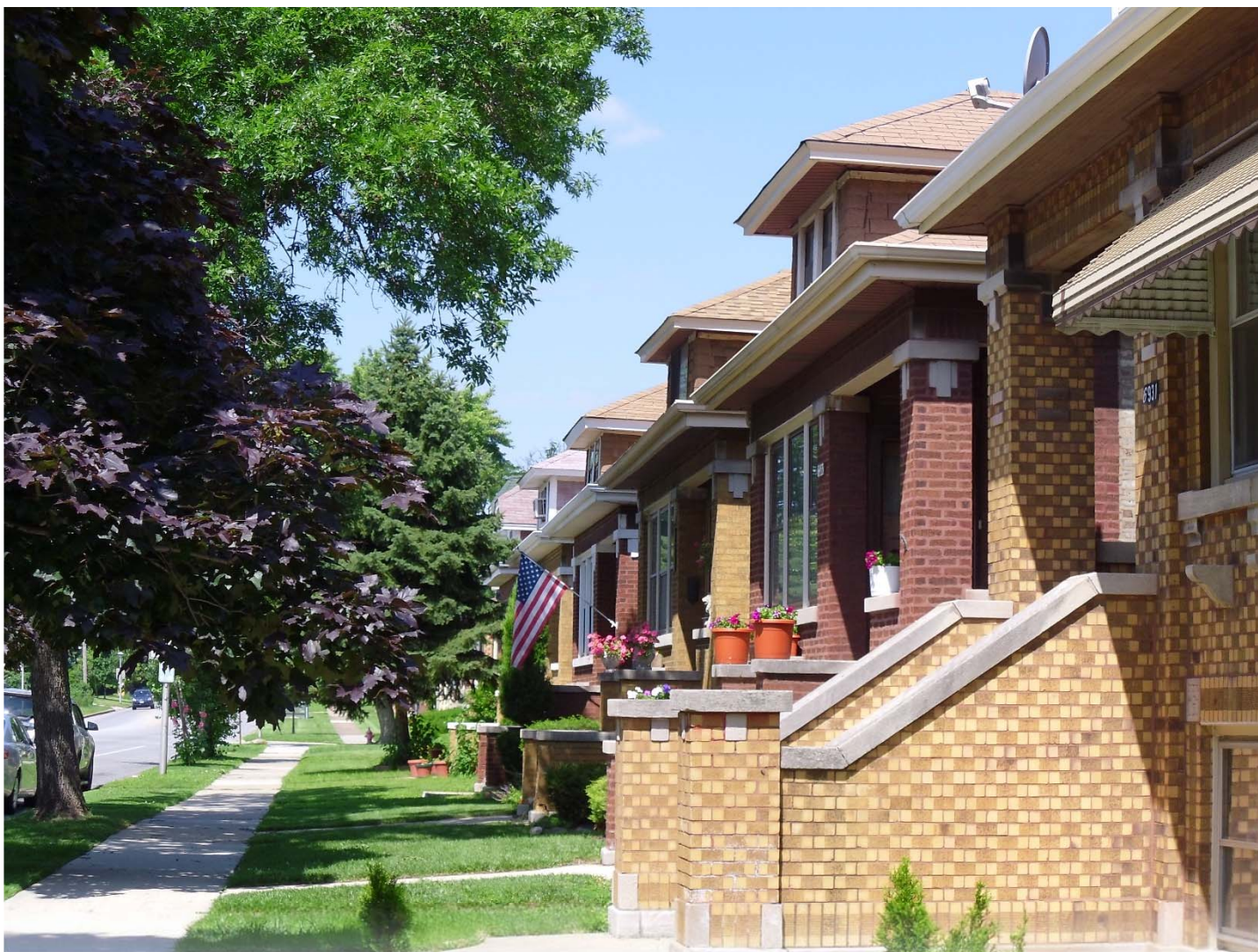




City of Berwyn, IL

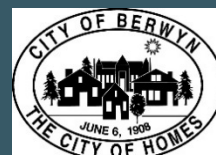
Stormwater Management Plan

Adopted July 10, 2018

City of Berwyn, IL

Stormwater Management Plan

Prepared for:



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July 2018

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1.1 STORMWATER BACKGROUND

Like many communities in suburban Chicago, Berwyn is an older urban community that was originally developed with a combined sewer system (as opposed to separate stormwater and sanitary sewage systems that exist in newer communities). In the combined system, raw sewage and stormwater runoff are combined and carried through the local pipe system to interceptors and, ultimately, a treatment plant. When the volume of water exceeds the pipe capacity, as typically seen in significant rain events, the combined stormwater runoff and raw sewage can back up into basements, street drains, and adjacent waterways. For example, the storms of April 2013 caused widespread flooding in Berwyn, including backups into many homes. In light of climate change, experts project an increase in the number and frequency of short and intense rain events in the future, which would strain the City's combined sewer system.



The City of Berwyn has no natural waterways and handles stormwater with its combined sewer system. The City has 100 miles of combined sewer mains ranging from 8 inches to 7.5 feet in diameter. Sewage and wastewater is generated inside homes and businesses through sinks, toilets, dishwashers, washing machines, etc. The stormwater enters the combined sewer system from yards, streets, parking lots, and exterior drains. Because of this dual duty, combined sewers are easily overwhelmed in wet weather conditions and can cause basement flooding. The combined sewer and sanitary systems

discharge into Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) sewer lines, which are much larger and commonly referred to as interceptors. In Berwyn there are five interceptor sewer lines owned and maintained by MWRDGC. The combined sewer system conveys both sanitary sewage and stormwater to the MWRDGC interceptors in Berwyn and eventually to the MWRDGC Stickney Water Reclamation Plant.

The combined sewer system in Berwyn is tributary to the MWRDGC interceptors and Tunnel and Reservoir Plan (TARP). Berwyn is at the downstream end of the MWRDGC interceptor system. Chicago, Oak Park, Forest Park, River Forest, and Elmwood Park are all contributors to this system upstream of Berwyn. The ultimate receiving point for TARP is the McCook Reservoir where sewer overflow is then pumped and treated at the Stickney Water Reclamation Plant. Stage 1 of the McCook Reservoir has been completed and provides 3.5 billion gallons of storage; Stage 2 will be complete in 2029 and will provide an additional 6.5 billion gallons of storage.

1.0 Introduction

While the added capacity to the TARP system will benefit some, the majority of combined sewer-related flooding in the City is related to limited capacity in the sewer system upstream of the outfalls to TARP.¹

1.2 FLOODING HISTORY

Flooding in Berwyn is generally caused by limited sewer capacity, lack of detention facilities, high groundwater levels resulting from storm events, and inadequate overland flow routes. Except for very special cases, sewers in general are not intended to convey large storm events greater than the 10-year event. This was true both in the past as well as with modern sewer designs used by engineers today.

Because Berwyn is an older community, most sewers are undersized due to the increase of impervious area, and the increase of sanitary sewage over time. In Berwyn, many of the neighborhoods have restrictive flows out of their local sewer. When combined sewer systems are undersized or in need of repair, or when large rainfall events occur, water will pond and attempt to find other routes of flow. It is normal to observe water flowing in gutters and ditches during these large storm events. When adequate and safe overland flow pathways are not present to carry runoff that exceeds the sewer capacity, flooding results. Berwyn is relatively flat, which can result in extensive ponding.

In addition to street flooding and ponding, the combined sewer system can cause water to back up into basements during large storm events. Basement flooding is the most common and problematic type of flooding in Berwyn. In some areas of the city, inadequate flow routes out of the alleys can lead to surface ponding and contribute to high groundwater and seepage issues.

In general, storms of a shorter duration and higher intensity cause a higher incidence of flooding issues for a combined sewer system. Since the City began collecting flood reports in 2010, Berwyn has experienced storms causing significant flooding in 2010, 2011, 2013, 2014, 2015, 2016, and 2017. These flood events are widespread among the City's residential neighborhoods. **Figure 1** (Page 1-3) for FEMA individual assistance claims from presidentially declared disasters in August 2007, September 2008, July 2010, and April 2013, as well as reported flooding locations collected by the City from July 2014 to October 2017.

¹ Refer to the MWRDGC handout "Understanding Your Sewer" (included as Appendix 2) for more information on the local combined sewer system, MWRDGC interceptors, and TARP system.

Scale:

0 200
[Redacted] Feet

Project Number: 15-0XXX

Prepared by:

Hey and Associates, Inc.
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Orientation:



Latest Revision: 11/8/2017

Orientation: Legend:

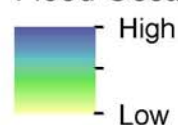
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→ Collector Sewer

----- Berwyn Limits

☐ Sewershed Boundaries

Density of Reported Flood Occurrences*



*Includes FEMA Individual Assistance claims and City flood reports

Project Name:
Berwyn Stormwater Analysis

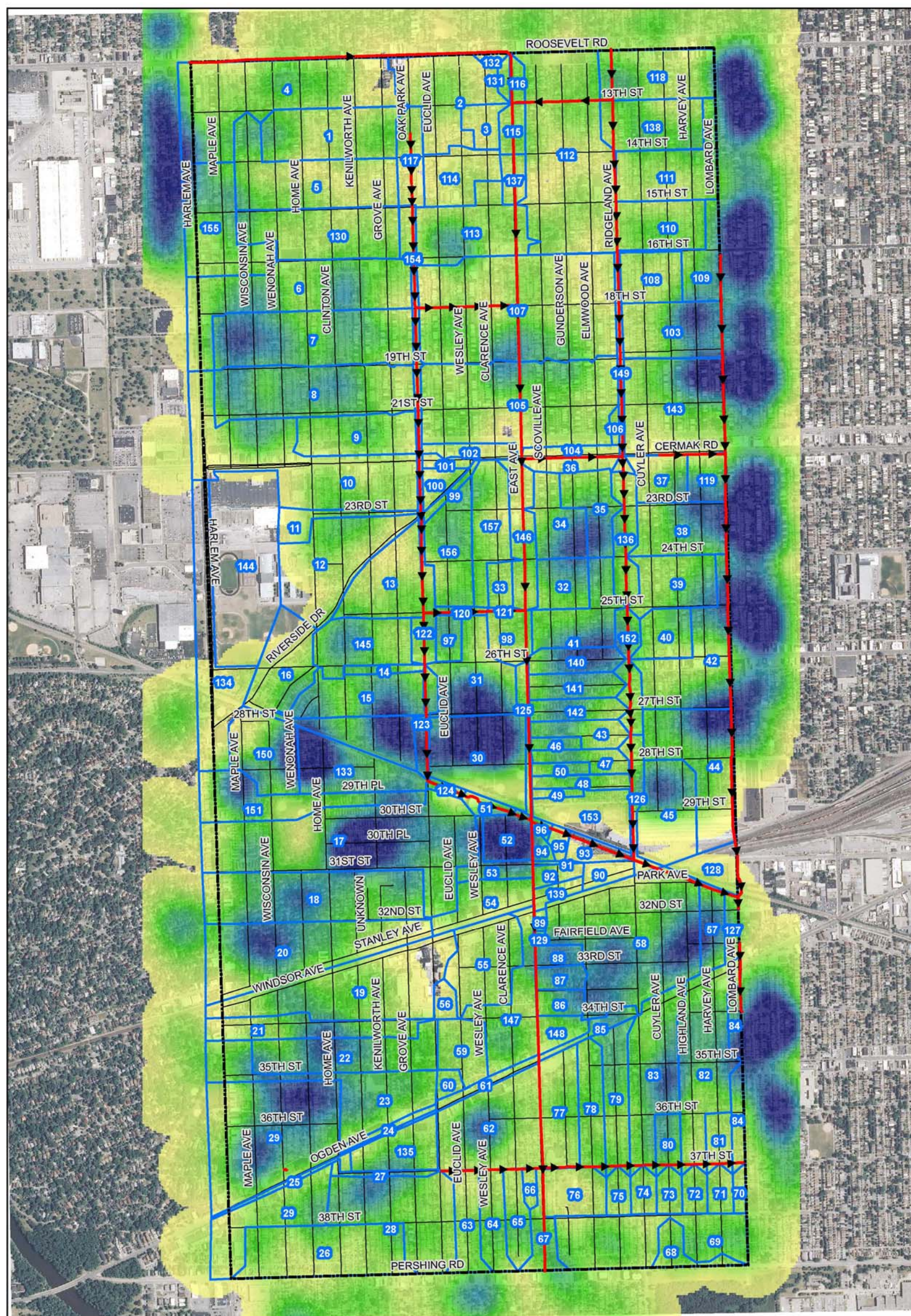
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CMAA

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Reported Flooding Locations

Figure:
1



1.0 Introduction

The flood events of April 2013 caused widespread flooding in the City of Berwyn (see Appendix 2). In May 2013, President Obama declared that a major disaster (DR-4116) occurred from the severe storms, straight-line winds, and flooding experienced from April 16 to May 5, 2013, in Illinois, including Cook County. After the storm, Cook County engaged the City of Berwyn in a needs assessment to understand the damages experienced by the community. The City reported 87 homes and 3 public schools affected by the storm and that storm sewers reached capacity causing sewer line failures and backups into many homes. Payments totaling \$1,267,203 from 303 claims were paid to residents in the City, as a result of the April 2013 storm from Individual Assistance grants federal program. In 2015, IDNR conducted a study of the cost and prevalence of urban flooding and found that 90 percent of damage claims were for locations outside of the mapped 100-year floodplain, highlighting the prevalence of urban flooding that occurs. Given that private insurance claims are not accounted for and some residents and businesses may not have filed a claim or been aware of assistance programs, Berwyn likely experienced additional damages beyond the \$1,267,203 documented.

While no road closures were documented in the community by Cook County, there are several low-lying streets, especially beneath the Canadian National viaducts at Oak Park Avenue and East Avenue, which may have become flooded during the storm and could have impeded transportation access of commercial, personal, and emergency trips. During major storm events, the Public Works Department routinely checks these viaducts to clear drains in the event that they become clogged and contribute to flooding.

Floodwaters carry pollutants which result in water quality impairment of rivers and streams, from both combined and separate sewers. Pollutants can include, but are not limited to, sediment, oil, grease, and toxic chemicals from motor vehicles; pesticides and nutrients from lawns and gardens; viruses, bacteria, and nutrients from pet waste and combined sewer overflows; road salts; and heavy metals from roof shingles. All of these pollutants can harm fish and wildlife populations, kill native vegetation, and make water recreation and adjacent recreational areas unsafe and unpleasant. In a combined sewer community such as Berwyn, these pollutants may only discharge to rivers and streams during heavy rainstorms resulting in combined sewer overflows. However, if a basement floods due to sewer backup, these pollutants from the combined sewer system can end up in homes which can create potential health risks that requires diligent cleanup and restoration.



The City of Berwyn will continue to face flooding and water pollution challenges in the future as a result of climate change. The Chicago region has been experiencing increases in annual precipitation and the number of very large storms that produce more than one inch of precipitation. Climate models suggest that the region will see greater variation in annual precipitation, with wetter wet years and drier dry years. These models also suggest that a larger proportion of precipitation will fall during a small number of very large storms, rather

than being distributed evenly throughout the year. The result will place increased strain on the combined sewer system and continue to put vulnerable residents, businesses, and infrastructure at risk of flooding. See Appendix 3 for more information on climate vulnerability.

1.3 PLANNING PROCESS

The planning process to create the Stormwater Management Plan included multiple steps that were undertaken over approximately 10 months. The process was developed in close consultation with the City of Berwyn and was designed to include input from community residents, business owners, park districts, school districts, and community leaders throughout.

- Project initiation (September 2017)
- Community outreach and engagement (November 2017–February 2018)
- Stormwater analysis (September–November 2017)
- Key recommendations (December 2017–January 2018)
- Plan and concept development (February–May 2018)
- Public review and adoption (June 2018)
- Community implementation of the plan (begins July 2018)

A complementary process took place to assess the City’s vulnerability to climate change. The assessment explored climate-related hazards affecting stormwater issues in Berwyn today and in the future, the vulnerability of different populations and areas of the City, as well as the City’s capacity to adapt to these changes. The findings of this assessment have been integrated into the Stormwater Management Plan (see also Appendix 3).

1.3.1 Community Engagement Overview

To better understand and address the community’s needs and vision for the corridor’s future, a number of community engagement activities were conducted to gather public feedback. In addition to the ongoing input of the project steering committee, this included conducting interviews with key stakeholders and conducting a public open house to identify the primary concerns of local residents, business owners, and other stakeholders. Overall, participants held many of the same concerns and generally expressed the desire for the City to continue investing in the stormwater management system, providing assistance to homeowners through the cost share program, and educating residents and businesses on how they can improve stormwater management on their properties. Some key findings include:

- Basement backups are the most severe and unsafe type of flooding and affect homeowners and renters alike.
- Basement seepage is a concern for many residents, especially in older homes with limestone foundations.

1.0 Introduction

- Not all homeowners can discern basement backups from basement seepage, which can result in making improvements to fix one problem and not the other.
- Improvements can be too costly for some residents to make, even with cost assistance from the City.
- Investments should be made in green and grey infrastructure improvements, including larger-scale stormwater projects that can benefit several blocks.
- Regulations for new development and redevelopment have helped reduce the City's stormwater burden, but can be difficult to meet on small lots.

1.4 PREVIOUS PLANS, STUDIES, AND IMPROVEMENTS

Several plans and studies developed for Berwyn in recent years address stormwater management through a policy and regulatory framework and through the development of design guidelines for infrastructure and site planning. These plans and studies have been reviewed and considered in the development of this plan.

Generally, transportation plans and proposed infrastructure improvements for Berwyn, such as the 2011 Active Transportation Plan and the Complete Streets Policy, create opportunities for managing stormwater and runoff through project development and design requirements. As transportation projects come through the development cycle, thoughtful design will address existing and future conditions that will help manage stormwater in Berwyn. For example, the Depot Drainage Study was prepared specifically to address flooding in the Depot District by establishing a defined drainage area with proposed sewer capacity improvements.

The 2012 Berwyn Comprehensive Plan is the guiding document for land use planning and serves as the policy element of the 2017 Zoning Ordinance. The Natural Environment, Open Space and Recreational Goals and Objectives chapter of the Comprehensive Plan calls for the incorporation of best management practices to reduce flooding and surface water runoff as well as improve overall stormwater management throughout Berwyn. As mentioned previously, the flood events of April 2013 created an immediate need for better flood management planning and general stormwater management.



New development within the Depot District Drainage Study.

A draft Stormwater Management Plan was developed by the City in 2014. Many elements of the plan were incorporated into the 2014 Cook County Multi-Jurisdictional Hazard Mitigation Plan, the 2017 Zoning Ordinance, and other programs and initiatives, as appropriate.

The 2014 Cook County Multi-Jurisdictional Hazard Mitigation Plan includes the City of Berwyn and provides an overall framework for partnership and funding opportunities related to flooding and stormwater management. Various projects and initiatives are identified in the annual plan update and have included successful programs such as the MWRDGC Residential Rain Barrel initiative, grant funding for the Depot District Streetscape Project and the Green Alley program, spot repairs to the sewer system, and larger infrastructure projects such as the 19th Street Generator project.

The 2017 Zoning Ordinance codified stormwater regulations that are generally found in Chapter 1250: Landscape Standards. These new regulations include more robust site plan review for planned developments; design criteria for the construction, expansion, and/or reconstruction of certain parking lots; compliance through a new fee-in-lieu payment structure; and operation and maintenance plans for stormwater management on private property. It is essential that these regulations be implemented and enforced consistently and uniformly by Berwyn's various government departments. This may require additional staff outreach and training.

Existing stormwater projects have been implemented by the City, its partners, and private entities across Berwyn (**Figure 2**, Page 1-8). A StormTrap system was installed at Proksa Park to enable usage of the park after rain events as well as provide a neighborhood level flooding benefit. Permeable pavers were installed at the Liberty Cultural Center parking lot. A large detention pond was installed at the Morton West High School. Multiple private developments have installed detention in accordance with the MWRDGC Watershed Management Ordinance that provide a stormwater benefit to Berwyn.

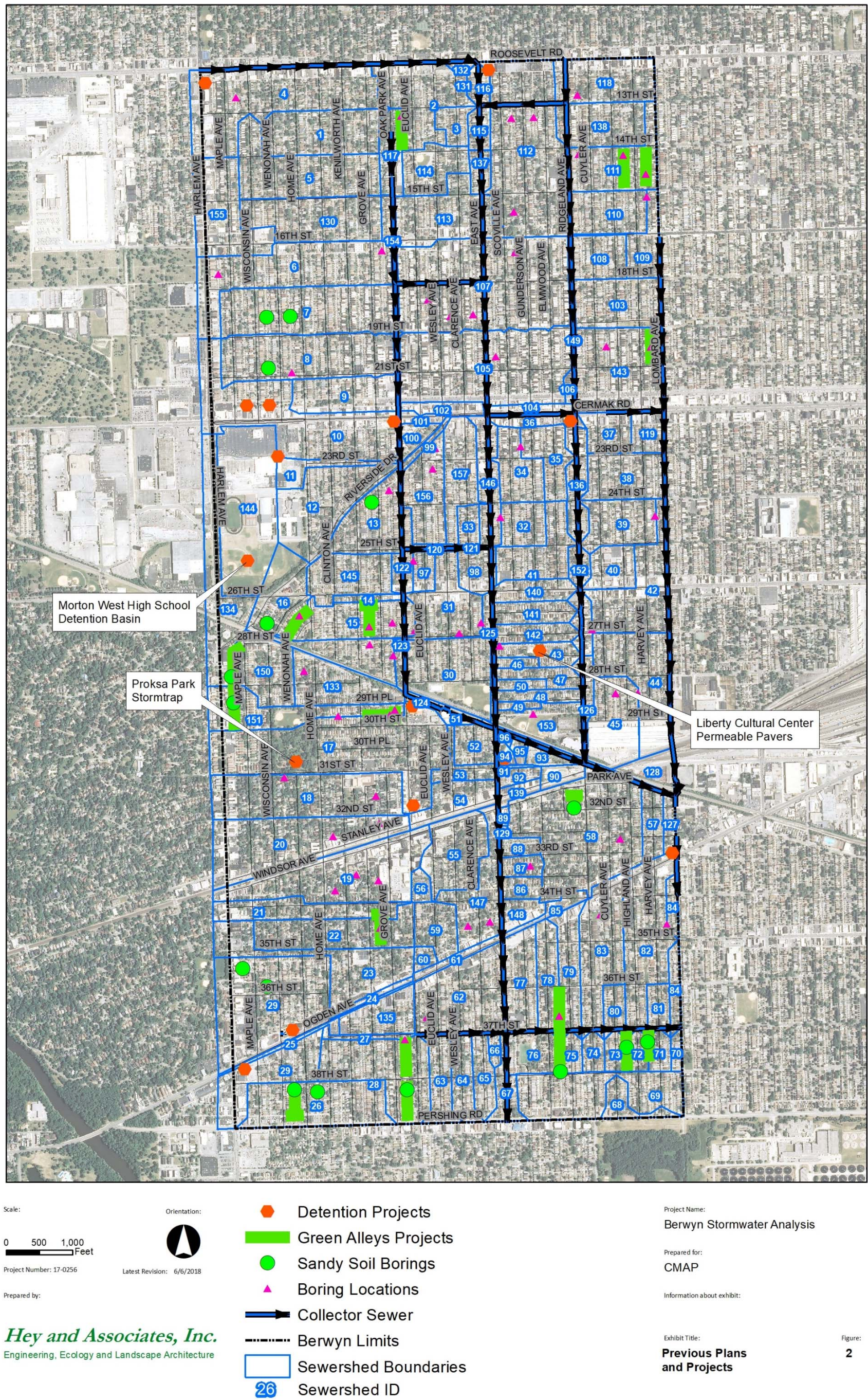


Permeable paver parking lot at Liberty Cultural Center. *Photo courtesy of Berwyn Park District.*

To date, the City has performed 77 soil borings to locate sandy soils that may provide increased stormwater infiltration. These borings were evaluated based on the depth and quality of the sandy soil. As a result of these borings, the Green Alley Program has updated fifteen alleys to date, by converting a traditional alley to an alley with permeable pavers in areas where sandy soils make infiltration possible. The City of Berwyn will continue to coordinate with MWRDGC to implement more Green Alleys where appropriate as funding becomes available.

This plan seeks to combine previous reports, regulations, and ideas in conjunction with input from the Steering Committee and City stakeholders to create a guiding document that will promote better stormwater management through a set of guiding principles.

Figure 2: Previous Plans and Projects



1.5 STORMWATER ANALYSIS

Because Berwyn's main flooding problem is related to limited sewer capacity, a sewershed analysis was performed to identify areas experiencing lower sewer capacity and other issues. In total, 157 sewersheds were delineated with methodology based on similar analyses completed in other communities. Sewersheds are typically defined by identifying the outlet or connection point of the local sewers to larger collector or interceptor sewers, and then identifying the contributing tributary area flowing through this sewer as shown on sewer atlases. The location where the local sewer (approximately 12 inches to 30 inches in diameter) joined a significantly larger collector sewer (60 inches or more in diameter) was used as the downstream point of each sewershed. In the cases of sewers in Berwyn where relief sewers have been added providing a cross-connection between sewersheds, the sewershed delineations were estimated based on the assumption that the pipes were generally flowing toward the larger sewers.

Each sewershed outlet pipe was identified and its basic parameters (i.e., size of pipe) were used to develop the calculations needed to determine the outlet capacity of the sewershed. The outlet capacity provides a straightforward method to determine how the sewer system may perform during storm events and how the sewershed compares to other geographic areas in the City with respect to flood risk due to limited flow capacity. The outlet capacity of the sewersheds was calculated based on standard hydraulic engineering equations and ranked to establish a comparable analysis of flood risk (Table 1). It was noted that much of Berwyn already has limited sewer capacity, to the point that the main outlets of the sewersheds have capacities comparable to allowable detention release rates throughout northeastern Illinois. This means that the existing sewer system is extremely limited in its ability to convey water during storm events and that the sewer system acts as a restriction to flow for larger storm events, which causes stormwater to pond in streets and other low-lying areas and combined sewers to back up in homes.

In addition, stakeholders noted flooding issues in areas of Berwyn where homes discharge to alley sewers. These sewers are typically shallow and have low capacity, which causes a higher risk and incidence of basement flooding than for homes that discharge to street sewers. To account for these conditions, the sewersheds were also evaluated based on whether they included alley sewers, as noted in **Table 1**.

The sewershed capacity and alley sewer presence rankings were combined to determine the sewersheds with the highest risk for flooding. **Figure 3** (Page 1-11) shows the sewershed ranking of the flood risk levels. A higher risk area is denoted by a sewershed ranking of 4 with a lower risk denoted by a sewershed ranking of 1. These rankings provide a prioritization mechanism for risk areas and a lower risk sewershed will likely have flood problems as well. **Figure 3** (Page 1-11) provides a calculated analysis of risk based on known data (i.e., sewer sizes), while **Figure 1** (Page 1-3) documents actual and known reports of flooding.

Table 1: Range of Calculated Sewer Capacity and Alley Sewer Presence for Each Sewershed

Sewershed Ranking (Higher Risk: 4 / Lower Risk: 1)	Calculated Sewer Capacity Range (cfs/acre)	Alley Sewer
1	0.56-9.83	Not present
2	0.29-0.56	Not present
3	0.15-0.28	Not present
4	0.10-0.33	Present

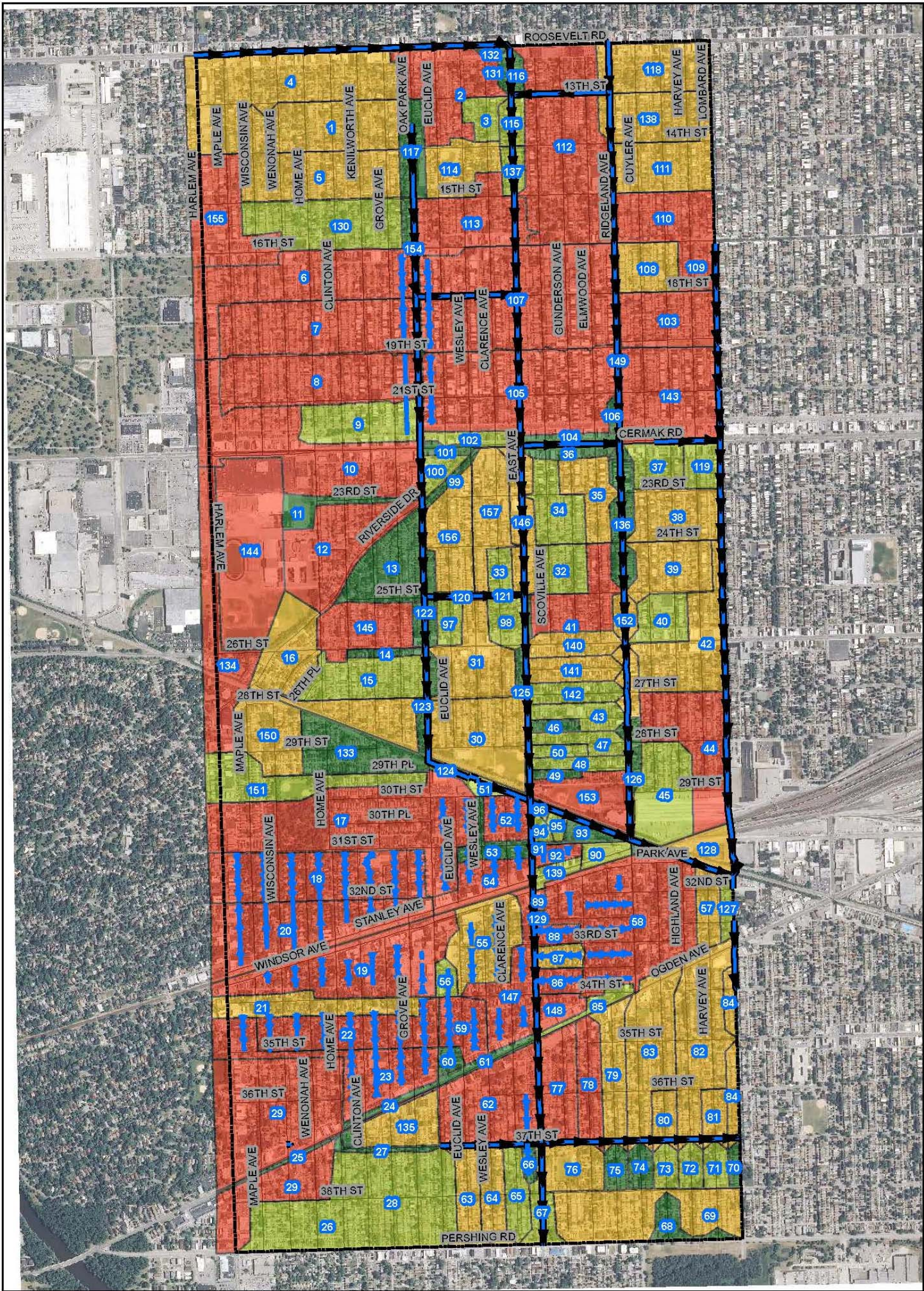
Note: cfs/acre: cubic feet per second per acre



This rain garden captures runoff from the street and adjacent parking lot.
Courtesy of Center for Neighborhood Technology.

The sewershed analysis identified areas with the lowest outlet capacity where there are also alley sewers. These sewersheds were then compared to sewersheds with sandy soils or potential land use opportunities, as shown in **Figure 4** (Page 1-12), as a way to focus Berwyn's initial efforts in addressing stormwater problems.

Figure 3: Sewershed Flooding Risk Ranking



Scale:

0 500 1,000 Feet

Project Number: 17-0256

Prepared by:

Orientation:

Latest Revision: 4/10/2018

Legend:

- Alley Sewers
- Collector Sewer
- Berwyn Limits
- Sewershed ID

Sewershed Boundaries

Higher Risk Quartiles

- 1
- 2
- 3
- 4

Project Name:

Berwyn Stormwater Analysis

Prepared for:

CMAA

Information about exhibit:

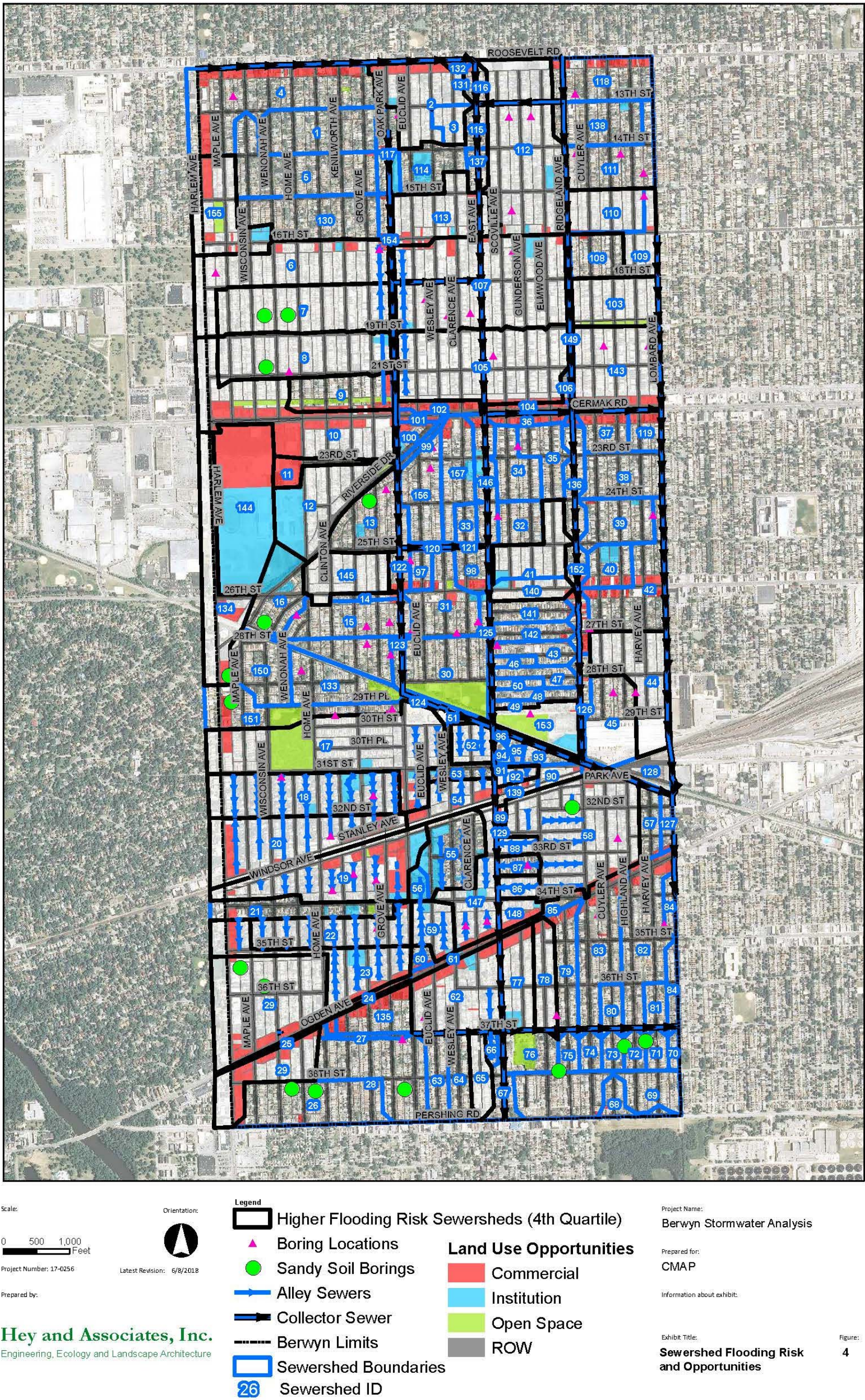
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Flood Risk Ranking

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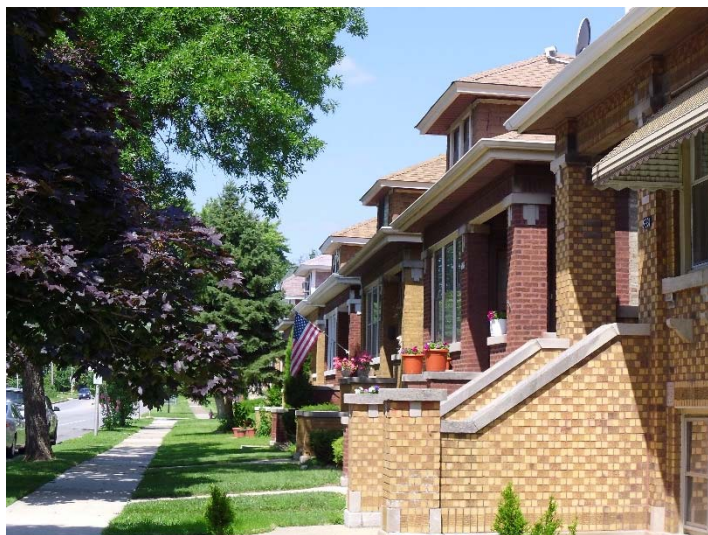
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Figure 4: Sewershed Flooding Risk and Opportunities



2.0 Guiding Principles

The City of Berwyn is a thriving urban community that strives to protect and enhance community assets and economic prosperity to ensure a high quality of life for residents, businesses and visitors. There is a clear need to enhance flood and stormwater management throughout the City and to reduce surface water runoff into the combined sewer system. Further, there continues to be a need to empower homeowners to make property improvements that can prevent basement and property flooding.



The overall goal of the Stormwater Management Plan is to reduce and prevent flooding in Berwyn, reduce nonpoint source pollution, and produce co-benefits for residents. The plan will prioritize the following flooding types, in order of importance:

- 1) Basement backups
- 2) Alley flooding
- 3) Street flooding
- 4) Parkway flooding²

The plan will aim to provide for effective management of stormwater runoff and to efficiently use available sewer capacity and retention/detention via green and grey infrastructure in both existing and future conditions. Generally, the goal is to avoid and prevent flooding, minimize it if it occurs, and mitigate it once it has occurred.

Essential to tackling these problems will be the integration of effective stormwater management decisions into local planning, municipal operations and budgeting decisions, data and information sharing, and transportation planning and programming.

² Parkway flooding is when flood waters are higher than the street curb and gutter and begin to flood grass or paved areas between buildings and the street.

3.0 Recommendations

3.1 KEY RECOMMENDATIONS

The City of Berwyn's Stormwater Management Plan is framed by the following topic areas:

- Policy/Regulations
- Flood Control Assistance
- Capital Improvements
- Maintenance and Monitoring
- Education and Outreach

Each topic area will discuss relevant recommendations, most of which are being implemented in nearby communities.

3.1.1 Policy/Regulations

Regulations are an opportunity to implement baseline standards for stormwater based on the needs of the City's infrastructure. Updates to various regulations pertaining to stormwater can be strengthened to provide short- and long-term improvements. Additional analysis and work may be necessary for some of these recommendations. Below are strategies to strengthen the regulatory requirements in order to address flooding issues.

Stormwater Management Regulations

- Develop green infrastructure/sustainability goals and standards for all City-funded projects. At a minimum, the 50-year storm should be used as a design standard for detention, as well as capturing the first 0.5 inches of rainfall. Any conveyance improvements should be a minimum 10-year design standard. These design standards are the minimum recommended standards for development and projects not regulated by other agencies (i.e., MWRDGC Watershed Management Ordinance). When planning for new or retrofit projects, the sewershed capacity should be considered to determine if additional detention or volume control would be beneficial beyond the minimum standard. Providing and promoting stormwater runoff volume capture can provide a cumulative benefit over time to the City's overall stormwater peak runoff while improving water quality.



Flooding in Chicago's Albany Park Neighborhood
Photo courtesy of Center for Neighborhood Technology

3.0 Recommendations

- Provide a flow chart or matrix to explain City and MWRDGC stormwater and development requirements. **This is a high priority recommendation.** Clear and concise guidance can assist both the City and those applying for a permit in fully understanding stormwater management, detention and sewer requirements which will promote successful coordination and implementation of development.
- Develop a stormwater detention/retention policy for single residential lots. Many communities throughout northeastern Illinois (i.e., LaGrange, Northbrook, and Elmhurst) have implemented stormwater detention requirements for residential lots which can be related to impervious coverage or land disturbance. These systems typically help reduce the peak stormwater runoff from a residential property by providing underground pipe or vault detention storage systems. The systems may be connected to the municipal sewer system with a restrictor limiting flow or by providing an overflow connection from the detention system back to the sewer system. Depending on site soil suitability, these systems can promote infiltration with an open bottom that allows stormwater runoff to recharge the soil. Guidelines would have to be developed for residential lots with the possibility of providing a fee-in-lieu of system where site constraints may not allow for installation of detention systems. These guidelines could be developed by the City of Berwyn to provide consistent calculations and methodology among the systems and provide for an easier permit review process. In addition, incentivizing residential stormwater detention through grant opportunities, cost-share programs, or permit fee reductions can help promote better stormwater management on the individual residential lots. It is recommended that the permit calculations be performed by a licensed engineer/architect. The City should review several different types of residential lots throughout the City to investigate what could be an adequate detention volume and footprint while allowing for some type of connection to the municipal sewer system. Review of some typical lots will help provide a possible range of detention volume that could be required and would lead to the development of permit guidelines for residential lot detention.
- Review opportunities to encourage stormwater best management practice implementation, such as providing stormwater detention/retention credits or through landscape design techniques, in all types of development. For example, the City of Chicago has developed a stormwater tool³ for developers to use and provides credits in the form of reduced detention requirements for using green infrastructure practices such as native landscaping, bioinfiltration, and permeable surfaces. **This is a high priority recommendation.** This policy would help promote development to incorporate green infrastructure and other sustainable practices and could be associated with detention required by the City.

Building Permits

- Conduct internal education and outreach for the City and its staff about consistency and uniformly enforcing the stormwater regulations codified in Chapter 1250 of the 2017 Zoning Ordinance and update staff annually on pertinent changes. Internal training and education should also address proper staff communication regarding implemented

³ See the City of Chicago Department of Water Management webpage (note: link may change):

https://www.cityofchicago.org/city/en/depts/water/provdrs/engineer/svcs/2009_sewer_constructionandstormwatermanagementrequirements.html

policy recommendations from Section 3.1.1 of this plan. The City should develop an internal routing flowchart and checklist to ensure adequate understanding of which departments and staff should be included relative to permit applications and ordinance requirements. If new stormwater regulations and requirements are implemented, it will be critical to provide a thorough understanding to all departments involved with enforcement. If the proposed work described in the permit application has a disturbance greater than or equal to 50 square feet, the permit should be routed to the Engineering Department for a stormwater review. **This is a high priority recommendation.**

- Improve tracking of permits (outside of flood control assistance projects) to document and better understand overhead sewers and backflow preventer installations. **This is a high priority recommendation.** The City should establish enhanced tracking to promote coordination within departments and to have a broader understanding of needs throughout the City that may help with future funding or grant opportunities.
- Require backflow preventers or overhead sewers for major home additions. Residents investing in their homes enhances the quality of life of families and ultimately the City. To protect their investments and to provide a reduced risk of future basement flooding, it would be beneficial to require installation of these plumbing measures. Ultimately this program in conjunction with new construction and flood control assistance program could get the City closer to having all residential homes protected from sewer backup. **This is a high priority recommendation.**
- Require downspout disconnecting for building additions, or for any new or updated cost share program Redirecting stormwater runoff from roofs to the ground will reduce the peak discharge to the sewer systems which could in turn reduce the risk of sewer backups. Downspout disconnections should be done in a manner to discharge water away from buildings and onto pervious surfaces to the extent practicable. **This is a high priority recommendation.**

Property Sale

The City should investigate the ability to create and enforce the necessary procedures or forms to implement any of the following recommendations. These options will likely require coordination with the City Attorney for implementation.

- Require backflow preventers/overhead sewers for sales of homes. Many homebuyers are not aware of issues associated with home plumbing and sewers and may not understand the risk of sewer backup. This program could help protect future property owners by providing a reduced risk of future basement flooding.
- Require a basement flooding home assessment or opinion by a certified inspector/contractor at point of sale for homes. Many new homebuyers are not aware of basement flooding risk nor do they know what to look for with regards to previous issues such as seepage or sewer backups. This program could help educate new homeowners to flood risks and promote more mitigation throughout the City. Prior to any implementation, the City should investigate how this could be applied for City approvals of home sales.

3.0 Recommendations

- Require downspout disconnection at point of sale for homes. Redirecting stormwater runoff from roofs to the ground will reduce the peak discharge to the sewer systems which could in turn reduce the risk of sewer backups. **This is a high priority recommendation.**
- Require inspection of lateral sewer at sales of homes by a certified plumber/contractor. Many homeowners and potential buyers are not aware of the need to inspect and maintain the lateral sewer. This will promote education and understanding of how the home plumbing system works while also providing details for a critical home system to the seller and buyer. The City should require a home inspection report that includes sewer televising with the option to sign a waiver that this was not completed. **This is a high priority recommendation.**
- Work with the City attorney to develop a rider to be submitted with the home inspection report that can help document additional flooding issues (i.e., seller was a resident of the home in the last two to five years and can state that there were no known flooding issues, sewer line televising requirements, etc.). **This is a high priority recommendation.**

Financing

Section 3.0 provides recommendations to enhance and improve stormwater management in the Berwyn. But a key component of most of the recommendations is to establish a dedicated and sustainable funding mechanism to ensure constant and consistent applicability and implementation from year to year. In addition, the City should develop a detailed understanding of annual and future costs associated with implemented stormwater management recommendations which would help support the need and basis for funding. Costs can typically include funding of staff and software/hardware, development of a detailed stormwater master plan with design alternatives and costs, short and long-term cost share programs, capital project expenditures, and annual operations and maintenance of stormwater infrastructure.

There are several options to consider when implementing a mechanism for stormwater funding. Among those considered are an additional nominal sewer fee, development fee, fee-in-lieu option, or stormwater utility fee for stormwater management.

- Sewer Bills. Berwyn currently has a funding mechanism for sewer and water service that is collected through its sewer bills. Since Berwyn is a combined sewer community and stormwater is directly related to the existing combined sewer system, a fee could be applied to the sewer bill to fund stormwater management. The fee could be flat or variable based on a variety of factors such as water usage, lot size, impervious area or zoning type. A nominal fee could be provided as soon as the next fiscal cycle. However, it would be recommended to conduct a detailed study on annual and future costs associated with the stormwater management program resulting from this Plan. This would provide the basis for fee development. **This is a high priority recommendation.**

- Development Fee. A stormwater permit fee for development could be considered, but would require a study to determine applicability and legality that would last 1–2 years. This fee would be required in addition to any on-site stormwater management, and could be implemented in addition to a monthly stormwater utility fee or sewer bill fee. However, this mechanism is highly variable and does not necessarily provide a dedicated funding stream for stormwater.
- The City has already established a fee-in-lieu of basis in the Zoning Ordinance (effective 9/22/2017) that allows for payments related to providing stormwater management controls subject to the approval of the Zoning, Planning and Development Commission. Currently the fees would be calculated by the Department of Public Works. The City should establish specific guidelines and protocol for the fee-in-lieu of program for detention regulated by the City. The City should incentivize commercial and industrial developments to meet the detention standard rather than allowing fee-in-lieu of payments. The fee-in-lieu of program should generally be geared toward residential developments or extreme cases of constrained properties. Where detention is required by MWRDGC through the WMO, there is currently no fee-in-lieu of option. Items to consider for the fee-in-lieu of program relative to Berwyn-regulated detention include:
 - Minimum orifice sizes for detention. Once an orifice size gets too small, there can become issues with effectiveness and maintenance. If a development requires a restrictor smaller than the allowable size, then the development may be required to pay a fee based on a volume difference of the minimum allowed restrictor size and the calculated restrictor size. The City should consider a minimum orifice size of 4 inches or the utilization of vortex restrictors similar to those used in the City of Chicago. **This is a high priority recommendation.**
 - Site constraints. Many parcels in a highly urbanized area such as Berwyn are subject to a variety of site constraints that may limit the ability to provide the required detention due to lot size, configuration, utilities, and other infrastructure. Development should generally try to provide detention to an extent practicable and a fee-in-lieu of program may allow for fees based on the volume difference of the detention provided compared to what is required. It is recommended that the City request permittees to setup a pre-application meeting to discuss site constraints and anticipated detention to be provided compared to detention required. This will allow for all parties to work together to identify the site design and layout that can provide both the City and permittee with achievable goals. **This is a high priority recommendation.**
 - Design concepts of a capital plan with design concepts. The City will commit to the development and design of concepts for detention throughout the City which can be paid for via the fee-in-lieu of program. The fee-in-lieu of program shall provide the opportunity to create, expand and manage both local and regional detention facilities and the fees from this program should be used for the planning, design, construction, and operations and maintenance. Establishing design concepts throughout the City, such as those included in Section 4.2 of this plan in opportunity areas shown in **Figure 5** (Page 4-3), can provide developments with the opportunity to pay a fee-in-lieu of to support the nearest detention facility. Costs should be developed on a detention volume basis for each design concept that includes the

3.0 Recommendations

planning, design, land and easement acquisition, construction, and operations and maintenance of the facility. Fees can then be calculated for the fee-in-lieu of program based on the nearest detention facilities with volume available. Where no design concepts are available or are too far away from the development, the City should establish a reasonable fee structure that could be based on similar design concept costs per unit volume.

Based on the most recent update to the WMO (effective 2/15/2018), MWRDGC allows for offsite volume control (Article 5 Section 503.3.B) or offsite detention (Article 5 Section 504.14). Offsite detention would need to meet the requirements of Article 5 of the WMO. This can provide an opportunity for developments to utilize offsite facilities to meet detention requirements which may work well in a highly urbanized area such as Berwyn.

- **Stormwater Utility.** A stormwater utility provides a mechanism to collect fees based use which is typically related to certain property characteristics including, but not limited to lot size, zoning, and impervious area. The collected fees would be placed into a dedicated fund for stormwater services which may include developing detailed stormwater alternatives (i.e., a Stormwater Master Plan), implementing capital projects, funding program staff, funding operations and maintenance program. Depending on the program, utility fees can range from \$2 to \$20 per month which is also typical of other stormwater utilities in Illinois.

The traditional basis for stormwater utilities came from the fact that many municipalities did not have an explicit mechanism for installing and maintaining storm sewer systems whereas they had funding in place for sanitary sewers and water service. This becomes more difficult in combined sewer communities where there is difficulty and challenges associated with the policy of trying to allocate portions of the combined sewer system funding to the stormwater utility or attempting to separate the funding basis for stormwater and typical sanitary sewer fees. According to the “2014 Stormwater Utility Survey” by Black & Veatch, out of all the communities with a mix of combined sewer and separate sewer system, there are zero communities that have a stormwater utility with over 75% of their system being combined sewer. This demonstrates the difficulty of establishing a utility and creating the separation or coordination with the combined sewer system. A stormwater utility for Berwyn is potentially available as a funding mechanism but a detailed and thorough study would have to be performed to provide the basis and reasoning for its implementation.

- The first step of a stormwater utility would be to conduct a study which would typically require one to two years to provide adequate time for research, analysis, public outreach, and recommendations for implementation. This study would have to explicitly look at current funding for sewer service and determine the appropriate means and methods for documenting the separation and need for stormwater funding.
- If the study recommends an acceptable stormwater utility, it would likely take an additional one to two years to fully implement the program.

3.1.2 Flood Control Assistance

The Flood Mitigation Shared Cost Program currently provides financial assistance to homeowners with the installation of overhead sewers, backflow preventers, and disconnecting of downspouts. This program can be expanded in the short term, with the goal of scaling back in future years when the majority of the community has implemented these measures. Below are strategies to strengthen the Flood Control Assistance program.

- Continue funding for flood control assistance (Flood Mitigation Shared Cost Program and Downspout Disconnection Program). This should also include education and outreach on the program, as well as the Single Family Rehab (SFR) Loan Program, to direct homeowners to the assistance that best suits their needs and encourage aldermanic offices to do the same. The program can continue to help residents with addressing issues on their property while providing the opportunity for further education and outreach related to stormwater and other infrastructure. **This is a high priority recommendation.**
- Develop a suite of financing options to remove cost share obstacles for residents with the highest need. Based on feedback during the development of this Plan, low- and moderate-income households face financial difficulties with the current requirements of the cost share program. As discussed in the climate vulnerability assessment (Appendix 3), low-income households and minority or limited English proficiency populations are often at greater risk of experiencing serious social, economic, and environmental impacts from flooding. Expanding funding and financing options for flood control assistance can provide a way to improve the quality of life and provide opportunities to homeowners with the most need.

The City should explore opportunities to leverage other grant or loan assistance provided to residents with low incomes. As a first step, the Public Works Department and Community Development Department should discuss how the Flood Mitigation Shared Cost Program could be paired with the SFR Loan Program and identify potential barriers that exist. For moderate-income households that exceed the requirements of the SFR Loan Program, the City could explore establishing a sliding pay scale that is based on income. **This is a high priority recommendation.**



Example of downspout disconnection to a rain garden in Berwyn.

3.0 Recommendations

- For a nominal fee (\$25–\$50), offer opinions on basement flooding issues as a City service (public works, engineer, plumber) and provide information on options to address problems and potential funding sources. Such a service would help educate residents on the issues and potential solutions before they hire a contractor to make improvements. **This is a high priority recommendation.**
- Review opportunities to provide residents with economy of scale benefits. An example of this would include providing backflow preventers to homeowners on a block at the same time as significant road improvements are made. Coordinating improvements has the potential to save the City money and reduce the risk of basement backups for homeowners.

3.1.3 Capital Improvements

The Capital Improvements program details proactive, strategic investments in the City's capital assets and provides an opportunity to integrate short- and long-term stormwater management goals. Below are strategies to strengthen the planning and programming of capital improvement projects.

The City of Berwyn currently engages in planning for stormwater management in their Capital Improvements program. Current activities include:

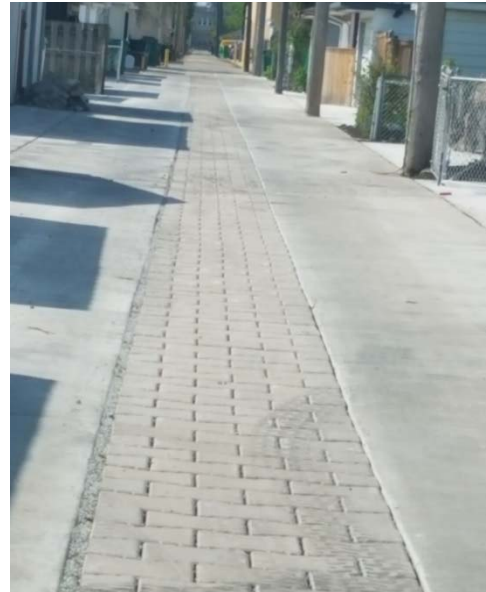
- Citywide soil boring program for assistance with Green Alleys and other green infrastructure opportunities.
- Green Alley program.
- Review of planned road and water projects for stormwater improvements.



Example of parkway rain garden with curb cuts to capture street runoff.
Courtesy of Center for Neighborhood Technology

Green Infrastructure

- Target key locations for green infrastructure based on sandy soil locations, public visibility, educational opportunities, and location within a sewershed, with priority given to high risk sewersheds. Additional consideration should be given to low-income populations, shown in Figure 5 (Page 4-3), since they are often at greater risk of experiencing serious social, economic, and environmental impacts from flooding. Review **Figure 4** (Page 1-12) for current locations of opportunities. Continue to update data based on future soil borings. **This is a high priority recommendation.**
- Continue Green Alley program and develop alternative designs for alleys without sandy soils, and alleys with existing, combined sewers. Review Figure 5 (Page 4-3) for additional project opportunities to potentially incorporate into new projects. The green alley program is a great opportunity to promote enhanced stormwater management and even without sandy soils for infiltration, there are additional benefits related to water quality and runoff attenuation. **This is a high priority recommendation.**
- Continue citywide soil boring program for assistance with green alleys and other green infrastructure opportunities. This can provide quick opportunities to implement localized stormwater management. Review Figures 3 and 4 for risk areas and opportunities to further refine locations of new soil borings. **This is a high priority recommendation.**
- Review planned road, sewer, and water projects for green infrastructure opportunities. At a minimum, the 50-year storm should be used as a design standard for detention, as well as capturing the first 0.5 inches of rainfall. Any conveyance improvements should be a minimum 10-year design standard. These design standards are the minimum recommended standards for development and projects not regulated by other agencies (i.e., MWRDGC Watershed Management Ordinance). Providing and promoting stormwater runoff volume capture can provide a cumulative benefit over time to the City's overall stormwater peak runoff while improving water quality.
- Incorporate green infrastructure in complete streets and streetscape projects. Green infrastructure can be designed in a way to provide aesthetic enhancements while also providing stormwater management enhancements. **This is a high priority recommendation.**



Green alley in Berwyn with permeable pavers.

3.0 Recommendations

Grey Infrastructure and Modeling

Require additional hydrologic/hydraulic modeling in low capacity sewershed areas when projects are designed, with a final goal of a model for the entire City in conjunction with a detailed stormwater master plan. The U.S. Army Corps of Engineers hydrologic/hydraulic SWMM model for the region can be used as a foundation to enhance and expand the Berwyn portion of model especially with a focus on low-capacity sewersheds. This modeling should be part of an overall detailed stormwater master plan that evaluates grey and green infrastructure improvements including but not limited to upsizing sewers, implementing detention, and attenuation of volume and flow. A stormwater master plan should provide recommendations on appropriate design goals (i.e., 10-, 25-, or 100-year level of service) for projects on a case-by-case basis or as an overall goal for the City. These costs can be rolled into funding needs to help refine the funding mechanism goals. **This is a high priority recommendation.**

At a minimum, the 50-year storm should be used as a design standard for detention, as well as capturing the first 0.5 inches of rainfall. Any conveyance improvements should be a minimum 10-year design standard. These design standards are the minimum recommended standards for development and projects not regulated by other agencies (i.e., MWRDGC Watershed Management Ordinance). Establishing a basis for design will provide for detailed project understanding and planning. Although the City may identify other areas that may need a higher level of service based on detailed hydrologic/ hydraulic modeling. The City should also continue to review planned road and water projects for opportunities to replace/improve existing sewers, as well as update the complete streets policy to facilitate the integration of stormwater management in complete streets and streetscape projects.

Coordination and Partnerships

- Coordinate with outside agencies such as MWRDGC, IEPA, USEPA, Illinois State Revolving Fund, and the Cook County Planning and Development Department for funding. The City has successfully coordinated with agencies and obtained grants through some of these agencies and should continue to prioritize seeking external sources of funding for improvements. Leveraging funding can provide for greater opportunities to enhance and expand the scope and goals of the project. **This is a high priority recommendation.**
- Continue to provide input and support for MWRDGC's ongoing regional programs and initiative projects, including watershed workgroups such as the Lower Des Plaines River Watershed Planning Council. Participating in these programs can provide opportunities to hear what other municipalities and agencies are doing, stay up to date on regulations, and discuss challenges facing each community. **This is a high priority recommendation.**
- Coordinate with MWRDGC, Illinois Department of Transportation (IDOT), and Cook County on local projects to see if additional stormwater benefits can be implemented. It is recommended that the City establish regular coordination meetings to identify and discuss current and future opportunities for collaboration. **This is a high priority recommendation.**

- Coordinate with schools and park districts to implement holistic projects that incorporate specific stormwater goals. An example of an opportunity is provided in Section 4.2.2 with improvements to a school property to provide multiple benefits including stormwater management as well as recreational amenities. **This is a high priority recommendation.**
- Continue to work with local organizations and institutions to reach seniors and residents with limited English proficiency. Low-income residents may have a hard time paying for flood mitigation tools, and after experiencing a flood, may have a harder time replacing damaged property. Minority and limited-English speaking residents, especially recent immigrants, may have difficulty accessing loan or cost share services. **This is a high priority recommendation.**

3.1.4 Maintenance and Monitoring

The City of Berwyn Public Works Department performs regular maintenance of the City's stormwater components. Current activities include: limited GIS mapping of the sewer system and its components, sewer lining improvements, and operation and maintenance plans for green infrastructure projects.

A strong maintenance and monitoring program can extend the life and value of a stormwater system. Asset management, either through a purchased system or done internally, can be a tool in decision making for strategic, operational, and financial reasons. Data gathering and reporting can support this effort in the short-term and is an on-going effort. Below is a menu of options to strengthen the ongoing maintenance and monitoring program in the City of Berwyn.

- Enhance GIS data as it relates to stormwater. This will promote a thorough understanding of the system and assets and can facilitate future planning. **This is a high priority recommendation.**
 - Develop protocol for Public Works field check and updating data management tracking system in GIS.
 - Develop complete GIS information of sewer system, including sewer depths. This could be accomplished by temporary staff or other support to help with data collection and GIS management. MWRDGC has a GIS/GPS assistance program that municipalities can participate in which allows the municipality to borrow GPS units at no cost to map sewer infrastructure. Berwyn would have to coordinate with MWRDGC and enter into an intergovernmental agreement.



Installation of StormTrap system in Proksa Park.

3.0 Recommendations

- Enhance GIS and map sewer lining improvements, problem areas, basement assessments, flood assistance program installations, other backflow preventer or overhead sewer installation, drainage structure cleaning program, soils (either from the soil boring program, or any development permit that may have boring data).
- Obtain planimetric impervious coverage, which will help in the event of a future stormwater utility, or could be used as a tool to regulate development or as data when applying for grants.
- Determine if a purchased asset management system is needed.
- Consider inlet restrictors similar to Chicago's Rainblocker program, while considering overland flow routes to prevent damage to structures. The Janura Park concept outlined in Section 4.2.1 could serve as a pilot program. Include ample education and engagement with residents, businesses, other property owners that will be affected. **This can be a high priority recommendation as it relates to current and planned projects.**
- Coordinate with other agencies (e.g., IDOT, MWRDGC) to obtain sewer information to enhance GIS. For example, the model created for USACE has some sewer information, but doesn't include the entire network. This will promote a thorough understanding of how other agency systems connect or interact with City infrastructure.
- Add better signage for flooding at underpasses. This will promote awareness to drivers and help prevent damages to vehicles. **This is a high priority recommendation.**
- Develop long-term maintenance and monitoring protocol for various types of stormwater management and green infrastructure projects. Consider implementing green infrastructure inspections as part of the process to renew a business license when the business has previously implemented these practices as part of the permitting process. This will help ensure the facilities are functioning as designed.

3.1.5 Education and Outreach

Stormwater education and outreach efforts can be effective in changing certain resident behaviors and actions that generate stormwater pollution in the community while promoting an understanding of how and why these systems work. Coordinated outreach carried out by City departments and aldermanic offices is critical to educate residents on flood mitigation programs available to them and other actions they can take to reduce the impacts of flooding and seepage. These recommendations are typically ongoing, but several can be implemented in the short term. Below are strategies to strengthen stormwater education and outreach.



Signage example for a rain garden.
Courtesy of Center for Neighborhood Technology

- Educate on the design and operation of the City combined sewer system as well as the MWRDGC Tunnel and Reservoir Plan (TARP) system. This should include education on Berwyn's location within the system and how there is a continued need local investments in the City's sewer system to mitigate flooding. MWRDGC created an "Understanding Your Sewer" brochure that explains combined sewer systems which should be distributed at every available opportunity (e.g., public meetings, sale of homes, yearly with water bills).
- Provide assessments and repair options for basement flooding types, including seepage. Tools such as CNT's My RainReady tool⁴ can be promoted to better educate homeowners. The City can also utilize Cook County Assessor data in conjunction with GIS to identify timeframes of home construction to understand what type of basement foundation the home might have (i.e., limestone, brick, concrete, etc.) given known timeframes of typical home construction style (i.e., Victorian, farmhouse, bungalow, etc.). For more information, see the climate vulnerability assessment in Appendix 5.
- Conduct internal education and outreach for the City and its staff about consistency and uniformly enforcing the 2017 Zoning Ordinance; update staff annually on pertinent changes and updates. Education content should include helping staff understand the policies and strategies discussed in Section 3.1.1. of this Plan and other pertinent material.
- Promote the Flood Mitigation Shared Cost Program and Single Family Rehab Loan Program to homeowners. The Public Works Department and Community Development Department should work together to educate other City Departments on the program, such as the Building, Fire, and Police Departments, and encourage aldermanic offices to promote the programs as well. See Section 3.1.2.
- Provide educational and informational signage with projects to communicate benefits. On streets where inlet restrictors are used or standing water is common after a storm, the City should convey the message that if water is in the streets, that means it is not in basements. Update manhole covers and/or catch basins to state "water in streets protects your basements" or similar message as projects occur.
- Replacing trees lost to the emerald ash borer is a top priority for many communities in the Chicago region, but in some cases, residents may oppose the installation of new trees in their front yard or parkway due to concerns about roots clogging sewer pipes. The City should continue to educate residents on tree roots and strategies to avoid clogs in old sewer laterals. Generally, tree roots do not directly damage pipes, but if a pipe is already damaged (due to age, faulty connections, or other causes) roots may enter the pipes, causing a clog. Often, this threat can be mitigated by ensuring all pipes are in good condition, that the tree is well mulched and has ample room for healthy roots near the surface, and by avoiding certain fast-growing wetland species.
- Maintain and build new partnerships. The City should partner with park districts, school districts, and the Pav YMCA to educate students, coordinate tours with MWRDGC, and identify new community partners. For example, School & Community

⁴ CNT, MyRainReady. See <http://myrainready.cnt.org>

3.0 Recommendations

Assistance for Recycling and Composting Education (SCARCE)⁵ is an environmental education nonprofit that uses innovative and hands-on education programs to promote good stormwater management, sustainable communities, and to engage the broader community through events and program.

⁵ SCARCE website. See <https://www.scarce.org/>

4.0 Opportunities and Concept Plans

4.1 PROJECT OPPORTUNITIES

To help Berwyn prioritize its efforts to address the sewersheds at a higher risk of flooding, the sewershed analysis ranked flooding problem areas based on their outlet capacity and whether they are served by alley sewers Figure 3 (Page 1-11). When considering which stormwater projects to implement, the City should assess the severity of the flooding problem area weighted against the expected performance of the project, as well as ease of implementation. Based on initial Steering Committee input, identified areas of opportunity included locations with sandy soils; certain land use opportunities such as open spaces in parks or on school property; wide rights-of-way (i.e., Cermak Road); residential rights-of-way, and commercial areas. The City should use the opportunities map **Figure 5** (Page 4-3) to identify potential projects in areas of high flooding risk and areas with high infiltration potential/sandy soils.



Schools present opportunities to manage stormwater while improving the schoolyard

Potential neighborhood detention for fee in-lieu projects for the City to consider include:

- Partnerships with the Berwyn South School District 100 and Berwyn North School District 98 for schoolyard and stormwater projects. The Irving Elementary School Concept could serve as a pilot project for this type of collaboration to be replicated elsewhere in the City. Other schools such as Havlicek, Hiawatha, Pershing, and Piper Elementary could be considered for a similar schoolyard and stormwater project.
- Partnerships with the Park Districts for park and stormwater projects. The City and Berwyn Park District have previously collaborated for the Proksa Park detention area.
- Vacin Fairway parking lot retrofits. These City-owned parking lots are considered low hanging fruit to improve capacity in high need sewersheds.
- Green Alley projects modified to serve areas without sandy soil, with the inclusion of an underdrain and design capacity for the 10-year storm event. Green Alley projects in alleys with existing, combined sewers could be studied to determine if the alley sewers could be placed deeper or increased in size to provide basement flooding relief in conjunction with the stormwater benefit provided by a traditional green alley.
- Additional residential street modifications in low-capacity sewersheds similar to the 34th Street Concept.

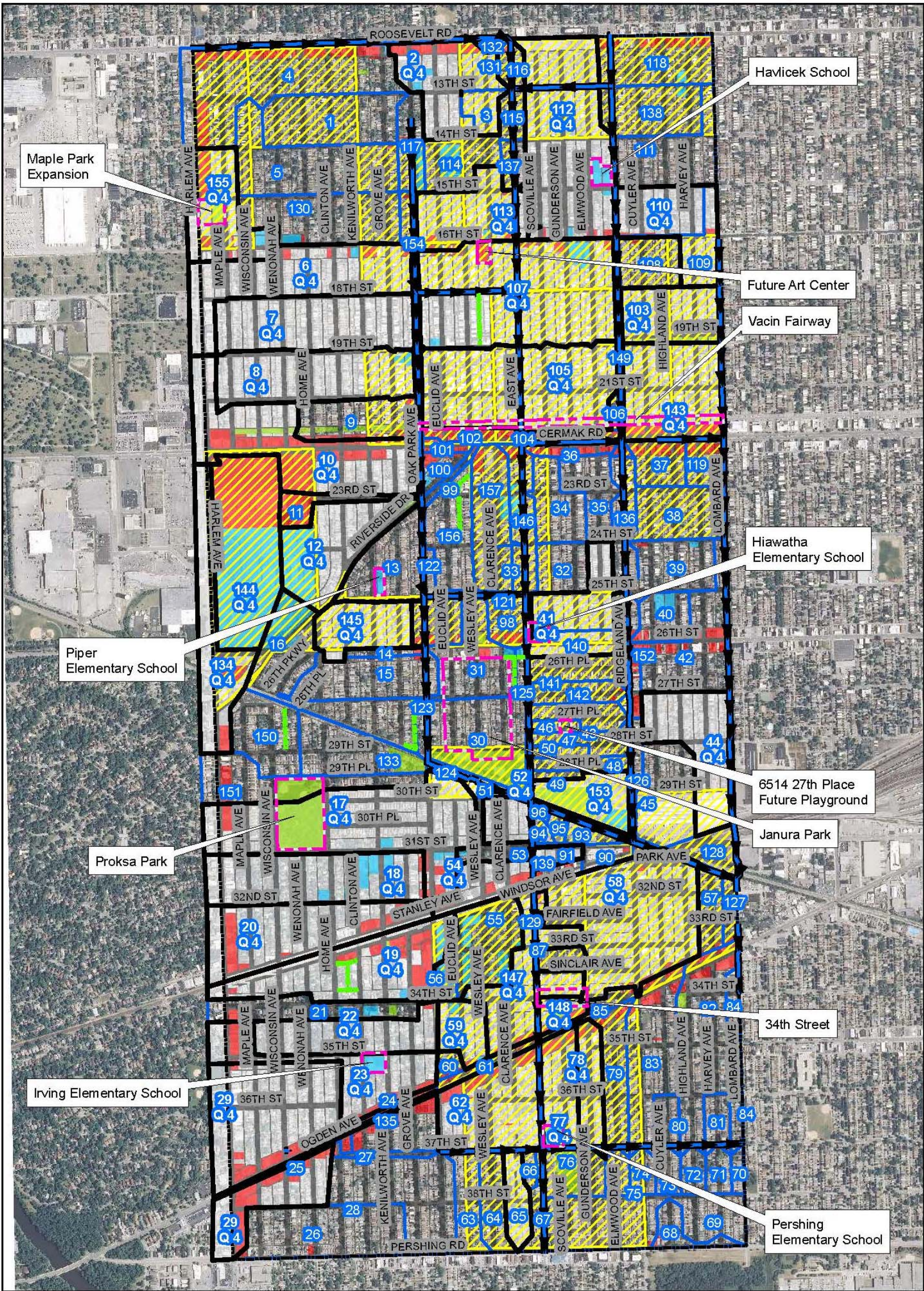
4.0 Opportunities and Concept Plans

To jumpstart implementation of stormwater improvements, three concept plans were developed in areas with lower-capacity sewersheds and can serve as pilots for distinct project types: Janura Park, Irving School, and 34th Street.

It should be noted that these projects could potentially be incrementally phased over several years depending on funding sources and partnership agreements.

Water quality benefits for the concept projects were evaluated using the US Environmental Protection Agency's (US EPA) Spreadsheet Tool for Estimating Pollutant Load (STEPL). STEPL uses simple calculations in a spreadsheet-based format for the analysis of nutrient and sediment loads for different land uses in a watershed. STEPL calculates the total load of nitrogen, phosphorus, and total suspended solids of the tributary area as well as the load reduction provided by best management practices. This analysis can be used on a wide variety of projects; it was used on each concept plan to quantify water quality benefits related to the proposed improvements.

Figure 5: Land Use and Project Opportunity Locations



Scale:
0 500 1,000
Feet
Project Number: 15-0XXX

Orientation:
Latest Revision: 6/8/2018

- Land Use**
- Proposed Green Alley Projects
 - Proposed Projects
 - Collector Sewer
 - Berwyn Limits
 - Sewershed Boundaries
 - Community Development Block Grant
 - Sewershed ID

- Commercial
- Institution
- Open Space
- ROW

Project Name:
Berwyn Stormwater Analysis
Prepared for:
CMAP
Information about exhibit:

Exhibit Title:
**Land Use and Project
Opportunity Locations**

Figure:
5

4.0 Opportunities and Concept Plans

4.2 STORMWATER CONCEPT PLANS

4.2.1 Janura Park Concept



The conceptual Janura Park project would serve approximately 24 acres of residential neighborhood to the north of Euclid Avenue, Wesley Avenue, and Clarence Avenue. Because the sewers in this area are combined sewers, they cannot be directly connected to a detention system. Instead, flow restrictors would be placed in the street inlets, forcing excess water to flow overland to the detention area. This would serve the function of keeping additional stormwater out of the combined sewer system, with the goal of alleviating the risk of basement flooding due to sewer backups. Flow paths should be verified at the

design stage to ensure positive drainage and incorporate minor grading as necessary.

Given the existing grade, the surface water from the north would flow across 28th Street and enter parkway rain gardens through curb cuts placed along the south side of the street. The rain gardens would have underdrains that convey stormwater to the underground detention area in Janura Park. The ground surface of the detention area will be graded to maximize stormwater capture, including overflow from the raingardens. The ground surface of the detention area would be graded to maximize stormwater capture. The underground detention volume is approximately 6 acre-feet, which is estimated to capture up to a 10-year storm event. The detention would need to be refined with detailed hydrology and hydraulics calculations and undergo preliminary and final engineering design. Once the detention area reaches capacity, it would overflow to a low area south of the detention area within the baseball fields. The detention system is designed to infiltrate stormwater back into the ground which would depend on soil conditions. An outlet is designed to release into the 20-inch combined sewer on 28th Street. Depending on funding and land availability, additional detention could be provided throughout the park space. This project could also be phased into several construction contracts based on funding availability but that may increase overall costs of the project when compared to constructing as a single contract.



Educational signage would be incorporated in this project. Medallions can be placed on the inlets with flow restrictors reading, “Water in the streets reduces water in your basement.” Educational signage should be placed in the rain gardens showing how the system feeds into the underground detention. Educational signage should also be placed near the underground detention quantifying the service area and stormwater benefits provided.

Water Quality Benefits

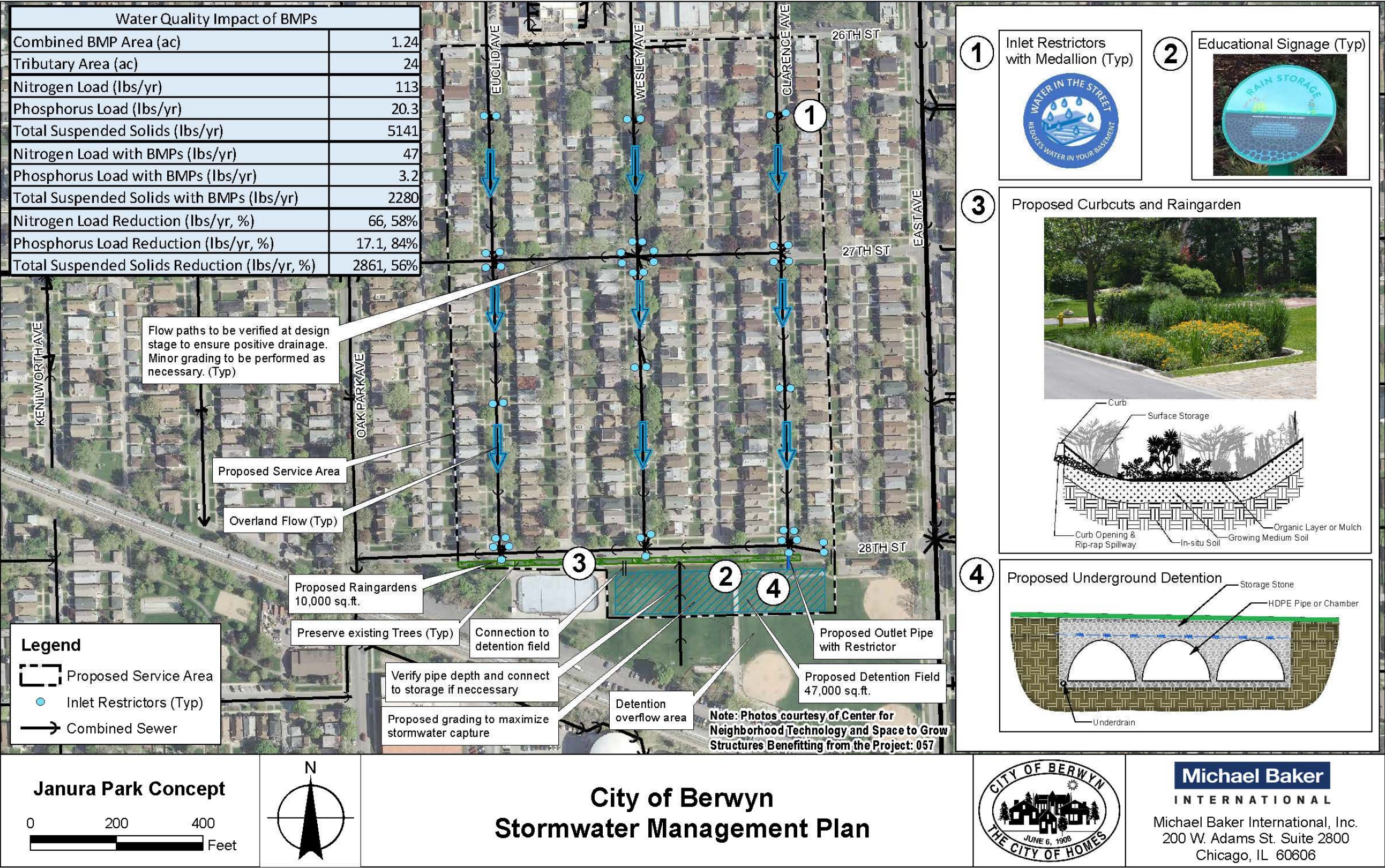
Water quality benefits will be provided in the rain gardens and underground detention areas. These will provide reductions in nitrogen, phosphorus, and total suspended solids. A summary table of the benefits is provided in **Table 2** below.

Table 2: Janura Park Concept Water Quality Benefits

Water Quality Impact of BMPs	
Combined BMP Area (ac)	1.24
Tributary Area (ac)	24
Nitrogen Load (lbs/yr)	113
Phosphorus Load (lbs/yr)	20.3
Total Suspended Solids (lbs/yr)	5141
Nitrogen Load with BMPs (lbs/yr)	47
Phosphorus Load with BMPs (lbs/yr)	3.2
Total Suspended Solids with BMPs (lbs/yr)	2280
Nitrogen Load Reduction (lbs/yr, %)	66, 58%
Phosphorus Load Reduction (lbs/yr, %)	17.1, 84%
Total Suspended Solids Reduction (lbs/yr, %)	2861, 56%

Cost Estimate

An Engineer's Opinion of Cost was developed for this project and is \$3,527,748. Backup documentation for the Opinion is included in the **Appendix 5.1**.



4.2.2 Irving School Concept



The project at Irving Elementary School is an opportunity to provide the surrounding area and the school with stormwater benefits as well as an upgraded learning and play space.

On the surface, the project would incorporate permeable surfaces, new play equipment, outdoor education features, signage regarding the project, and an open play area. The design could also include a learning garden for native plants or fruits and vegetables. The various surfaces in the schoolyard would be designed to drain into an underground detention area designed to

capture approximately 0.25 acre-feet, which could provide storage up to a 10-year storm event. The detention would need to be refined with detailed hydrology and hydraulics calculations and undergo preliminary and final engineering design. The bottom of the detention area would be designed to infiltrate the water into the ground or slowly release it back into the existing 12-inch sewer. Downspouts from the school should be disconnected and directed to the underground detention where possible.

This project could also be phased into several construction contracts based on funding availability and partnership agreements but that may increase overall costs of the project when compared to constructing as a single contract.

Permeable pavers would be installed in the parking areas along Clinton and 35th Street to intercept the stormwater and drain it to the detention area. Permeable pavers should follow the latest and best-available design guidance and standards. Optional inlet restrictors could be placed on the surrounding streets to direct additional flow to the detention facility, but may require additional grading depending on the existing flow paths. The detention area is currently shown to service only the Irving School property and roadway areas adjacent to the permeable pavers, but should be expanded if inlet restrictors are installed.

This project would serve as a pilot project for a partnership between the City of Berwyn and the Berwyn South School District 100. The Healthy Schools Campaign could be contacted to aid in the planning process, as it is currently involved in a similar program in Chicago. Key steps for establishing a partnership include:

- Engaging the community and other stakeholders in the process to determine their wants and needs.

4.0 Opportunities and Concept Plans

- Exploring the possibility to manage off-site stormwater from adjacent streets on the school property.
- Identifying potential resources to cover design and construction costs.
- Establishing long-term maintenance needs and responsibilities.



Water Quality Benefits

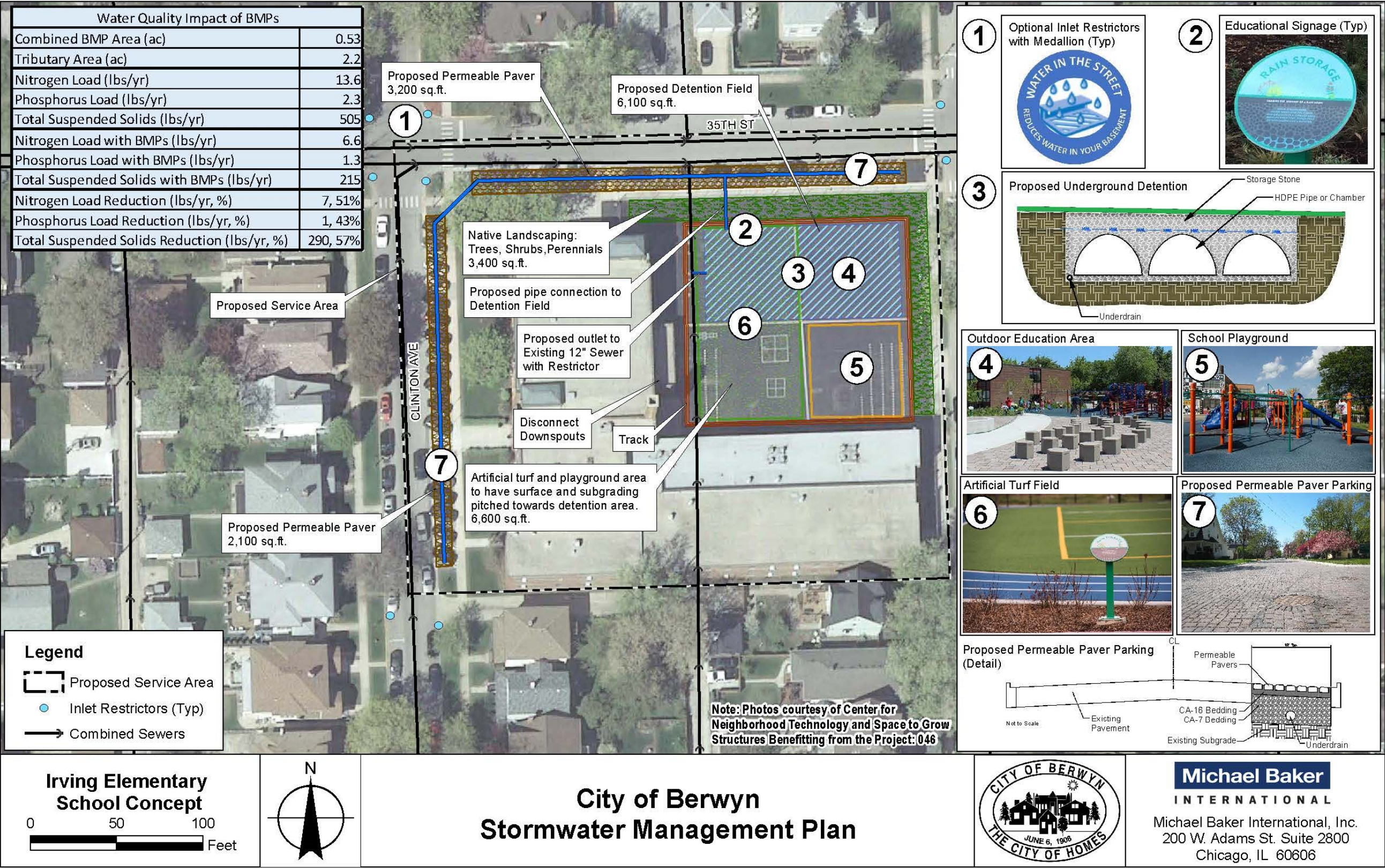
Water quality benefits will be provided in the permeable pavers and underground detention areas. These will provide reductions in nitrogen, phosphorus, and total suspended solids. A summary table of the benefits is provided in **Table 3**.

Table 3: Irving School Concept Water Quality Benefits

Water Quality Impact of BMPs	
Combined BMP Area (ac)	0.53
Tributary Area (ac)	2.2
Nitrogen Load (lbs/yr)	13.6
Phosphorus Load (lbs/yr)	2.3
Total Suspended Solids (lbs/yr)	505
Nitrogen Load with BMPs (lbs/yr)	6.6
Phosphorus Load with BMPs (lbs/yr)	1.3
Total Suspended Solids with BMPs (lbs/yr)	215
Nitrogen Load Reduction (lbs/yr, %)	7, 51%
Phosphorus Load Reduction (lbs/yr, %)	1, 43%
Total Suspended Solids Reduction (lbs/yr, %)	290, 57%

Cost Estimate

An Engineer's Opinion of Cost was developed for this project and is \$687,268. Backup documentation for the Opinion is included in the **Appendix 5.2**.



4.0 Opportunities and Concept Plans

4.2.3 34th Street Concept

The homes along 34th Street currently connect to the combined sewer system through alley sewers, which tend to be smaller and shallower than combined sewers and are more likely to result in basement backups when the system is overwhelmed. The goal of this concept is to provide stormwater benefits along 34th Street to relieve the alley sewers.



Permeable pavers would be placed in the parking lanes of the street to capture street runoff and drain to the existing, shallower 15-inch diameter combined sewer along East Avenue. Permeable pavers should follow the latest and best-available design guidance and standards. Optional detention could be included in the street during final design when utility conflicts and sewer depths are known.

Homeowners along 34th Street would be encouraged to direct flow from their downspouts toward 34th Street so that roof drainage can be captured before entering the combined sewer system. Where space is available, the downspouts can be directed to new parkway rain gardens with underdrains feeding into the permeable paver system.

Educational signage can be placed on either end of the street, illustrating the scope of the project and the stormwater benefits provided.

Water Quality Benefits

Water quality benefits will be provided in the raingardens and permeable paver areas. These will provide reductions in nitrogen, phosphorus, and total suspended solids. A summary table of the benefits is provided in **Table 4**.

4.0 Opportunities and Concept Plans

Table 4: 34th Street Concept Water Quality Benefits

Water Quality Impact of BMPs	
Combined BMP Area (ac)	0.43
Tributary Area (ac)	3.4
Nitrogen Load (lbs/yr)	16.3
Phosphorus Load (lbs/yr)	3
Total Suspended Solids (lbs/yr)	742
Nitrogen Load with BMPs (lbs/yr)	14.5
Phosphorus Load with BMPs (lbs/yr)	2.6
Total Suspended Solids with BMPs (lbs/yr)	658
Nitrogen Load Reduction (lbs/yr, %)	1.9, 11%
Phosphorus Load Reduction (lbs/yr, %)	0.3, 11%
Total Suspended Solids Reduction (lbs/yr, %)	84, 11%

Cost Estimate

An Engineer's Opinion of Cost was developed for this project and is \$523,244. Backup documentation for the Opinion is included in the **Appendix 5.3**.

