastructure like a bioswale could make a positive impact on site.

- ***Modeled Scenario Description:*** 3,980 sq. ft. of Rain Garden on 9 acre lot and 8 20 ft. by 5 ft. Bioswales (800 cumulative sq. ft. of Bioswales) along parking lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 9,924,995 gallons/ year

- ***Estimated Construction Costs (Low-High):*** $137,008 - 273,245
- ***Estimated Annual Maintenances Costs (Low-High):*** $10,834
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

95. Ambridge Mann Park: 200 Garfield Street

Located in the Ambridge Mann neighborhood, totaling 7 acres, Ambridge Mann Park sits directly to the south of the Grand Calumet River, and directly to the north of the South Shore railroad. It holds two baseball fields, basketball courts, playground equipment, with approximately 660 feet of the GreenLink Trail planned to run through the neighborhood. Due to its position on a riparian corridor, and surrounded by a dense street network, Ambridge Mann Park is an ideal location for green infrastructure, particularly on its north side.

- ***Modeled Scenario Description:*** *26,100 sq. ft. of Rain Garden on 7 acre lot.*
- ***Estimated Runoff Reduction (Gallons Managed):*** 65,171 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $705,675 - 811,967
- ***Estimated Annual Maintenances Costs (Low-High):*** $94 - 2,261
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

96. Borman Square Park: 700 Madison Street

Located in downtown, totaling 8.6 acres, Borman Square Park boasts natural features, recreational amenities, and greater topographical variation than any other park in Gary. In addition to a pavilion, pool, playground, tennis court, and basketball courts, there are trails crossing through a hilly, wooded area. With its position in a dense street network and its hill, there is the opportunity to incorporate green infrastructure into its natural features, to assist with stormwater management.

- ***Modeled Scenario Description:*** 18,500 sq. ft. of Rain Garden on 7 acre lot.
- ***Estimated Runoff Reduction (Gallons Managed):*** 1,683,883 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $249,926 - 297,064
- ***Estimated Annual Maintenances Costs (Low-High):*** $27,029
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

97. **Tolleston Park:** 1500 Rutledge Street

Located in the Tolleston neighborhood, and of the largest parks in the city, Tolleston Park stands at 17.6 acres in size. A park with a diverse set of amenities, Tolleston Park includes basketball courts, a baseball field, pavilion, playground, beach volleyball court, hiking trails, a swimming pool and water park, tennis courts, horseshoe pits, and picnic areas. With these amenities, and with its close proximity to the Boys & Girls Club, Tolleston Park is heavily used and heavily visited. Given its acreage, Tolleston Park has ample space for green infrastructure, which contribute towards beautification and stormwater management in a heavily visited public space.

- ***Modeled Scenario Description:*** *4,879 sq. ft. of Rain Garden on 7 acre lot.*
- ***Estimated Runoff Reduction (Gallons Managed):*** 1,109,377 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $65,863 - 86,457
- ***Estimated Annual Maintenances Costs (Low-High):*** $7,123
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

98. **Buffington Park:** 636 Connecticut Street

Located in Downtown, and totaling 8.6 acres in size, Buffington Park boasts a series of amenities including playsets, trails, a picnic shelter, and monument. Surrounded by a dense street grid, there is the opportunity to incorporate green infrastructure into the park's natural features to assist with stormwater management.

- ***Modeled Scenario Description:*** 9,030 sq. ft. of Rain Garden on 8.6 acre lot.
- ***Estimated Runoff Reduction (Gallons Managed): 822,136 gallons/ year***
- ***Estimated Construction Costs (Low-High): $122,023 - $151,178***
- ***Estimated Annual Maintenances Costs (Low-High):* $13,195**
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

99. **Howe Park:** 3901 Vermont Street

Located in the Glen Park neighborhood, totaling 3.5 acres, Howe Park holds various recreational amenities like a pavilion, pool areas, playgrounds, and tennis courts, in addition to a new splash pad, picnic shelter and basketball courts. With the

draw of these recreational amenities and given the neighborhood's stormwater problems, green infrastructure like bioswales or rain gardens would complement these other amenities in the park.

- ***Modeled Scenario Description:*** *29,400 sq. ft. of Rain Garden on 3.5 acre lot.*
- ***Estimated Runoff Reduction (Gallons Managed):*** 177,793 gallons/ year
- ***Estimated Construction Costs (Low-High):*** $396,942 - 463,672
- ***Estimated Annual Maintenances Costs (Low-High):*** $105 - 2,532
- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District

Green Flex Sites:

Green flex sites are areas where interim green infrastructure measures can be applied on large, vacant parcels, in advance of larger scale redevelopment occurring on those sites. Properties can include both brownfield sites and vacant public spaces, like parks. Currently, two such projects exist in Gary:

100. Junedale Fields: 51st Avenue & Madison Street

Located in the Glen Park neighborhood, Junedale Fields is a vacant city-owned little league field, standing at over 7 acres size. Since 2015, Greenprint Partners has maintained 5 acres of hybrid poplar trees, to assist with stormwater management from the creek to the south, and soil restoration on site. The pop-up tree farm also is situated just south of the Glen Park Leadership Academy, providing an educational opportunity for its students through partnerships.

101. Bear Brands: 205 E 21st Avenue

Located in the Midtown neighborhood, the Bear Brands site is a vacant city-owned brownfield that used to house the Bear Brands Hosiery Factory facility. Since 2016, Greenprint Partners has worked with Delta Institute to plant hybrid poplar trees on site, which removes contaminants from the soil through the process of phytoremediation. The project has also incorporated public art and recreational amenities on site.

- ***Key Partners:*** City Departments (Parks, Green Urbanism, Planning & Redevelopment), Gary Sanitary District, Gary Stormwater Management District, Private Land Managers

APPENDIX D: STORMWATER PARKS SCORING ASSESSMENT

Name	Tiers	Storm water IDX Score	Stormwater IDX rank	Conservation IDX Score	Conservation IDX rank	Rec & Beautification IDX Score	Rec & Beautification IDX rank (out of 55)
Jackson	1	61	8	1	29	32	29
Borman	1	50	20	1	33	28	39
Tolleston	1	49	22	0	35	47	9
Buffington	1	49	23	1	33	62	1
Howe	1	34	31	11	9	39	20
Pittman	1	27	39	0	35	46	10
Roosevelt	1	26	40	0	35	27	40
North Gleason	1	18	46	14	6	11	53
Hatcher	1	14	50	19	5	15	50
Marquette	1	10	52	65	1	8	54
Ironwood	1	8	53	0	35	19	46
Brunswick	1	4	55	59	2	15	50
Gateway	2	63	7	0	35	25	43
Reed	2	60	9	0	35	44	13
Ambridge Mann	2	51	18	0	35	33	28
Snake (East Glen Park)	2	33	33	4	17	45	12
Patcher	2	16	49	0	35	36	23
Seeberger	2	13	51	39	3	16	49
Nichols	3	68	3	3	19	35	24
Linear Park	3	63	6	0	35	38	21
June LaBroi	3	60	9	2	27	39	19
Aetna	3	59	12	0	35	49	5
Idle Hour	3	54	16	4	18	31	32
Glen Ryan	3	53	17	0	35	41	15
Rees	3	48	25	0	35	54	3
Carolina	3	48	25	0	35	32	29

Marshallltown	3	34	32	1	29	21	44
MC Bennett Greenhouse	3	29	36	13	7	31	36
Knox	3	17	47	0	35	19	46
Gibson	3	17	47	0	35	12	52
Tarrytown Playground	Inactive	57	13	1	29	59	2
Westbrook Park	Inactive	50	21	0	35	17	48
Norton Park	Inactive	43	30	0	35	52	4
Means Manor Totlot	Inactive	26	40	2	20	49	5
Sunrise Playground	Inactive	7	54	0	35	6	55
Unnamed Playlot	Inactive	70	1	11	9	49	5
Aetna Playground 2	Inactive	70	1	2	20	27	40
Aetna Playlot	Inactive	64	4	2	20	40	17
Central Drive Totlot	Inactive	64	4	2	20	31	32
Aetna Playground 1	Inactive	60	11	8	12	30	37
Pierce Park	Inactive	57	13	7	14	34	27
Van Buren Totlot	Inactive	57	15	13	8	32	29
Indian Boundary	Inactive	51	18	1	29	38	21
Pulaski Playground	Inactive	48	24	2	28	34	25
Westbrook Fields	Inactive	48	25	0	35	31	32
Hovey Playground	Inactive	47	28	4	15	31	32
Edison Park	Inactive	46	29	36	4	42	14
Dallas Totlot	Inactive	31	34	0	35	21	44
Kentucky Totlot	Inactive	30	35	2	20	30	38
Maryland Totlot	Inactive	29	37	8	13	41	16
Martin Luther King Dr Totlot	Inactive	29	38	2	20	25	42
Glen Park Playlot	Inactive	24	42	2	20	40	17
Georgetown Park	Inactive	21	43	4	15	49	5
Jundale Park	Inactive	19	44	0	35	45	11
Rutledge Totlot	Inactive	19	45	9	11	34	26

APPENDIX E: ZONING CASE STUDIES

Industrial Properties

Case Study 1

Property Address: 1000 & 1100 North Clark Road

Parcel Identification Number:

- 45-03-36-226-003.000-004,
- 45-03-36-276-001.000-004

Description: Two contiguous industrial properties north of the airport, directly abutting globally rare dune and swale wetlands. Wetlands onsite

Size: 38 acres
Neighborhood: Airport Zone
Zoning: M2 – General Manufacturing
Closest Environmental Feature: IDNR Clark & Pine Nature Preserve, wetlands and visible dune swale onsite
Conservation Impact Area: Within Conservation Impact Area (Green Link +)
Environmental Concern: Adjacency to protected wetlands

Case Study Feature	Area (Sq. ft.)	Area (acres)	%
Parcel ALL	1,667,919	**38.3**	100.00%
Wetlands on	631,187	**14.5**	37.86%
Riparian Buffer (35ft)	124,146	**2.85**	7.44%
Buildable Area (isolated)	123,891	**2.84**	7.42%
Buildable Area (contiguous)	788,695	**18.11**	47.27%

Case Study 1 Qualitative Assessment: This parcel has the presence of extensive wetlands connected to a contiguous wetland system. It would be very challenging to see any development occur on the wetlands inside the parcel. The buffer area around the wetlands does impede somewhat into the current footprint of the parcel's improved areas. However, the triangle area in the Southern corner of unimproved land is buildable and likely makes up for the buffer area which edges into the existing structures/parking lots.

Case Study 1 Conclusion: The regulation is functioning as designed. The buildable footprint remains similar to what it is currently. A full redevelopment (raze structures for rebuild) would include breaking up and revegetating buffer areas that are currently impervious (looks like parking lots). A partial-development outside of buffer areas would be unaffected by regulation. Partial-development within buffer areas would not be allowed.

Case Study 2 (CS_2)

Property Address: Michigan Street & 15th Avenue

Parcel Identification Number:

- 45-08-11-100-011.000-004

Description: Vacant industrial lot that is future headquarters of HMD Trucking, 1/3rd of a mile from Interstate 65.

Size: 11.3 acres
Neighborhood: Pulaski
Zoning: M2 – General Manufacturing
Closest Environmental Feature: Freshwater pond, shrub wetlands on north end of site
Environmental Concern: Freshwater pond, shrub wetlands on north end of site Conservation
Conservation Impact Area: <.5 mile from Conservation impact area to NE and SE
Index Score: 0
Stormwater Index Score: 28

Table 1: Case Study 2, Draft 2 (Riparian Buffer)

Case Study Feature	Area (Sq. Ft.)	Area (acres)	% Area
Parcel ALL	492,230	11.3	100.00%
Wetlands on	173,369	3.98	35.20%
Riparian Buffer (35ft)	29,621	0.68	6.02%
Buildable Area	289,240	6.64	58.76%

Case Study 2 Qualitative Assessment: this parcel has the presence of a freshwater pond and shrub wetlands located in the Northern section of the parcel that may have environmental concerns. The wetlands and freshwater pond will trigger USACE permitting challenges if the developer intends to infill development there. These should be considered unbuildable areas regardless of this regulation. The riparian buffer of 15% of total parcel will not only protect the wetlands but will also reduce potential flooding risk and severity due to wetland flooding. It might also matter whether the freshwater pond is naturally forming or if it is due to nearby drainage like from the highway interchange to the East. GI stormwater management of impervious surfaces will need to be installed within the buildable area which does not include the pond, wetlands, or buffer area. The 5.63 acres of buildable land should be adequate for developer. The buildable footprint is similar to nearby parcels that appear to have similar activities.

Case Study 2 Conclusion: The regulation is functioning as designed. Ecosystems and habitat within buildable parcel will restrict infill development through existing regulations (USACE) and the buffer will protect the ecosystem services provided by the wetlands and the industrial land use from wetland flooding. Development footprint is near 50% of the total parcel and at over 5 contiguous acres we do not see this regulation as a development hardship.

Case Study 3 (CS_3)

Property Address: Lake Sandy Jo

Parcel Identification Number:

45-08-18-328-001.000-003	45-08-18-426-002.000-003	45-08-18-426-012.000-003	45-08-18-426-021.000-003
45-08-18-328-002.000-003	45-08-18-426-003.000-003	45-08-18-426-013.000-003	45-08-18-426-022.000-003
45-08-18-328-003.000-003	45-08-18-426-004.000-003	45-08-18-426-014.000-003	45-08-18-426-023.000-003
45-08-18-328-004.000-003	45-08-18-426-005.000-003	45-08-18-426-015.000-003	45-08-18-426-024.000-003
45-08-18-328-005.000-003	45-08-18-426-006.000-003	45-08-18-426-016.000-003	45-08-18-426-025.000-003
45-08-18-328-006.000-003	45-08-18-426-007.000-003	45-08-18-426-017.000-003	45-08-18-426-026.000-003
45-08-18-328-007.000-003	45-08-18-426-008.000-003	45-08-18-426-018.000-003	45-08-18-426-027.000-003
45-08-18-328-008.000-003	45-08-18-426-009.000-003	45-08-18-426-019.000-003	45-08-18-426-028.000-003
45-08-18-328-009.000-003	45-08-18-426-010.000-003	45-08-18-426-020.000-003	45-08-18-426-029.000-003
45-08-18-328-010.000-003	45-08-18-426-011.000-003	45-08-18-328-016.000-003	45-08-18-426-030.000-003
45-08-18-328-011.000-003	45-08-18-328-012.000-003	45-08-18-328-017.000-003	45-08-18-426-031.000-003
45-08-18-426-036.000-003	45-08-18-328-013.000-003	45-08-18-328-018.000-003	45-08-18-426-032.000-003
45-08-18-426-037.000-003	45-08-18-328-014.000-003	45-08-18-401-001.000-003	45-08-18-426-033.000-003
45-08-18-426-034.000-003	45-08-18-328-015.000-003	45-08-18-426-035.000-003	

Description: Remediated superfund parcel (former quarry), targeted as a distribution center, 1.15 miles from Interstate 80/94 exit.
Size: 52 acres
Neighborhood: Small Farms
Zoning: R2 – Single Residential
Closest Environmental Feature: Little Calumet River
Environmental Concern: Freshwater emergent wetland to the northwest
Conservation Index Score: 0
Stormwater Index Score: 23

Case Study 3 Impact Area Analysis:

- No riparian buffer required- site not adjacent wetland or waterbody
- No conservation buffer required- parcel is not adjacent to conserved land or hi quality ecosystems (site is former brownfield).
- No unimproved buffer required- Site is surrounded by local roads and highway

Case Study 3 Qualitative Assessment: This parcel will be evaluated as industrial due to expected land use despite it is currently zoned as residential. There are no buffers present due to a lack of a) riparian areas, b) adjacency to a conserved parcel, c) location within Conservation Impact Area. The fact that the parcel is a remediated Superfund site there are implications for stormwater management

Case Study: The regulation is functioning as designed. This parcel does not have any stormwater ecosystem services or high-quality habitat to protect via buffers. The entire parcel is buildable though due to its remediated Superfund site status, the type of GI installed must be reviewed and okayed by city staff with the potential help of outside engineers

Case Study 4 (CS_4)

Property Address: 5400 W 5th Avenue (Edison School)

Parcel Identification Number:

- 45-07-01-180-001.000-004

Description: Vacant school with remnant dune and swale and inactive park on north end

Size: 20.5 acres
Neighborhood: Brunswick
Zoning: R2 – Single Family Residential
Closest Environmental Feature: Ivanhoe Nature Preserve, Grand Calumet River
Environmental Concern: Protecting remnant dune and swale, blight reduction
Proximity to Conservation Impact Area: within conservation impact area
Conservation Index Score: 39
Stormwater Index Score: 50

Case Study Impact Area Analysis: The site contained 4.1 acres of wooded area (High-quality habitat) and is zoned for single-family residential. A 10 ft. buffer was applied the wooded area (high-quality habitat). No riparian buffer is required because the parcel is not adjacent to any water bodies or wetlands. No unimproved land buffer is required because the parcel is surrounded roads. NOTE: "quality habitat" was determined through satellite imagery (wooded areas), it was not determined by existing datasets.

Case Study Feature	Area (Sq. Ft.)	Area (acres)	%
Parcel ALL	910,843	20.9	100.0%
High Quality Habitat	177,290	4.1	19.5%
Conservation Buffer (10ft)	19,602	0.5	2.2%
Buildable Area (Isolated)	69,261	1.6	7.6%
Buildable Area (contiguous)	644,691	14.8	70.8%

Case Study 4 Qualitative Assessment: This parcel will be evaluated as residential due to current zoning and that it is surrounded by dense residential areas. Though the future use of the site has not been identified, it seems like a good opportunity for either a multi-family parcel, mixed-use multi-family and retail, or publicly owned and managed to alleviate stormwater flooding concerns for neighboring residents. The high-quality natural area (remnant dune and swale) has been identified as an important landscape in need of protection. We should note that the site plan review process would trigger the on-the-ground First Pass Conservation Assessment where the identification of a dune and swale system would qualify the area for protection under this regulation. At over 4 acres in size, the area is large enough for conservation and site stewardship.

Case Study 4 Conclusion: The regulation is functioning as designed. High-quality habitat is protected via buffers appropriate to the potential impact of nearby lands. Due to the fact that a dune and swale area is located within the conservation impact area to be identified as protected then this regulation is functioning as it should help realize other city identified priorities Vis a Vis Gary Green Link. There is ample area within the contiguous buildable footprint for GI stormwater management for impervious surface runoff.

Case Study 5 (CS_5)
Property Address: 1531-16 Benton

Parcel Identification Number:

- 45-08-12-427-002.000-004

Description: Truck storage facility surrounded by wetlands

Size: 1.9 acres
Neighborhood: Aetna
Zoning: M1 – Limited Manufacturing
Closest Environmental Feature: Calumet Nature Preserve, Little Calumet River
Environmental Concern: Flooding from freshwater emergent wetland to the south
Conservation Priority Area Proximity: within conservation priority area
Conservation Index Score: 50
Stormwater Index Score: 65

Case Study 5 Impact Area Analysis: The site is adjacent to wooded areas (high-quality habitat) on the east and south sides of the parcel and is zoned for manufacturing. A 50 ft. buffer was applied the wooded area (high-quality habitat). No riparian buffer is required because the parcel is not within 100 ft. of wetland or water bodies (the wetland to the south of the parcel is >250 Ft. away). No unimproved land buffer is required because the parcel is surrounded roads on the west and north side. NOTE: "quality habitat" was determined through satellite imagery (wooded areas), it was not determined by existing datasets.

Case Study Feature	Area (Sq. Ft.)	Area (acres)	%
Parcel ALL	82,764	1.9	100.0%
High Quality Habitat	0	0	0.0%
Conservation Buffer (50ft)	26,136	0.6	31.6%
Buildable Area	56,628	1.3	68.4%

Case Study 5 Qualitative Assessment: The parcel will be evaluated as it currently is used and zoned for -m-1 industrial. If the parcel were too redeveloped under full-development parameters outlined in this regulation, then the conservation buffer would be applied as described to protect potential high quality ecosystems adjacent to it on the South and East. We should note that the site plan review process would trigger the on-the-ground First Pass Conservation Assessment. If specific landscapes or plants of interest are identified during the First Pass then a Second Pass Conservation Assessment replete with a floristic quality assessment (paid by the developer) would need to be completed. If the surrounding potentially high quality ecosystem has a score of ## or higher, then the 50 ft conservation buffer would be applied. If not, then the entire parcel would be buildable.

Case Study 5 Conclusion: The regulation is functioning as designed. Even with the conservation buffer applied, a contiguous 68% of the parcel would be buildable.

Case Study 6 (CS_6)

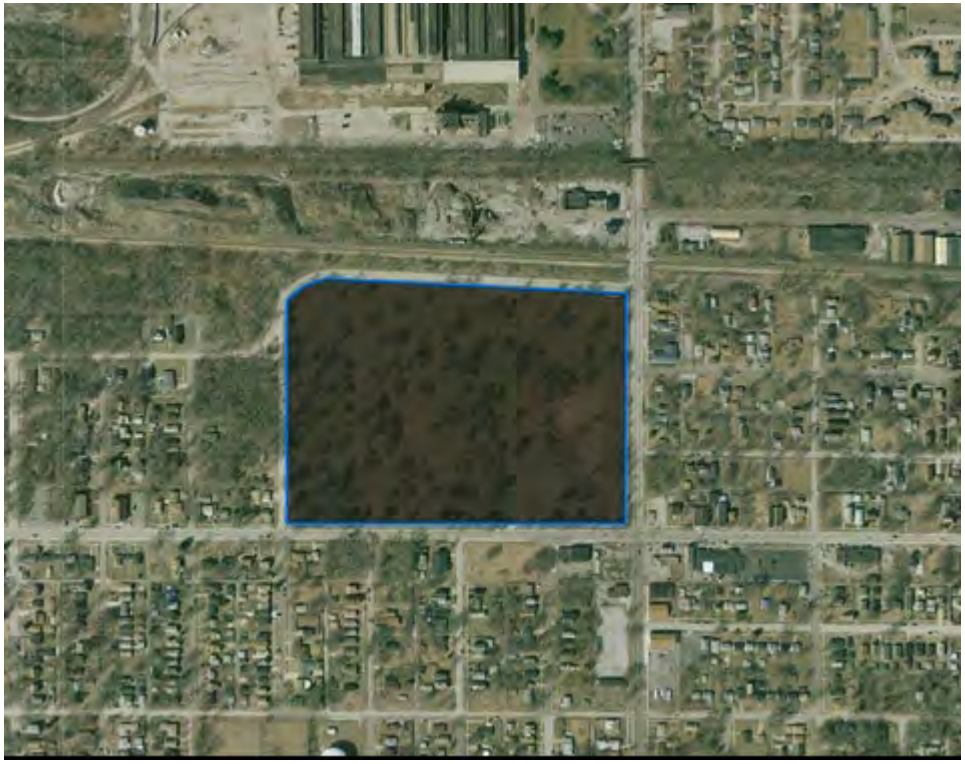
Property Address: Former Ivanhoe Gardens Site (11th Avenue & Chase Street)

Parcel Identification Number:

- 45-08-07-227-001.000-004
- 45-08-07-227-002.000-004
- 45-08-07-227-003.000-004
- 45-08-07-227-004.000-004
- 45-08-07-227-006.000-004

Description: Vacant parcel from former public housing project, targeted for redevelopment as a distribution center

Size: 25.5 acres
Neighborhood: West Side
Zoning: R5 – Multi-Family Residential
Closest Environmental Feature: Brunswick Park
Environmental Concern: Flooding and blight reduction
Conservation Index Score: 0
Stormwater Index Score: 54



Case Study 6, Impact Area Analysis-

- No riparian buffer required- site not adjacent wetland or waterbody
- No conservation buffer required- parcel is not adjacent to conserved land or hi quality ecosystems
- No unimproved buffer required- Site is surrounded by local roads and rail

Case Study 6 Qualitative Assessment: This parcel does not have any buffers applied due to a lack of a) riparian areas, b) adjacency to a conserved parcel, c) location within Conservation Impact Area. It is possible, based off of google street view images that this parcel is a large oak savanna, but due to not being inside of the Conservation Impact Area, it would not qualify for the First Pass. Could be a potential issue to review.

Case Study 6 Conclusion: The regulation is functioning as designed. This parcel does not have any high quality habitat to protect via buffers. There is ample opportunity/need for on-site GI stormwater management. Due to the high Stormwater Index Score, it's likely that this parcel would qualify for a Stormwater Impact Area in which there would be requirements for more runoff from impervious surfaces to be managed via GI. The entire parcel is buildable.

Case Study 7 (CS_7)

Property Address: 901 Alabama Street

Parcel Identification Number:

- 45-08-02-354-001.000-004

Description: Vacant screw and bolt factory

Size: 20 acres
Neighborhood: Emerson
Zoning: R5 – Multi-Family Residential (evaluated as industrial)
Closest Environmental Feature: Freshwater forested/shrub wetland to the south
Environmental Concern: Flooding
Conservation Index Score: 0
Stormwater Index Score: 23

Case Study 7 Impact Area Analysis:

Rational- The site contains wetlands onsite (Freshwater Forested/Shrub Wetland), high-quality habitat, and is zoned for manufacturing. A 100ft buffer was applied to the wetlands on and off-site on the south and west sides of the parcel, and a 50ft buffer was applied to the high-quality habitat on site and to the west of the parcel. The parcel on the north end is active, so no unimproved land buffer was applied.

NOTE: "quality habitat" was determined through satellite imagery (wooded areas), it was not determined by existing datasets. Site also contains abandoned rail line through high-quality habitat area.

Case Study Feature	Area (Sq. Ft.)	Area (acres)	%
Parcel ALL	859,878	19.7	100.00%
High Quality Habitat on Site	90,594	2.1	10.66%
Conservation Buffer (50ft)	49,223	1.13	5.74%
Wetlands on site	104,544	2.4	12.18%
Riparian Buffer (100ft)	31,799	0.73	3.71%
Buildable Area	581,093	13.34	67.72%

Case Study 7 Qualitative Assessment: Due to past industrial land use, the parcel is evaluated as industrial rather than it's currently zoned residential designation. The wooded areas to the West of the parcel are in fact rail line. If it is no longer used then the First Pass Conservation Assessment would need to be performed. If the rail line is active, then it would not occur. Through google street view images, it appears that the rail line is inactive and thus the potential conservation buffers are applied. If a full development were to occur, current improved areas within buffer areas would need to be broken up and revegetated.

Case Study 7 Conclusion: the regulation is functioning as designed. The regulations' assessment of rail line is a critical decision point that must be clear and easy to assess for the developer. Overall, while the regulation does reduce the buildable area to 57.7%, which a developer might see as a hardship, it is still over 11 acres for building footprint. Due to past manufacturing activities on-site a phase 1 and likely phase 2 environmental assessment will need to be performed, dwarfing site plan review and preparation costs for assessing the potential for high quality ecosystem both on-site and within the rail area.

Case Study 8 (CS_8)

Property Address: 6200 Industrial Highway APPR

Parcel Identification Number:

- 45-03-25-100-003.000-004
- 45-03-26-200-001.000-004

Description: Vacant lot, planned for redevelopment as steel manufacturing

Size: 78 acres
Neighborhood: Airport Area
Zoning: M3 – Heavy Industrial
Closest Environmental Feature: Freshwater forested/shrub wetland to the southeast
Environmental Concern: Flooding and disturbing wetlands
Conservation Index Score: 24
Stormwater Index Score: 53

Case Study 8 Impact Area Analysis: The site contains wetlands onsite (Freshwater Forested/Shrub Wetland, Freshwater Emergent Wetlands) and is zoned for manufacturing. A 100ft buffer was applied to the wetlands on site on the southeast sides of the parcel. The parcel is surrounded by roads on the 3 remains sides of the parcel, so no unimproved land buffer was applied.

Case Study Feature	Area (Sq. ft.)	Area (acres)	%
Parcel ALL	3,397,694	78	100.00%
Wetlands on site	1,139,534	26.2	33.50%
Riparian Buffer (100ft)	68,389	1.57	2.01%
Buildable Area	2,189,771	50	64.40%

Case Study 8 Qualitative Assessment: The buffer and wetland designation is applied perfectly. This parcel's wetland area is part of a critical swath of wetland and high quality habitat South of US Steel. The wetland section of the parcel is the least buildable area due to it being narrow (likely 500ft or so wide) and long.

Case Study 8 Conclusion: The regulation is functioning as designed. While a large portion of the parcel (38.8%) will not be buildable, that area is part of a critical ecosystem landscape that, through protecting, realizes the vision of the Gary Green Link.
A majority of the parcel is buildable.

Commercial Properties

Case Study 9 (CS_9)

Property Address: 6121 & 6131 E Melton Road

Parcel Identification Number:

- 45-09-06-480-003.000-004
- 45-09-06-480-011.000-004
- 45-09-06-480-012.000-004
- 45-09-06-480-005.000-004
- 45-09-06-480-016.000-004
- 45-09-06-480-015.000-004
- 45-09-06-480-014.000-004

Description: Large vacant commercial lot on US 20, a ¼ mile east of the Miller NICTD station and Lake Street commercial district.

Size: 12.8 acres
Neighborhood: Miller
Zoning: B-1
Closest Environmental Feature: Indiana Dunes National Lakeshore – Miller Woods
Environmental Concern: Lot of impervious surface, flooding and blight along corridor.
Conservation Index Score: 1
Stormwater Index Score: 73

Case Study 9 Impact Area Analysis:

- No riparian buffer required- site not adjacent wetland or waterbody
- No conservation buffer required- parcel is not adjacent to conserved land or hi quality ecosystems (site is former brownfield).
- No unimproved buffer required- Site is surrounded by local roads and commercial lots

Qualitative Assessment: The unimproved parcel to the South, while unimproved, is devoid of habitat and therefore would not trigger the need for a first pass assessment.

Conclusion: Lot is 100% buildable. The entire parcel should be considered buildable though on-site GI stormwater management will need to be installed to manage runoff from impervious surfaces if the parcel activity is full development.

Case Study 10 (CS_10)

Property Address: 564 Lake Street (Ming Ling Restaurant)

Parcel Identification Number: 45-09-06-402-028.000-004

Description: Large, vacant restaurant building in the middle of a walkable commercial district

Size: 0.18 acres
Neighborhood: Miller
Closest Environmental Feature: Unprotected freshwater wetland to the west, Indiana Dunes National Lakeshore – Miller Woods to the north
Environmental Concern: Stormwater and blight along corridor.
Conservation Index Score: 0
Stormwater Index Score: 73
Impact Area Analysis:

- No riparian buffer required- site not adjacent wetland or waterbody
- No conservation buffer required- parcel is not adjacent to conserved land or hi quality ecosystems.
- No unimproved buffer required- Site is surrounded by roads and developed Land

Case Study 10 Qualitative Assessment: This parcel will be evaluated as commercial based on its existing landuse and proximity to other commercial space. Buffers are not applied to this parcel, but given the high stormwater index score, it is likely it would be contained within a Stormwater Impact Area. Currently the entire parcel is impervious. If a developer decides to do a full redevelopment of the site there will need to be some area dedicated to on-site GI stormwater management. Given the nature of the storefront retail, the placement of the GI would likely be in the back area which is currently a parking lot.

Case Study 10 Conclusion: The regulation is functioning as designed. The entire site is buildable.

Residential

Case Study 11 (CS_11)

Property Address: 3200 Broadway (Gleason Park Golf Course)

Parcel Identification Number:

- 45-08-21-200-003.000-004
- 45-08-21-401-001.000-004

Description: Large public golf course that has been proposed for redevelopment as a commercial or institutional use.

Size: 103 acres
Neighborhood: University Park
Zoning: Northern portion is F1-Floodplain, southern portion is R1–Single Family Residential
Closest Environmental Feature: Little Calumet River
Environmental Concern: Flooding from the Little Calumet River
Conservation Index Score: 6
Stormwater Index Score: 15

Impact Area Assessment: About half of the site is zoned as a floodplain (non buildable area). The southern half of the site is zoned for residential and contains a wetland (freshwater pond). A 25 Ft. riparian buffer was applied to the wetland within the residentially zoned area.

Case Study Feature	Area (Sq. Ft.)	Area (acres)	%
Parcel ALL	4,462,304	102.4	100.00%
Riparian Buffer (25 ft)	20,038	0.5	0.45%
Wetlands on sites (that are not within floodplain)	34,848	0.8	0.78%
Floodplains on site	2,007,688	46.1	44.99%
Buildable Area	2,399,730	55.1	53.78%

Case Study 11 Qualitative Assessment: This is an interesting parcel as it is currently zoned residential, but the intended use is commercial or institutional (better of two options with IU Northwest and Lighthouse nearby). The floodplain area is not buildable and with its proximity to the Little Cal River, it is highly unlikely infill of the floodplain would be allowed as it would threaten nearby buildings with diverted flow. At 55 acres of buildable area, this parcel is large enough for major development activities. As any development would increase impervious surface coverage for the parcel, on-site GI stormwater management is critical. The regulation would likely allow the use of the freshwater pond to be utilized and enhanced to aid in stormwater management if it was installed and not naturally occurring (likely it was created given the golf course context). However, a floristic quality assessment of the freshwater pond would need to be performed and if shown to be low quality then likely stormwater management would be acceptable to permitting bodies (USACE, IDEM, IDNR).

Case Study 11 Conclusion: The regulation is functioning as designed

Case Study 12 (CS_12)

Property Address: 1301-14 Arizona Street (Aetna School)
Parcel Identification Number:

- 45-08-12-256-007.000-004

Description: Vacant school

Size: 11.2 acres
Neighborhood: Aetna
Zoning: R2–Single Family Residential
Closest Environmental Feature: Unprotected forest land to the southwest
Environmental Concern: Stormwater and blight
Conservation Index Score: 0
Stormwater Index Score: 23

Impact Area Assessment: There is a wooded area on the southwest portion of the site (high-quality habitat) and the site is zoned residential. A 10ft conservation buffer was applied to the high-quality habitat on site. The west and north sides of the site are surrounded by roads, and the parcel adjacent to the east are in active use so no unimproved or riparian buffers we applied.

Case Study Feature	Area (Sq. Ft.)	Area (acres)	%
Parcel ALL	485,260	11.1	100.0%
Conservation Buffer (10 ft)	14,375	0.3	3.0%
High Quality Habitat on site	161,173	3.7	33.2%
Buildable Area (isolated)	34,413	0.8	7.1%
Buildable Area (contiguous)	275,300	6.3	56.7%

Case Study 12 Qualitative Assessment: The wooded area within the parcel would need to be evaluated via First and Second Pass before the protection zone and buffer are placed. If the landscape is a high quality ecosystem then it would be applied. The remaining buildable area of 63.8% should be sufficient, especially given that the current impervious surface footprint is significantly less area.

Case Study 12 Conclusion: the regulation is functioning as designed. The developer will be required to at least perform a First Pass of the unimproved wooded area prior to a Site Plan Review.

Case Study 13 (CS_13)

Property Address: 8th & Broadway (Memorial Auditorium parcel)

Parcel Identification Number:

- 45-08-03-351-001.000-004
- 45-08-03-351-002.000-004
- 45-08-03-351-008.000-004

Description: Vacant downtown lot with remnant of historic structure, new mixed use housing development planned

Size: 1.63 acres
Neighborhood: Downtown
Zoning: B2- General Retail
Closest Environmental Feature: Buffington Park
Environmental Concern: Flooding and stormwater runoff from impervious surfaces
Conservation Index Score: 0
Stormwater Index Score: 80

Case Study 13 Impact Assessment:

- No riparian buffer required- site not adjacent wetland or waterbody
- No conservation buffer required- parcel is not adjacent to conserved land or hi quality ecosystems (site is former brownfield).
- No unimproved buffer required- Site is surrounded by local roads and commercial lots.

Case Study 13 Qualitative Assessment: No buffers applied. Entire lot is buildable, however, placement of onsite GI Stormwater management will be a concern for developer as the site looks to be entirely impervious surfaces.

Case Study 13 Conclusion: the regulation is functioning as designed. The entire lot is buildable.

Case Study 14 (CS_14)

Property Address: Lakeshore Commons (Hemlock Street & Lake Street)
Parcel Identification Number:

45-05-31-401-001.000-004	45-05-31-403-003.000-004	45-05-31-403-012.000-004
45-05-31-401-002.000-004	45-05-31-403-004.000-004	45-05-31-403-013.000-004
45-05-31-401-003.000-004	45-05-31-403-006.000-004	45-05-31-404-001.000-004
45-05-31-402-001.000-004	45-05-31-403-007.000-004	45-05-31-404-002.000-004
45-05-31-402-002.000-004	45-05-31-403-008.000-004	45-05-31-404-003.000-004
45-05-31-402-003.000-004	45-05-31-403-009.000-004	45-05-31-404-004.000-004
45-05-31-403-001.000-004	45-05-31-403-010.000-004	45-05-31-404-005.000-004
45-05-31-403-002.000-004	45-05-31-403-011.000-004	45-05-31-404-010.000-004

Description: Low income housing site, located just east of Indiana Dunes National Lakeshore –Miller Woods, and just south of Lake Street Beach

Size: 21.5 acres
Neighborhood: Miller
Zoning: R6 – Multi-Family Residential
Closest Environmental Feature: Miller
Environmental Concern: Protecting Miller Woods and Lake Michigan from flooding and stormwater runoff
Conservation Index Score: 5
Stormwater Index Score: 65

Case Study 14 Impact Area Analysis: The site contains wetlands (Lake) on the north end of the side, is adjacent to Miller Woods (high-quality ecosystem) on the west side of the side, and is zoned residential. A 25-foot riparian buffer was applied to the wetlands on the north end of the side, and a 10ft conservation buffer was applied to the west side of the site. Roads run along the south and east ends of the site. No unimproved land buffers were applied.

Case Study Feature	Area (Sq. Ft.)	Area (acres)	%
Parcel ALL	889,499	20.4	100.00%
Conservation Buffer (10 ft)	13,939	0.3	1.60%
Wetlands on Site	24,396	0.6	2.70%
Riparian Buffer (35 ft)	21,780	0.5	2.45%
Buildable Area	829,384	19.0	93.33%

Case Study 14 Qualitative Assessment: The parcel will be valued as a residential parcel for development. It appears that this may be a case study on how the regulation WOULD HAVE IMPACTED development of the parcel. Overall it looks like there might have been some impact on the buffer area at the Northern end of the site, which might have forced the homes to shift southward. The conservation buffer on the West side of the parcel looks like it would have had minimal to no impact on where roads were placed.

Case Study 14 Conclusion: The regulation functions as designed.

Case Study 15 (CS_15)

Property Address: Colonial Gardens (35th Avenue & Kentucky Street)

Parcel Identification Number:

45-08-22-407-001.000-004	45-08-22-407-018.000-004	45-08-22-407-035.000-004
45-08-22-407-002.000-004	45-08-22-407-019.000-004	45-08-22-407-036.000-004
45-08-22-407-003.000-004	45-08-22-407-020.000-004	45-08-22-407-037.000-004
45-08-22-407-004.000-004	45-08-22-407-021.000-004	45-08-22-407-038.000-004
45-08-22-407-005.000-004	45-08-22-407-022.000-004	45-08-22-407-039.000-004
45-08-22-407-006.000-004	45-08-22-407-023.000-004	45-08-22-407-040.000-004
45-08-22-407-007.000-004	45-08-22-407-024.000-004	45-08-22-407-041.000-004
45-08-22-407-008.000-004	45-08-22-407-025.000-004	45-08-22-407-042.000-004
45-08-22-407-009.000-004	45-08-22-407-026.000-004	45-08-22-407-043.000-004
45-08-22-407-010.000-004	45-08-22-407-027.000-004	45-08-22-407-044.000-004
45-08-22-407-011.000-004	45-08-22-407-028.000-004	45-08-22-407-045.000-004
45-08-22-407-012.000-004	45-08-22-407-029.000-004	45-08-22-407-046.000-004
45-08-22-407-013.000-004	45-08-22-407-030.000-004	45-08-22-407-047.000-004
45-08-22-407-014.000-004	45-08-22-407-031.000-004	45-08-22-407-048.000-004
45-08-22-407-015.000-004	45-08-22-407-032.000-004	45-08-22-407-049.000-004
45-08-22-407-016.000-004	45-08-22-407-033.000-004	45-08-22-407-050.000-004
45-08-22-407-017.000-004	45-08-22-407-034.000-004	

Description: Vacant low-rise public housing project

Size: 8 acres

Neighborhood: University Park

Zoning: R2 – Single Family Residential

Closest Environmental Feature: Little Calumet River

Environmental Concern: Freshwater wetlands west and to the northeast of the site

Conservation Index Score: 8

Stormwater Index Score: 35

Case Study 15 Impact Area Analysis-

- No riparian buffer required- the site is adjacent wetland on the east side, but the site and wetland are separated by a road
- No conservation buffer required- parcel is not adjacent to conserved land or hi quality ecosystems (site is former brownfield).
- No unimproved buffer required- Site is surrounded by local roads. The site contains 50 single family residential parcels. Over half of the parcels contain vacant/ abandoned structures

Case Study 15 Qualitative Assessment: The parcel will be evaluated as a residential parcel for development. It appears that this may be a case study on how the regulation WOULD HAVE IMPACTED development of the parcel. The riparian buffer is not applied as there is a road between wetlands and the site.

Case Study 15 Conclusion: The regulation is functioning as designed

APPENDIX F: DOCUMENTS & SITES SOURCED

Plans, Studies, Guides & Ordinances	Organization	Published
Gary Green Link Master Plan	City of Gary, Indiana	2005
Gary Comprehensive Plan		2008
East Lakefront Master Plan		2016
University Park – Blueprint for Change		2017
Storm Water Management Ordinance		2006
Gary Smart Growth Principle Initiative		2007
Gary Municipal Zoning Ordinance		2010
Regional Conservation Action Plan for the Gary/Chicago International Airport	Gary Chicago International Airport	2012
2040 Comprehensive Regional Plan	Northwestern Indiana Regional Planning Commission	2011
The Marquette Plan 2015 – The Lakefront Reinvestment Strategy		2015
Functional Classification Map		2016
Green Infrastructure Designs Guide	Delta Institute	2017
Guide to Flood Susceptibility and Stormwater Planning	Chicago Metropolitan Agency for Planning	2018
Green Infrastructure Vision (Version 2.3) Ecosystem Service Valuation		2014
Policies to Encourage the Preservation of Regional Green Infrastructure		2014
Project Clean Lake: Green Infrastructure Plan	Northeast Ohio Regional Sewer District	2012
Land Development Ordinance	City of Camden, New Jersey	2011
Unified Development Ordinance	City of Buffalo, New York	2016
Stormwater Management Regulations	City of Milwaukee, Wisconsin	2018
Stormwater Plan Review Guidelines – Regulatory Requirements	City of Philadelphia, Pennsylvania	2018
Stormwater Drainage System Design Criteria	Grand Rapids, Michigan	2013
Environmental Overlay Districts	City of Pittsburgh, Pennsylvania	2018
Stormwater Code	City of Seattle, Washington	2009
Riparian Setback Ordinance	City of Cleveland, Ohio	2006
Comprehensive Zoning Ordinance	City of New Orleans, Louisiana	2015
Green Infrastructure Barriers and Opportunities in Camden, New Jersey	US Environmental Protection Agency	2013
Critical Dune Area Program	State of Michigan – Department of Environmental Quality	2012

Steep Slope Ordinance	Lake Forest, Illinois	2011
Green Infrastructure: *A Landscape Approach-Planning Advisory Service Report 571*	American Planning Association	2013
Advancing Northwest Indiana's Logistics As The Gateway To The World	Conexus Indiana	2017
Indiana Dunes Country Education Guide	Indiana Dunes Tourism	2013
Stabilizing Local Housing Markets in Cuyahoga County: Blight Elimination	Federal Reserve Bank of Cleveland	2017
Public Private Partnerships and Finance of Large-Scale Green Infrastructure in the Great Lakes Basin	Environmental Consulting & Technology, Inc.	2017
Urban Land: Urban Agriculture Practices to Improve Cities	Urban Land Institute	2017
Web Tools	**Organization**	**Published**
Gary Green Infrastructure Tool	City of Gary, Indiana	2017
National Stormwater Calculator	US Environmental Protection Agency	2018
NYC Green Infrastructure Co-Benefits Calculator	City of New York, New York	2015
Data Sources	**Organization**	**Published**
Property Data	City of Gary, Indiana	2017
	Lake County Assessor's Office	2017
Soils, Sewer & Stormwater Data	Gary Sanitary District	2017
Web Articles	**Organization**	**Published**
Top 10 Most Populous Metropolitan Areas	US Census	2018
Areas and Volumes of the Great Lakes	Encyclopedia Britannica	2013
The Natural Heritage of Indiana: Indiana Dunes	Indiana Historical Bureau	2018
Indiana Dunes National Park website	National Park Service	2019
Waterways Permitting Handbook	Indiana Department of Environmental Management	2016
Wetlands Restoration Definitions and Distinctions	US Environmental Protection Agency	2017
Stormwater Discharges from Municipal Sources		2017
Gary Sanitary District and City of Gary Clean Water Settlement		2016
"Looking back at the Flood of 2008"	Northwest Indiana Times	2012
"Detroit studying whether to shut water in underpopulated neighborhoods"	Bridge	2018
Vacant to Vibrant	Legacy City Design	2017
Soil Infiltration: Soil Quality Guide for Educators	US Department of Agriculture & Natural Resources Conservation Service	2018

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