

A Blueprint to Scale Up Reforestation and Wetland Restoration in Underserved Communities Across the Greater Milwaukee Area

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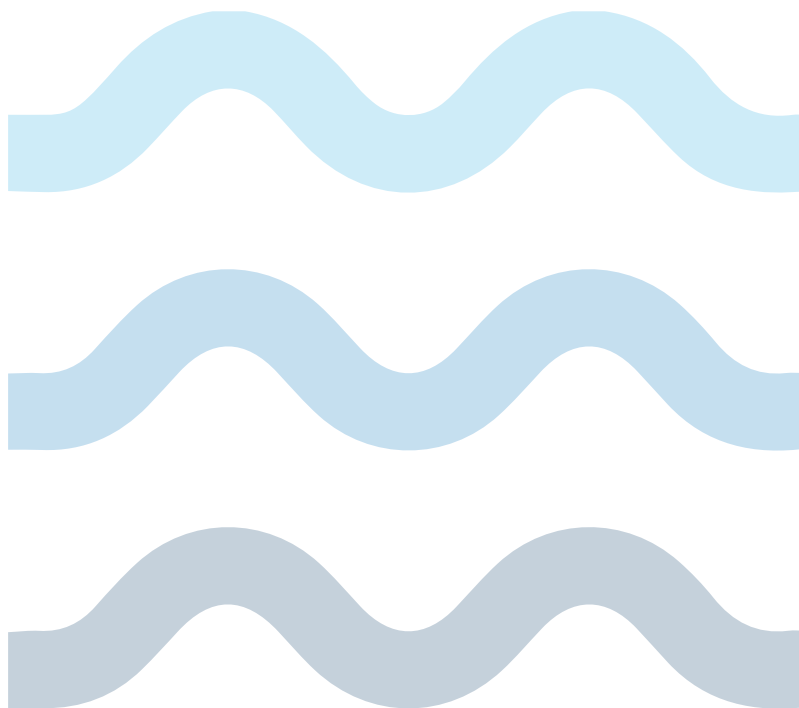
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Milwaukee Metropolitan Sewerage District (MMSD) has no authorship of this report and views these recommendations as third-party input.

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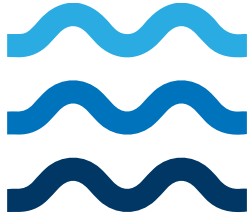


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Lastly, this report is an abridged version of a full-length report that we will share with public agencies upon request. Any related communications can be directed to the following.

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About the project team

Started in 2020 and funded by the Great Lakes Protection Fund (GLPF), *Resilient Infrastructure for Sustainable Communities* (RISC, www.risc.solutions) was created to establish a resilience and finance leadership cluster of municipal resilience officers and other sustainability leaders across the binational Great Lakes region. RISC's key goals include providing a forum for collaboration and innovation on an inter-regional scale on new models for project delivery, investment, financing, and asset management; promoting One Water; and helping implement large-scale investments that lead to sustainable stormwater infrastructure and green neighborhoods in Great Lakes communities, thus directly addressing water quality and quantity challenges presented by the changing climate.

Corvias Infrastructure Solutions, LLC (CIS) is a national leader in the development and implementation of public infrastructure solutions, focusing on improving the environmental, economic, and social condition of the nation's infrastructure through solutions that drive local economic inclusion and equity, reduction of public risk, and increased community investment and buy-in. CIS also offers related advisory/research expertise and services on topics including One Water/nature-based solutions, climate resilience, disaster prevention, environmental equity/justice/finance, water affordability, and public trust.

Delta Institute (Delta) collaborates with communities to solve complex environmental challenges throughout the Midwest. Delta addresses Midwestern environmental, economic, and climate challenges today, so that our home and region are more resilient, equitable, and innovative tomorrow.

Insurance Information Institute (Triple-I) seeks to ensure people have the information they need to make educated decisions, manage risk, and appreciate the essential value of insurance. Triple-I provides a wealth of data-driven research studies, white papers, videos, articles, infographics, and other resources solely dedicated to explaining insurance and enhancing knowledge.

Table of contents

Section	Page
Executive Summary	6
1. Introduction	8
2. The Current State of NBS in MMSD’s Service Area	12
3. The Case for RWR Scale Up	17
Flood Risk in the Greater Milwaukee Area	18
Intersections with Environmental Justice and Equity	19
Intersections with Deforestation and Land-Use Changes	20
Benefits of Reforestation and Wetlands Restoration	25
Environmental Benefits	25
Social Benefits	26
Governance Benefits	27
4. MMSD’s Capital Spend Plan and Allocation to NBS	31
5. Financing and Delivery Mechanisms for MMSD’s RWR Program	32
Public and Private Funding Sources	33
Delivery Framework for GSI Scale Up	35
Transactional Frameworks and Revenue Sources	37
Option 1: CBP	37
Option 2: CBP with an EIB	38
6. Public Input and Engagement	41
7. Conclusion	44
8. References	45

List of Figures

Figure 1-1 MMSD’s Service Area	10
Figure 1-2 Greater Milwaukee Watersheds	11
Figure 2-1 Locations of Existing Nature-Based Solutions	16
Figure 3-1 Milwaukee 10-year and 100-year Future Precipitation Estimates	19
Figure 3-2 Average nominal flood depth by HOLC grade (100 mm storm).	20
Figure 3-3 A chart showing the distribution of tree canopy over the people of color in the City of Milwaukee. Source: Tree Equity Score, American Forests.	20
Figure 3-4 Tree Canopy Within Greater Milwaukee Watersheds	22
Figure 3-5 Wetland Area Within Greater Milwaukee Watersheds	23
Figure 3-6 American Forests Tree Equity Score Within Greater Milwaukee Watershed Boundary	26
Figure 4-1 MMSD’s 2023 Combined Summary of Revenues. Source: MMSD’s 2023 Capital and O&M Budget.	30
Figure 4-2 MMSD’s 2023 Combined Summary of Expenditures. Source: MMSD’s 2023 Capital and O&M Budget.	31
Figure 5-1 Legal framework structure of a CBP partnership.	36
Figure 6-1 Priority Environmental Justice Communities in MMSD’s Service Area	42

List of Tables

Table 5-1 Possible Funding Sources	34
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Executive summary



This project, funded by the Great Lakes Protection Fund, looks at possible frameworks to successfully deliver extensive reforestation and wetland restoration across the greater Milwaukee region within the Milwaukee Metropolitan Sewerage District (MMSD) service area. MMSD is a Wisconsin-based wastewater utility that has committed substantial resources to the use of reforestation, wetlands restoration, and other nature-based solutions (NBS) including green stormwater infrastructure (GSI) projects to enhance their operations. This commitment has positioned MMSD to build upon its past work to implement integrated NBS for stormwater management on a large scale.

Average precipitation in Wisconsin has gone up around 17 percent since 1950, and intense precipitation events are growing more common, requiring MMSD to take immediate action to build resilience to flooding. MMSD's leadership in NBS dates back to the early 2000s when it first launched its Greenseams program to protect key lands containing water-absorbing soils to help store and drain water into the ground naturally. Since then, MMSD has implemented several other programs that have expanded the use of NBS across its service area. In particular, this report focuses on MMSD's Reforestation and Wetland Restoration (RWR) program that is a 10-year initiative leading to a) planting of six million trees, b) restoring 4,000 acres of wetlands, c) capturing an estimated 350 million gallons of stormwater with trees, and d) storing up to an estimated 1.5 million gallons of floodwater in every acre of wetland.

Our interviews with local community leaders suggest that urban flooding is a top priority for communities as they face more intense rain events. Community engagement is needed to build trust and overcome organizational funding/capacity constraints—especially for EJ communities. Communities also need funding and technical support for supporting tree planting and maintenance to improve community well-being and environmental health. Finally, interviews with community leaders suggest the need for greater collaboration between MMSD and community-based organizations to tackle flooding concerns and reforestation initiatives.

As flood risk grows more severe due to changing climate, MMSD will need to continue to scale up its investment in NBS like reforestation, wetland restoration, and other GSI. This will require MMSD to find new ways to generate funding to pay for these projects. MMSD will need new, innovative transactional frameworks and new sources of financing to deliver these projects. In this report, we provide a *Blueprint* for scaling up NBS across MMSD's service area, with an emphasis on supporting underserved communities. The suggested approach centers around the use of Community-based Partnerships (CBPs).

CBPs are designed to be in place for an extended period – one or more decades – as a means of developing standard delivery framework with scalable development resources, risk sharing, and capacity building that result in efficiency and significant cost savings. The “front-end” investment of time and energy required to create the partnership can yield valuable benefits for decades.

Expanding the use of CBPs can further establish MMSD as a national leader in proactive management of stormwater.

In 2020, MMSD and Corvias Infrastructure Solutions, LLC (CIS) created the first CBP in the Great Lakes region – the Fresh Coast Protection Partnership (FCPP)¹ aimed at capturing 11 million gallons of stormwater across 19 municipalities, reducing overflow volume and regional flooding on private land, the combined sewer service areas, and in communities within the greater Milwaukee region. The FCPP has committed \$29.2 million in funding for NBS projects over an eight-year period. The partnership will not only mitigate flood risks but will also build local capacity and participation in the region and contribute to improved equity – awarding 25 percent of contracts to small, minority, and women-owned enterprises. This is just the start and can serve as an example for scaling up investments in reforestation, wetland restoration, and other NBS projects.

¹ Corvias. 2023. Fresh Coast Protection Partnership. Accessed on June 22, 2023 at <https://www.corvias.com/projects/fresh-coast-protection-partnership>



1.

Introduction

The Milwaukee Metropolitan Sewerage District (MMSD) is a regional government agency that provides water reclamation and flood management services for about 1.1 million people in 28 communities in the Great Milwaukee Area, spread across a 432 square mile area (Figure 1-1) and services six watersheds in the Greater Milwaukee Area (Figure 1-2).

The Milwaukee metro area has grown by five percent since 2000 – slower than peer metro areas in the Midwest that have experienced a 10 percent growth on average during this time. This average masks variations in demographic changes across communities – 18 of the 28 communities that make up the MMSD service area lost population since 2000. The region’s relatively slow population growth is coupled with economic challenges including relatively lower income levels and long-term job losses. In 2015, the Milwaukee metro area ranked 78th out of the nation’s 100 largest metro areas for recovery from the recession.

Although Milwaukee is not a very large city², its regional wastewater system is among the largest, most sophisticated, and well run in the country. MMSD is nationally regarded as a leader in wastewater treatment, flood management, and green infrastructure and has received the U.S. Water Prize and many other awards. Around 26 square miles, or 6 percent of MMSD’s planning area, have combined sewers. Approximately 323 square miles, or 76 percent of the planning area, have separate sewers. The remaining 74 square miles, or 18 percent of the planning area, are considered unsewered, i.e., they are within the planning area but have not yet been added to MMSD’s sewer area.

Average precipitation in Wisconsin has gone up by around 17 percent since 1950, according to a [report](#) by the Wisconsin Initiative on Climate Change Impacts. Extreme rainfall will likely become more common in the coming decades, the report concludes, bringing flooding concerns from rising groundwater or overflowing streams. Within the last two decades, Milwaukee, Wisconsin has experienced more intense precipitation events. Wisconsin recorded its wettest year in 2019, according to

National Weather Service statistics dating back 125 years. These floods have claimed several lives, destroyed homes, and cost millions of dollars in damage. In January 2020, a powerful winter storm, driven by climate change and urbanization, resulted in an estimated \$10.7 million in damage across Milwaukee County.

MMSD has committed substantial resources to the use of reforestation, wetlands restoration, and other nature-based solutions (NBS) including green stormwater infrastructure (GSI) projects to enhance their operations (Figure 1-3). This commitment has positioned MMSD to build upon its past work to implement integrated NBS for stormwater management on a large scale. In particular, this report focusses upon MMSD’s Reforestation and Wetland Restoration (RWR) program that is a 10-year initiative leading to a) planting of six million trees, b) restoring 4,000 acres of wetlands, c) capturing an estimated 350 million gallons of stormwater with trees, and d) storing up to an estimated 1.5 million gallons of floodwater in every acre of wetland.

To keep up with growing flood risk, MMSD has committed to investing \$294 million in watercourse and flood management projects over the next ten years according to the 2023 Capital and O&M Budget. The budget only includes \$13 million in expenditures for these projects in 2023, but MMSD has budgeted almost \$100 million for 2028. This is a substantial increase and will likely require MMSD to find new ways to generate funding to pay for these projects. MMSD will need new, innovative transactional frameworks and new sources of financing to deliver these projects.

To further this effort, *Resilient Infrastructure for Sustainable Communities* (RISC) undertook a review of the MMSD planning documents, projects, and finances along with climate projections, relevant literature, and stakeholder mapping to develop A Blueprint for NBS Scale up Across MMSD’s Service Area, which includes a summary of financing and delivery approaches, transactional frameworks and revenue sources, and opportunity areas for future GSI investment. A summarized version of the project’s findings is presented in this report.

² It is the 31st largest city in the United States according to the 2020 Census.



Introduction



Figure I-1 MMSD Service Area

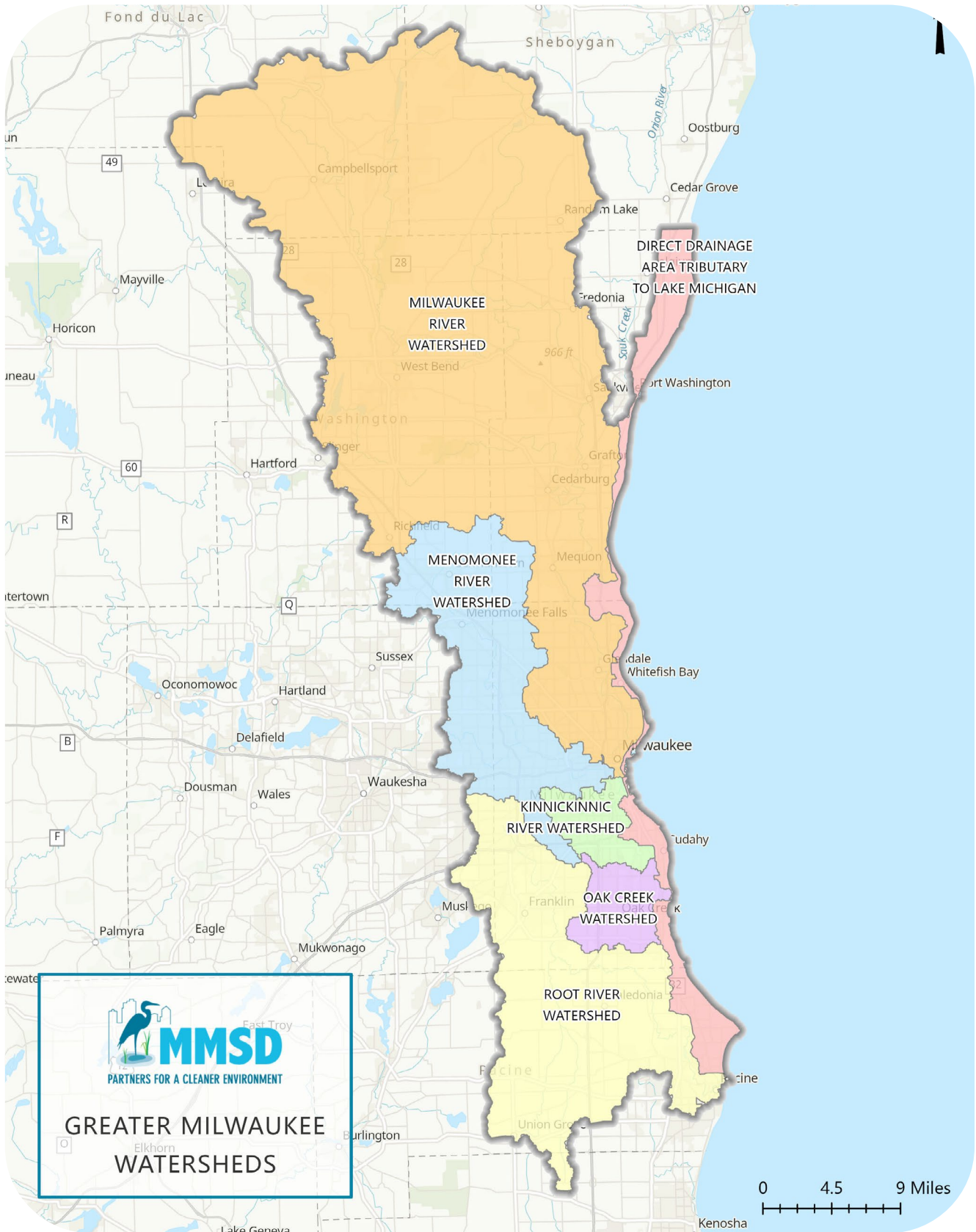


Figure I-2 Greater Milwaukee Watersheds

2.



The Current State of NBS in MMSD's Service Area



By weaving natural features into the built environment, NBS can not only provide stormwater management, but also several other environmental, social, and economic benefits not typically provided by gray infrastructure. NBS increases exposure to the natural environment, reduces exposure to harmful substances and conditions, provides opportunity for recreation and physical activity, improves safety, promotes community identity and a sense of well-being, and provides economic benefits at both the community and household level (EPA, 2017). By siting NBS in underserved areas, it has the potential to increase equity in outcomes such as reduced heat island effect, visual aesthetics, and neighborhood desirability, increased green spaces, and reduced crime. Research has shown that distributing NBS across the landscape, as opposed to clustering it either upstream or downstream, is effective even at low coverage during small storms (Zellner et al., 2016).

MMSD has also been an early adopter of NBS (Figure 2-1). The following timeline provides an overview of MMSD's leadership on this topic:

2001: Regional Stormwater Rule

In 2001, MMSD took additional steps to better manage regional flooding by passing its regional stormwater rule across 28 communities. This rule, Chapter 13 of MMSD's regulations, was designed to protect downstream communities from flooding caused by upstream communities with less stringent stormwater regulations. The legislation provides equitable stormwater management across the whole District by providing baseline requirements specifically for construction activities within the service area (Hickock-Wall 2001).

2000

2000: Greenseams Program

The "Greenseams" program was initiated in 2000 to purchase lands in areas expected to be under pressure from future development, especially locations along stream or riverine corridors, to preserve open spaces and encourage infiltration in areas that could otherwise be converted to impervious surfaces (MMSD, 2013). The purchased lands are protected from development to improve long-term flood management and lessen the grey infrastructure commitments associated with rapid construction and development. The program has set aside over 5,290 acres of green space as of 2023. MMSD's goal is to conserve 10,000 acres by 2035.

2001





The Current State of NBS in MMSD’s Service Area

2002: Best Management Practices Partnership Program

The Best Management Practices (BMPs) Partnership Program was initiated in 2002 allowing MMSD to fund some of the first green infrastructure installations in the MMSD service area (MMSD 2013). With supportive, regulatory framework established and available existing green areas, MMSD was able to implement multiple green infrastructure installations in MMSD’s service area.



2010: Regional Green Roof Initiative

MMSD instituted the Regional Green Roof Initiative and offers grants and other incentives to encourage the installation of these technologies in urban areas. To date, this program has funded nine acres of green roofs in MMSD’s service area (MMSD, 2013). MMSD has also developed prioritization and categorization maps for the city showing which buildings are prime candidates for green roof installations (MMSD, 2013).

2002

2004

2005

2009

2010

2012

2004: Rain Barrel Program

MMSD initiated its rain barrel program in 2004 in an effort to involve the entire region in green infrastructure initiatives (MMSD, 2013). Working with local partners, MMSD retrofits, sells, and distributes recycled, food-grade, 55-gallon drums to be used as rain barrels. The program has installed 22,000 barrels as of 2015 and has made significant progress towards the ultimate goal of installing over 150,000 barrels throughout MMSD’s service area (MMSD 2013).

2005: Lake Michigan Rain Gardens Initiative

The Lake Michigan Rain Gardens Initiative was established in 2005 to install rain gardens as replacements of grass areas near downspouts (MMSD, 2013). The program provides wholesale-price plants to the public, and MMSD reports it has sold over 40,050 plants through 2016. This program was a product of a cooperative relationship between the Graham-Martin Foundation and MMSD.

2009: Fresh Coast, Green Solutions

MMSD produced “Fresh Coast, Green Solutions” in 2009 illustrating actions communities could take to enhance the effectiveness of green solutions to stormwater problems. Two years later, MMSD launched a website to provide member communities information on MMSD’s green infrastructure efforts. Simultaneously, MMSD released its 2035 Vision report to outline its goals for the region and provide a roadmap for proposed green infrastructure programs.



2012: Green Infrastructure Partnership Program

The Green Infrastructure Partnership Program was established in 2012 allowing MMSD to fund demonstration projects to publicly document the myriad benefits of green infrastructure (MMSD 2013). Under this program, funding is provided to communities and organizations for green infrastructure projects but requires that they provide educational outreach to accelerate public acceptance and adoption. Finally, as mentioned previously, MMSD’s board of commissioners voted to formally adopt green infrastructure in 2012 as part of MMSD’s stormwater infrastructure (MMSD 2013).

2018: Fresh Coast Ambassador Program

The [Fresh Coast Ambassador Program](#) launched in 2018, is a collaboration between the [Boys & Girls Club](#), [Cream City Conservation](#), and MMSD. This program works with high school students to gain work experience in [green infrastructure](#). Cream City Conservation and the Boys & Girls Club leverage their partnership with the local workforce development board, [Employ Milwaukee](#), to connect young people to paid work experiences while providing career planning, support services, and culturally competent, social and emotional learning to ensure the young person can thrive and grow in the program.

2022: Reforestation and Wetland Restoration Program Development

MMSD began developing the RWR program in 2022, and since then has begun a phased implementation of the projects. The RWR program is a 10-year year program that seeks to: i) plant 6 million trees; ii) restore 4,000 acres of wetlands; iii) capture an estimated 350 million gallons of stormwater with trees; and iv) store up to an estimated 1.5 million gallons of floodwater in every acre of wetland. This program will develop and implement projects on public and private land in urban, suburban, and rural areas.

2013

2018

2019

2021

2022

2023

2013: Regional Green Infrastructure Plan

MMSD developed the Regional Green Infrastructure Plan in 2013 to serve as a comprehensive synthesis of past efforts, future goals, and actions needed to achieve those goals (MMSD, 2013). The plan takes an integrated approach to the 2035 Vision and “will focus on the infrastructure of watersheds, seeking a healthy balance between two types of infrastructure: grey and green. The Plan considers watershed-specific characteristics to select appropriate green infrastructure solutions” (MMSD, 2013, p. 26).

2019: Regional Stormwater Rule Update

Chapter 13 was updated to lower the impervious area threshold to allow for the expansion of NBS projects.

2019: City of Milwaukee Green Infrastructure Plan

In 2019, the City of Milwaukee published the “City of Milwaukee Green Infrastructure Plan”, produced in partnership with MMSD and other city departments. The plan includes a bold vision to increase stormwater storage by scaling up investments in NBS and doing so in a way that builds urban resilience and contributes to equitable outcomes (City of Milwaukee, 2019).

2021: Fresh Coast, Fresh Start Pilot Program

The [Fresh Coast, Fresh Start \(Fresh Start\)](#) pilot program launched in 2021 brings together community partners, [Cream City Conservation](#), [Milwaukee Jobs Work](#), and [Milwaukee County Parks](#) to provide opportunities for populations that are re-entering the community from incarceration or are under or unemployed in the water sector. The goal is to train adults to be workforce-ready and, in doing so, that leads to a job opportunity or apprenticeship.

2023: Fresh Coast Ambassador Program Expansion

In 2023, MMSD received a \$1 million grant from the Department of Labor for workforce efforts. This grant is being used to expand the Fresh Coast Ambassadors program to include young adults, ages seventeen to twenty-five. It is estimated that from 2023 to 2025, 32 participants will have gone through the program. The goal of this effort is to create interest in the water industry and conservation careers while providing paid training and work experience to unemployed and underemployed residents within MMSD’s service area.

2023: Reforestation and Wetland Restoration Phased Implementation

Currently, the program is currently in the pilot phase and will be completed by 2032. The program will begin with identification of five pilot projects using the programmatic criteria ranking process to ensure projects meet programmatic goals. It is anticipated that one project will be in the urban area (City of Milwaukee), two projects will be in the suburban areas (outer ring suburbs), and two projects will be in the rural areas.



The Current State of NBS in MMSD's Service Area

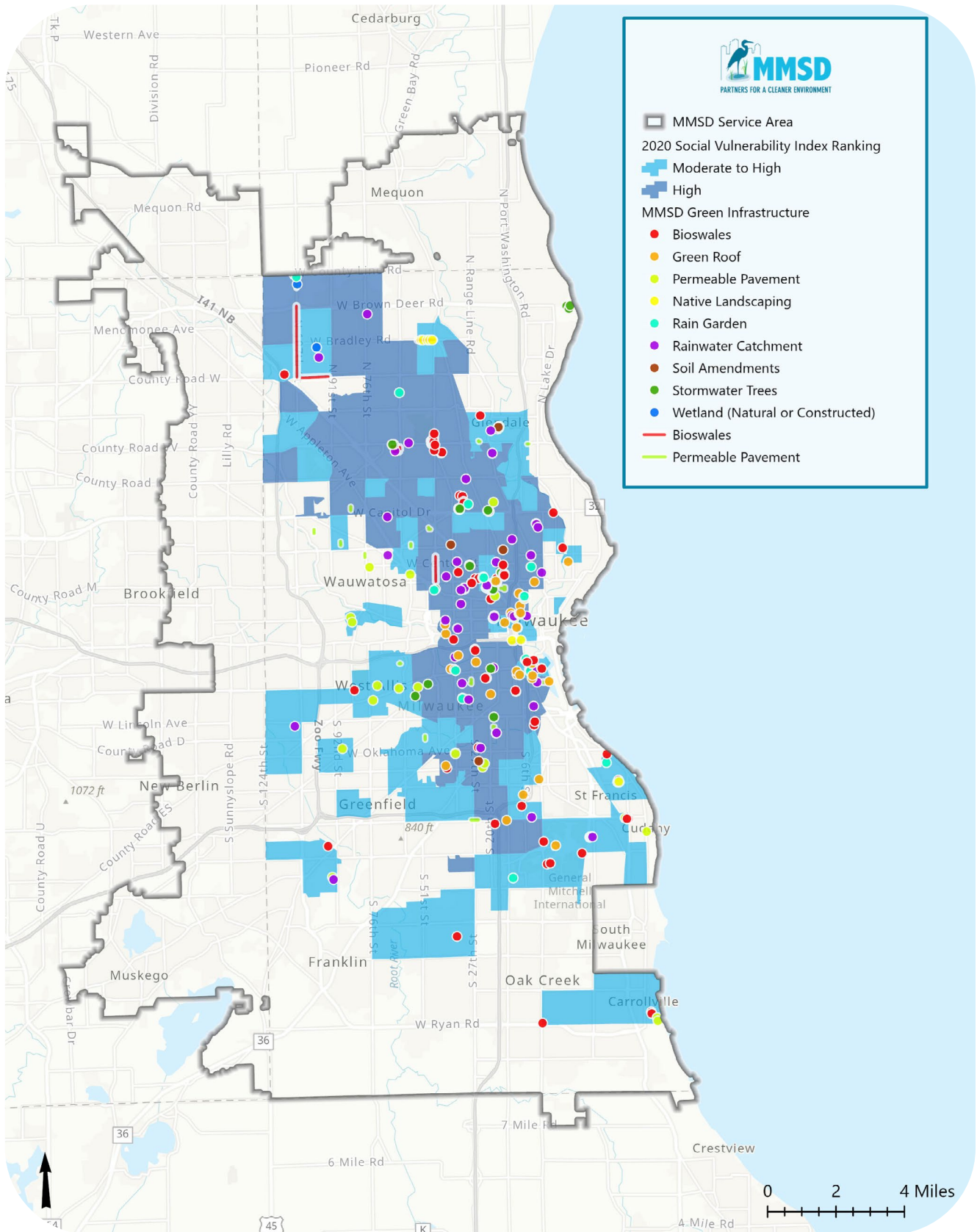


Figure 2-1 Locations of Existing Nature-Based Solutions



3.

The Case for RWR Scale Up



The Case for RWR Scale Up

Flood Risk in the Greater Milwaukee Area

Milwaukee is susceptible to flooding. Three major rivers run through the city of Milwaukee – Milwaukee, Menomonee, and Kinnikinic – before they empty into Lake Michigan. The city also has many streams that run along streets and through parks and neighborhoods. Fluctuating water levels of Lake Michigan and increased rainfall from severe storms because of climate change pose a significant threat to the region. Until the 1970's, MMSD's efforts to manage stormwater predominantly focused on storm/flood water conveyance capacity. At the time, flooding streams, creeks, and rivers were viewed as a serious nuisance. Rarely were the waterways seen as valuable environmental resources and community assets worth protecting. During this time, MMSD's flood control practices consisted primarily of straightening, deepening, and widening the various streams, creeks, and rivers within its jurisdictional area.

Slowly, the philosophy of flood control and accompanying engineering practices evolved into building long-lasting environmental and quality-of-life benefits connected with flood management projects. In 1996, this prompted MMSD to invest in an environmentally responsible watershed planning program, moving from a flood "control" paradigm to a flood "management" paradigm.

Average precipitation in Wisconsin has gone up by around 17 percent since 1950, according to a [report](#) by the Wisconsin Initiative on Climate Change Impacts. Extreme rainfall in particular will likely become more common in the coming decades, the report concludes, bringing flooding concerns from rising groundwater or overflowing streams. Within the last two decades, Milwaukee, Wisconsin has experienced more intense and frequent flooding events. Wisconsin recorded its wettest year in 2019, according to National Weather Service statistics dating back 125 years (Torres, 2020). These floods have claimed several lives, destroyed homes, and cost millions of dollars in damage. A powerful winter storm in January 2020 alone resulted in an estimated \$10.7 million in damages across Milwaukee County. Increasingly frequent flooding events can be attributed primarily to two phenomena: climate change and urbanization.

An analysis of precipitation frequency estimates (PFE)³ of large Midwestern cities suggests that Milwaukee has experienced a 11 percent increase in PFE during the period beginning 1960 till present day (Sinha et al., 2023). The increase in rainfall estimates is likely to continue well into the future as well. Although projections are unavailable for Milwaukee, the neighboring city of Chicago provides some context. Relative to the currently used 100-year PFE, Chicago is expected to experience a 15 percent increase by mid-century and 20 percent by late century, respectively. As a result, a 100-year event is expected to produce over 51,000 MG (7.0 inches) by mid-century and nearly 54,000 MG (7.3 inches) by late-century in Milwaukee;

² Precipitation Frequency Estimates (PFE) are estimated rainfall depths for a given return period such as 10-years or 100-years. A 10-year return period event will occur, on average, once for every ten years of record or has a 10 percent chance of occurring in any given year.

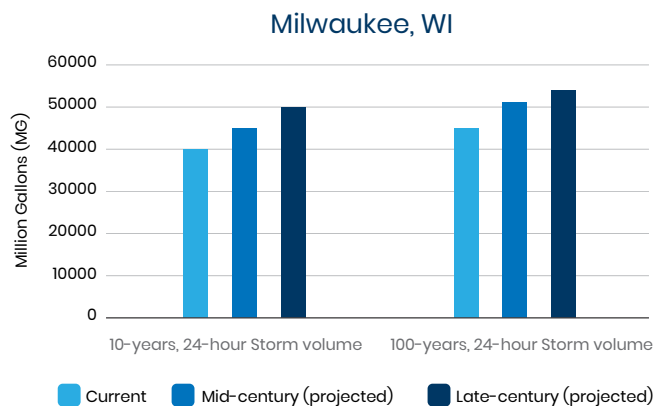


Figure 3-1 Milwaukee 10-year and 100-year Future Precipitation Estimates

by comparison, a similar storm event today will produce 45,000 MG (6.1 inches) (Figure 3-1). Furthermore, as the city has expanded, the area of impervious surfaces (such as rooftops, roads, sidewalks, etc.) has also increased, replacing natural flood buffers such as wetlands and trees, decreasing city-wide water retention, and increasing runoff.

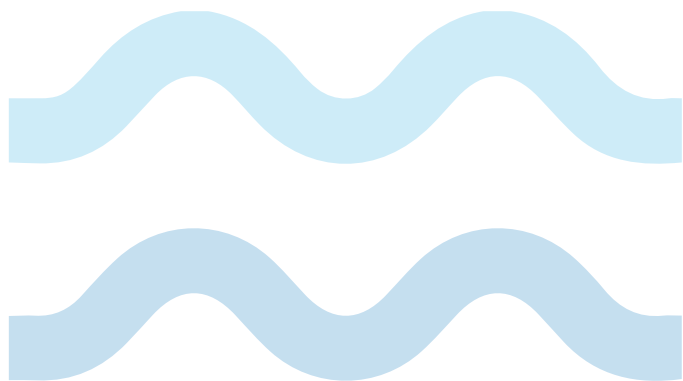
According to the First Street Foundation’s [Flood Factor](#), the city of Milwaukee has a major risk of flooding over the next 30 years, which means flooding is likely to impact the community’s day-to-day life. Urgent action will be needed to mitigate flood risk as it grows more severe in the coming years

Intersections with Environmental Justice and Equity

MMSD serves 28 communities in the Greater Milwaukee area and there are vast disparities across these communities. The City of Milwaukee serves as an anchor, given its history as a prosperous industrial city half a century ago. The city’s deindustrialization, along with globalization and economic restructuring in the U.S., has created challenges for the region’s economic base and workforce. White flight – a national phenomenon where wealthier White families left cities for nearby suburbs, leaving behind poor, majority-Black cities – during the 1970s resulted in Milwaukee steadily losing population, while the metro area expanded. This dichotomy has resulted in deep racial divides; the four-county Milwaukee metropolitan area has the highest segregation index for black-white segregation.⁴ Racially discriminative housing policies have led to an uneven distribution of flood risk across the Greater Milwaukee Area.

An investigation of modern flood risk in historically redlined areas of Milwaukee found that median nominal flood depth for areas that were historically redlined (assessed as “D”) was worse than the other areas (Tango et al., 2022). The average location in historically redlined areas had 14 percent deeper nominal flood depths than the average location in historically green-lined areas (83.12 mm vs. 72.73 mm), as shown in Figure 3-2. Additionally, the analysis found that economic damages resulting from flooding were 12 percent higher in historically redlined areas than their green-lined counterparts in a scenario of equal flooding. This likely reflects a greater density of buildings in historically redlined areas, which leads to greater maximum damage estimates. Additionally, greater density in the built environment typically allows for fewer permeable surfaces, which could further exacerbate this disparity in a real flooding scenario.

⁴ Brookings. 2018. Black-white segregation edges downward since 2000, census shows.





The Case for RWR Scale Up

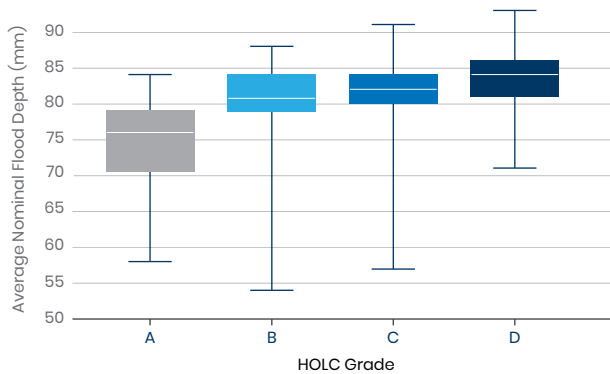
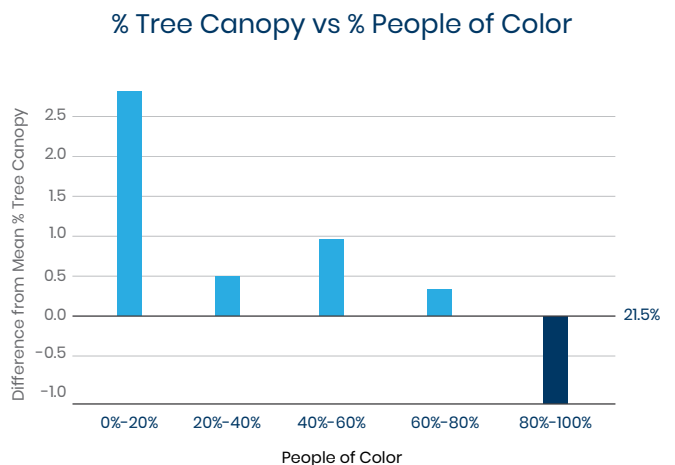


Figure 3-2 Average nominal flood depth by Home Owner Loan Corporation HOLC grade (100 mm storm).

Based on prior research, it is likely that poorer and majority-Black neighborhoods in the city, especially those that were historically redlined, have much lower tree cover than their wealthier, majority-White neighborhoods (Nowak et al., 2022). An analysis of tree canopy by the American Forests, a Washington, DC-based nonprofit, confirms this (see Figure 3-3).



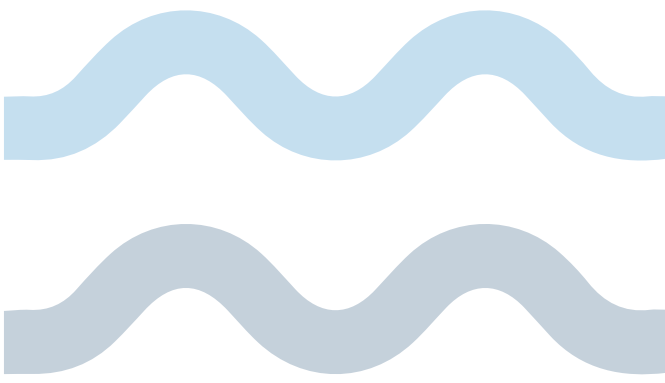
Each bar represents the mean tree canopy % for block groups within the specified range of people of color. The amount above or below the thick horizontal line indicates the difference from the area-wide mean canopy%

Figure 3-3 A chart showing the distribution of tree canopy over the people of color in the City of Milwaukee. Source: Tree Equity Score, American Forests.

Intersections with Deforestation and Land-Use Changes

Despite popular belief, North American forests were not all old growth at the time of colonization by European settlers. Native Americans had already been modifying forest habitats for millennia, opening up forests for grass, herbs, and shrubs favored by elk, deer and bison they hunted, burning along trails to make travel easier and eliminate hiding places for predators and human enemies, and later when they started practicing intensive agriculture and built settlements. This process dramatically intensified with the arrival of European settlers, who had far more nefarious intents for clearing forests, but their initial settlements were restricted to the Atlantic seaboard and the New England states.

The Great Lakes region was still relatively untouched at this point, but all that changed with the onset of the Industrial Revolution (Bronaugh, 2012). Railroads and steam-generated power helped make lumber a large-scale industrial commodity. This vastly increased the demand for lumber far beyond local needs. For the first time in history, large-scale deforestation took place for no local reason, permanently altering the ecology and landscape. Although deforestation continued after that, the overall decline in forest cover plateaued around 1920, as trees reclaimed a portion of the abandoned farms and clear cuts, resulting in new-growth forests. The Great Lakes region also lost 62 percent of its original wetlands in the post-industrial era to make way for housing, industry, and transportation (Yerkes, n.d.). Losses in some parts of the region exceed 90 percent, creating modern day hazards like flash flooding and urban heat island effect.



According to a recent study led by researchers at the University of Notre Dame and the University of Maryland, tree logging and agricultural expansion in the U.S. Midwest over the past 150 years wiped out woody biomass in the forests that was accumulated over 8,000 years (Raiho et al., 2022). Old-growth trees are more drought-tolerant than younger trees in the forest canopy and are thus a critical tool in managing the impacts of climate change (Au et al., 2022). While we may not get back the old-growth forests of yesteryears, intentional efforts and time can provide similar, if not the same, benefits from secondary-growth forests that have shown resilience to extreme weather like drought (Au et al., 2022).

Climate change poses a potent threat to trees, especially in urban areas where their protections are withering, and they are susceptible to multiple threats. A global

analysis, conducted across 164 cities in 78 countries, reported that “about half the trees were already experiencing climate conditions beyond their limits” (Esperon-Rodriguez, 2022). The outcomes were largely fueled by “extreme swings of too much water, too little water, too much wind, and storm intensities,” according to a retired scientist at the U.S. Forest Service (Valdes, 2022).

New Orleans lost 10 percent of its trees when Hurricane Katrina hit the city in 2005. In 2021, Hurricane Ida uprooted many new saplings the city had planted. Exactly half of the U.S. states – including the Great Lakes states of Michigan, Indiana, Ohio, and New York – have lost significant amount of urban tree cover in the last decade (Nowak and Greenfield, 2018). Among the Great Lakes states, Ohio lost the most tree cover – 10,180 acres/year, amounting to a 1.4 percent loss.



The Case for RWR Scale Up

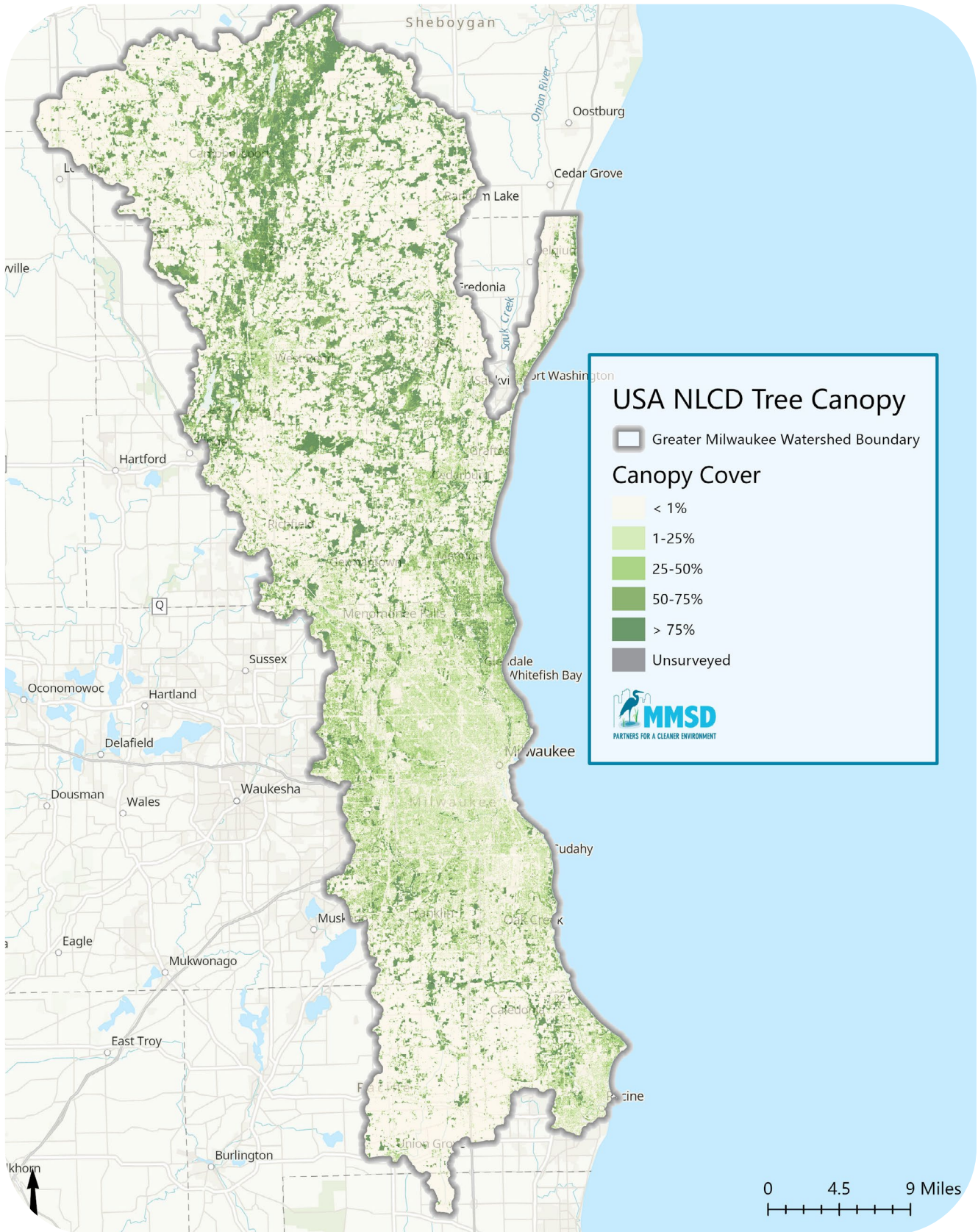


Figure 3-4 Tree Canopy Within Greater Milwaukee Watersheds

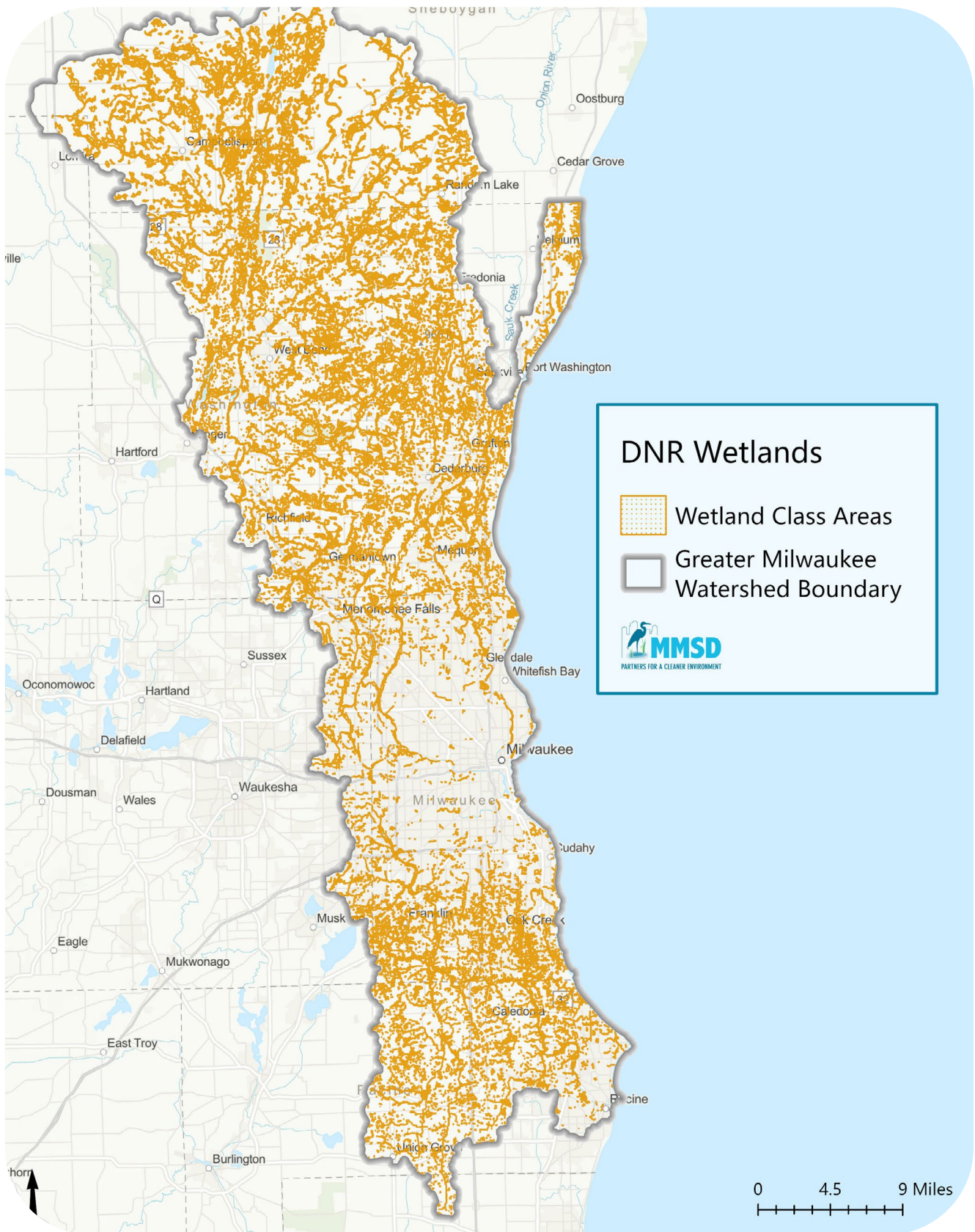


Figure 3-5 Wetland Area Within Greater Milwaukee Watersheds



The Case for RWR Scale Up

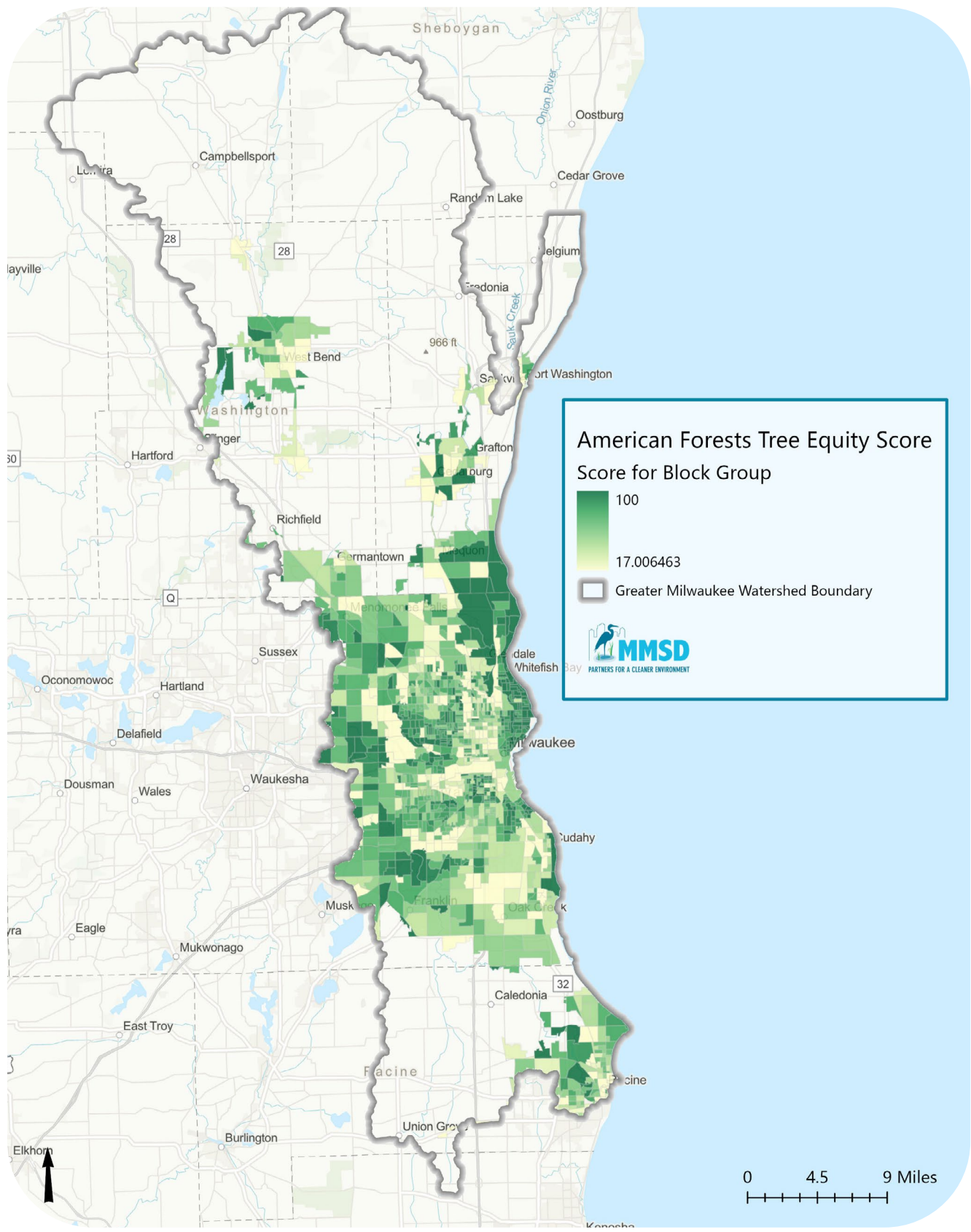


Figure 3-6 American Forests Tree Equity Score Within Greater Milwaukee Watershed Boundary

Benefits of Reforestation and Wetlands Restoration

The present-day discussion is not the first time that policymakers have focused on large-scale nature-based solutions. Facing the Dust Bowl, President Franklin Roosevelt championed the Prairie States Forestry Project, also known as the “Great Wall of Trees” (Orth, 2007). Under this project, the federal government paid farmers to grow “shelter belts” of trees around farmlands, employing thousands of rural workers. At the conclusion of the project in 1942, the great wall had over 220 million trees and stretched 140,000 square miles from Texas to North Dakota (White House Council on Environmental Quality et al., 2022). The trees reduced erosion, protected livestock from windstorms, provided shade, and created habitat for birds and wildlife.

In 2009, the UK government launched a “Slowing the Flow” program at the North Yorkshire town of Pickering, after the town suffered four serious floods in a period of 10 years (Forest Research, 2022). The work included planting 40,000 trees, fixing 300 “leaky” dams and the restoration of heather moorland⁵, all intended to slow the flow of water into the river and reduce its peak height. A new flood storage area was also set aside in nearby fields. The project cost the government £500,000, significantly less than a proposed flood wall in the town (Walker & Carrington, 2015). An analysis published in 2016 found that the project prevented flooding in the town during December 2015, at a time when heavy rainfall caused devastating flooding across the region. The report by the UK’s Forest Research agency estimated that Slowing the Flow project measures reduced the flood peak by around 15-20 percent, with around half of the reduction being attributed to the upstream land management measures and the other half to the flood storage area (Forest Research, 2016).

Reforestation and wetland restoration (RWR) offer many environmental, social, and governance (ESG) benefits:

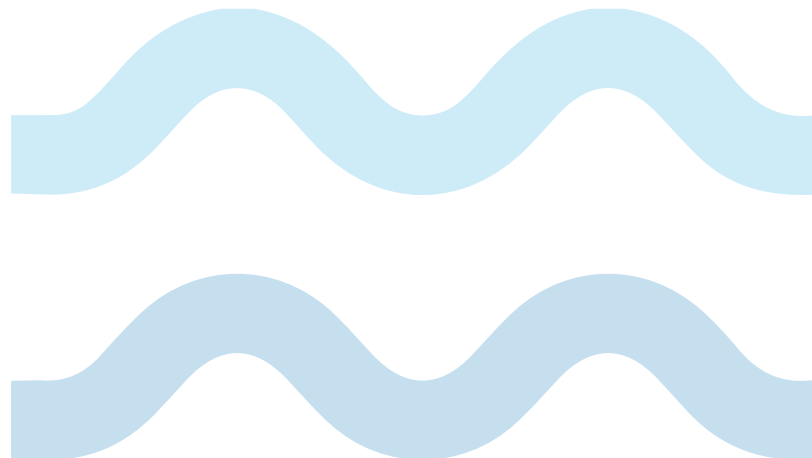
⁵ Upland areas in northern UK that are dominated by heathers, a low-growing evergreen shrub.

Environmental Benefits

Reduce Downstream Flow Potential: The presence of trees mitigates soil compaction, thus allowing for greater water infiltration and storage, which reduces surface runoff and the threat of downstream flooding. Wetlands help to minimize impacts from flooding by providing an area for water to move and slow down during storm events. Coastal wetlands can reduce the destructive power of natural disasters, like hurricanes, by creating a barrier for wind and waves. On average, coastal wetlands reduced flood losses during Hurricane Sandy by 16 percent (Narayan et al., 2017).

Improve Water and Air Quality: Trees also filter and improve water quality through reduced sediment loss and uptake of metals and minerals. As trees grow and breathe, they remove carbon dioxide and other harmful pollutants from the air. Similarly, wetlands act as a living water filter, trapping pollutants and slowing down runoff.

Increase Carbon Sink Potential: By increasing tree density, more carbon can be sequestered by the growing forest. The loosened soil also allows the trees to grow more vigorously, which increases the rate of carbon accumulation in plant tissues and the soil.





The Case for RWR Scale Up

Increase Wildlife Protection:

Reforestation makes the land more hospitable to wildlife by providing food and shelter and creating better connectivity to other forested areas. Wetland restoration can offer similar protection to migratory birds, insects, and other mammals. For example, golden-winged warblers and other songbirds benefit from early successional forest cover and the reduction in forest fragmentation. The endangered Indiana bat and forest interior dependent species gain new habitat as the forest matures. Pollinators also benefit from flowering trees and plants used in reforestation efforts.

Create a More Resilient, Sustainable

Watershed: Resilience, as defined by the EPA, is “a capability to anticipate, prepare for, respond to and recover from significant multi-hazard threats with minimum damage to social well-being, the economy and the environment.” A fully functioning ecosystem with diverse plant and animal species provides protection from pests, natural and human disasters, and other threats to the local areas.

Support Animal and Plant Biodiversity:

Planting a diverse mix of native hardwoods and shrubs that are less likely to establish on their own. We’re also helping to restore imperiled species and declining forest types, such as shortleaf pine and red spruce.

Social Benefits

Reduced Flood Damages to Downstream

Customers: Actions such as floodplain reconnection and restoration, enhanced water storage in wetlands, forests, or farmland, and restoring riparian buffers stabilizes banks and slows down water during flooding, reducing damage to downstream residents, properties, and surrounding ecology. Large-scale restoration efforts such as the UK’s “Slowing the Flow” demonstrate the impact of intentional nature-based solutions on reduced flood damages.

Health Benefits: Exposure to green spaces has several health benefits, from lower stress hormones and heart rate variability to higher self-esteem among children (Twohig-Bennett and Jones, 2018).

Employment Opportunities: Employment is generated for local, professional tree planters, equipment operators, and nurseries, and a renewable, sustainable, multi-use resource base is established for the future.

Overall Well-Being: The environmental and health benefits offered by trees and other greening initiatives can serve to improve overall well-being. Access to green spaces can be so healing that doctors in Canada are experimenting with prescribing their patients a pass to the national parks (Root, 2022).





Governance Benefits

Community-Building and Social Cohesion:

Large-scale reforestation and wetland restoration requires community engagement, collaboration with various government and non-government entities, and participation of local stakeholders. All of this serves to build community and promote social cohesion between various groups of people and institutions.

Environmental Compliance: Implementation of these projects will improve environmental performance and help increase compliance with stormwater permits and/or regulations. This in turn can help increase the government's accountability and public trust.

Policy Alignment: Scaling up reforestation and wetland restoration projects in underserved communities supports many local and state resilience goals, such as MMSD's "[2019 Resilience Plan](#)", "[City of Milwaukee Climate and Equity Plan](#)," and the state of Wisconsin's "[Statewide Forest Action Plan](#)" and "[Trillion Trees Pledge](#)."

Evaluating the Impact of MMSD's RWR Program on Community Resilience

The Insurance Information Institute (Triple-I) performed an analysis to estimate the likely impact of scaling up the RWR on community resilience. The analysis uses Triple-I's Community Resilience Ratings' quantitative methodology that is comprised of the following components:

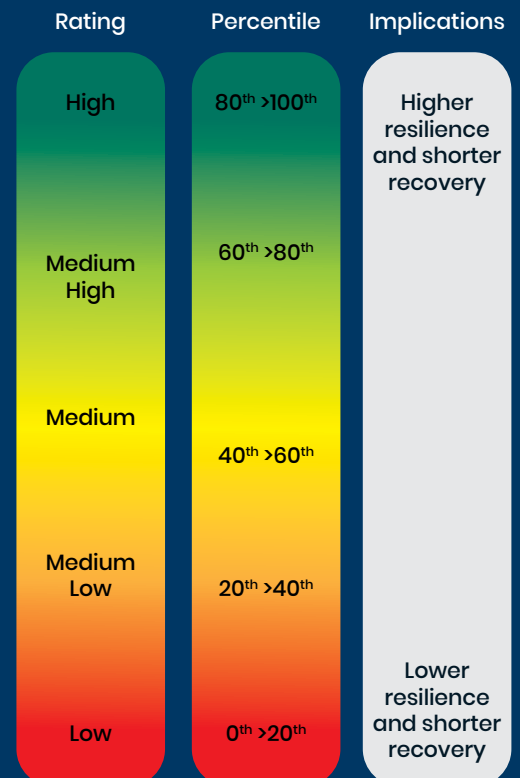
- The insurance protection gap, socio-economic risk drivers, and speed of recovery after extreme weather events, based on energy consumption patterns;
- The literature on nature-based solutions and resilience to extreme-weather events and climate risk at the municipal level;
- The growing literature on credit ratings methodology that factor climate into a municipality's capacity to service its debt obligations; and
- The overall credit rating process' regulatory framework.

The analysis used the following metrics to evaluate changes in community resilience:

TRIPLE-I COMMUNITY RESILIENCE RATINGS KEY COMPONENTS		
Insurance Coverage Score	Insurance Protection Gap	Difference between a county's insurable and insured property (\$ or %)
	NFIP Take-up Rates	Number of active National Flood Insurance Program (NFIP) policies over the number of occupied units in special flood hazard area (%)
Storms & Recovery Score	Recovery Speed	Number of months a county's energy consumption takes to return to pre-storm level
	Storms per Season	Average number of storms impacting a county per season/per year
Socio-Economic Score	Median Income	A county's median income expressed as a percent of the national median income
	Poverty Rate	A county's poverty rate expressed a function of the national poverty rate (Gini)

The analysis suggests that scaling up the RWR program would increase resilience across all the metrics analyzed:

Community Resilience Ratings Actions		
	Pre-MMSD RWR Program	Post-MMSD RWR Program
Overall Rating	Medium Low	Medium
Insurance Coverage Score	Low	Medium Low
Insurance Protection Gap	Low	Medium Low
NFIP Take-up Rates	Medium Low	Medium Low
Storms & Recovery Score	Medium Low	Medium
Recovery Speed	Medium Low	Medium
Storms per Season	Medium Low	Medium Low
Socio-Economic Score	Medium	Medium-High
Median Income	Medium	Medium-High
Poverty Rate	Medium	Medium-High





4.

MMSD's Capital Spend Plan and Allocation to NBS



MMSD's Capital Spend Plan and Allocation to NBS

MMSD operates from two budgets, one for capital expenditures (primarily construction projects) and another for operation and maintenance (O&M) expenses (collection, conveyance, and treatment of wastewater). The 2023 combined budget totaled \$349.8 million, a \$31 increase over the 2022 budget, or a 9.6 percent increase. This is a 13.9 percent increase compared to the 2019 Capital and O&M budget, which totaled \$307.1 million. The increase is largely attributable to MMSD's strong credit ratings—AAA, Aa1, and AA+ with Fitch, Moody's, and Standard & Poor's, respectively. MMSD's revenues are from a combination of sources, including tax levy and nonmember charges, user charge billings, district bonds, and Clean Water Fund Loan Program (CWFL) loans (Figure 4-1).

Expenditures for the combined 2023 total \$348.8 million. The majority of MMSD's capital expenditures in 2023 are for rehabilitation, replacement, or improvement of existing District facilities and infrastructure (Figure 4-2). MMSD budgeted \$13.2 million for watercourse and flood management projects in 2023, a 19.1 percent decrease from the 2022 expenditures—which totaled \$16.3 million. The projected spend in watercourse and flood management projects is expected to increase substantially in the coming years in the next decade, projected to reach \$294 million in total according to MMSD's 10-year financing plan. Many GSI projects are captured under "Other Projects and Programs" in the 2023 capital budget, which totaled \$44.4 million (a 9.1 percent increase from 2022). Portions of the O&M budget also go toward some of the GSI work.

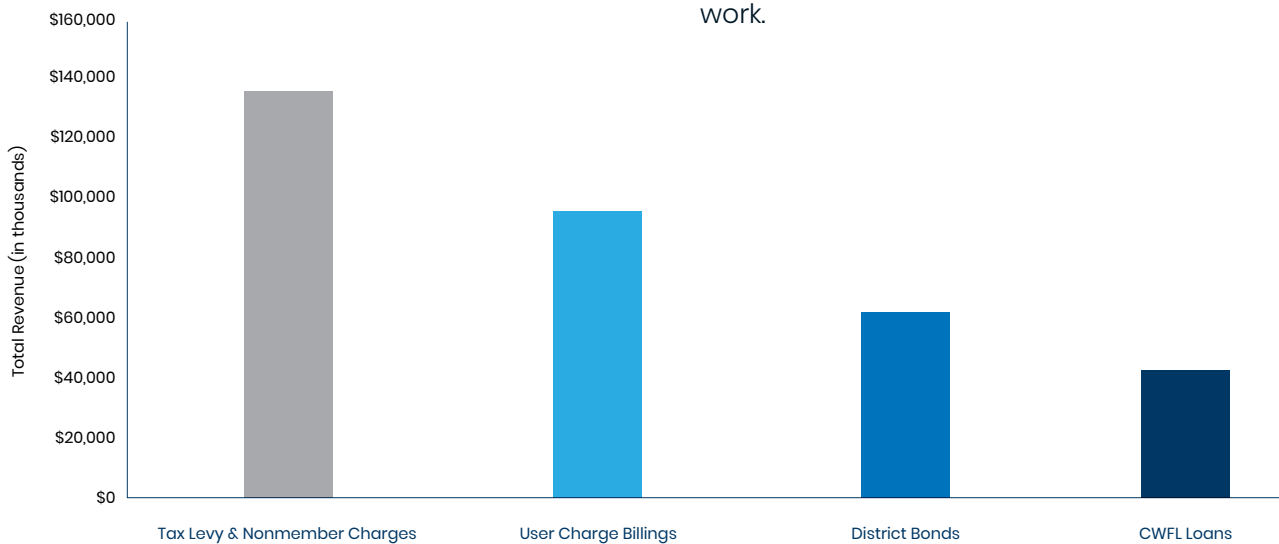


Figure 4-1 MMSD's 2023 Combined Summary of Revenues. Source: MMSD's 2023 Capital and O&M Budget.

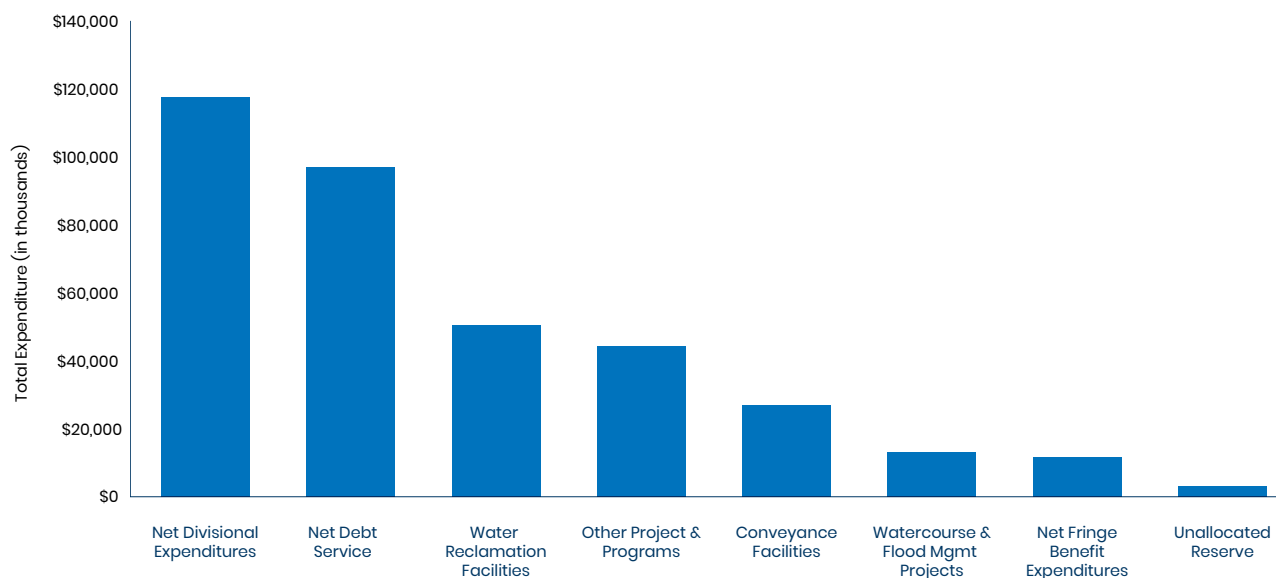


Figure 4-2 MMSD's 2023 Combined Summary of Expenditures. Source: MMSD's 2023 Capital and O&M Budget.

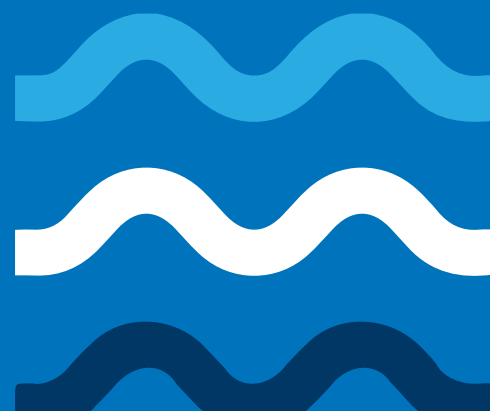
The investments made in capital and O&M projects in recent years are already yielding results according to the 2022 key performance indicators (KPIs) reported in the 2023 budget. Since establishing the 2035 Vision, MMSD has reduced the number of homes in the 100-year floodplain from 3,798 to 1,262 homes; increased its acquisition of river buffers through Greenseams to 5,290 acres; increased rainfall capture to 125 million gallons; and increased rainfall harvesting to 25 million gallons. MMSD is two-thirds of the way there in its goal to have zero homes in the 100-year flood plan, and halfway there to its goal to acquire 10,000

acres of river buffers. There is still room for improvement, though. In 2023, MMSD has had one sanitary sewer overflow and one combined sewer overflow in 2023, above its goals for zero sanitary sewer overflows and zero combined sewer overflows. MMSD also is only at 13 percent of its goal to capture the first 0.50 inch of rainfall, or 740 million gallons. Scaling up investments in NBS will be crucial for meeting these goals in the coming years in a way that is equitable and contributes to local and state environmental and climate goals by MMSD, City of Milwaukee, Milwaukee County, and Wisconsin.



5.

Financing and Delivery Mechanisms for MMSD's RWR Program



Scaling up reforestation, wetlands restoration, and other GSI projects across MMSD’s service area will require new approaches for project financing and delivery as well as innovative transactional frameworks and revenue sources. In this section, we describe traditional public funding and financing approaches as well as innovative mechanisms adopted by MMSD’s peer institutions across the country.

Public and Private Funding Sources

There are several funding sources that can be leveraged to pay for GSI scale up, including both public and private financing, as shown in Table 5-1.

Table 5-1 Possible Funding Sources

Funding Source	Type	Description
Federal Government	Infrastructure Investment and Jobs Act (IIJA)	IIJA authorized \$10 billion for states, tribes, local governments, and other entities to support the implementation of green infrastructure, water efficiency and restoration projects. Additionally, the IIJA authorizes \$5 billion for the EPA to provide grants to states and tribes to help them address combined sewage and stormwater overflows.
	Inflation Reduction Act (IRA)	IRA will invest nearly \$370 billion in energy security and climate change efforts over a 10-year period. This includes \$27 billion to the EPA for a new Greenhouse Gas (GHG) Reduction Fund, of which \$8 billion is set-aside for low-income and disadvantaged communities; \$3 billion for “Environmental and Climate Justice Block Grants” to reduce pollution and climate threats in disadvantaged communities; \$19.5 billion for agricultural conservation programs through USDA; \$2.2 billion for tree planting and related activities under the Urban and Community Forestry Program at USDA; and \$1 billion funding for energy and water efficiency improvements through the Department of Housing and Urban Development (HUD).
State Government	Wisconsin Clean Water Fund Program (CWFP) and Safe Drinking Water Loan Program (SDWLP)	CWFP and SDWLP offer loans to cover a wide range of water and sewer infrastructure projects. These programs will receive a large influx of funding from IIJA, totaling \$900 million in addition funding available through Wisconsin Department of Nature Resources’ (DNR’s) CWFP and SDWLP.
	Urban Nonpoint Source & Storm Water (UNPS&SW) Management Grant program	UNPS&SW offers competitive grants to local governments for controlling pollution from diffuse urban sources and can be used for reimbursing related planning or construction projects.
	Surface Water Grants	Surface Water Grants are available for wetland and shoreland habitat restoration projects, including support for education, ecological assessments, planning, implementation, and aquatic invasive species prevention and control.
	Urban Forestry Grants	Urban Forestry Grants for costs associated with tree inventory or canopy assessments; urban forestry strategic or management planning; urban forest risk reduction and pest control; public outreach and engagement; staff and volunteering training; and tree planting, maintenance, or removal.



Financing and Delivery Mechanisms for MMSD's RWR Program





Funding Source	Type	Description
Local/Special District Government	MMSD's Revenue and Funding Streams	MMSD allocates funding for watercourse and flood management projects, as well as for other projects and programs that include GSI, as part of its annual capital and O&M budget. Many of these funds are generated via tax levy and nonmember charges, user charge billings, district bonds, and CWFL loans.
Private Sector	Environmental Impact Bond (EIB)	EIBs are a tool for helping cities finance innovative programs and projects where traditional sources of financing may be harder to access. These bonds draw in private capital for investments in environmental projects such as GSI for improving water quality and are repaid based on the relative success of the project in achieving anticipated outcomes. In addition to financial de-risking, key benefits of the impact bond model are ease of execution, which can accelerate funding for innovative uses, lack of a long-term privatization, or encumbrance of an asset, and a very high degree of flexibility.
	Parametric Insurance	Community-based programs can incorporate a combination of parametric insurance and traditional indemnity coverage. Unlike indemnity insurance, parametric structures cover risks without the complications of sending adjusters to assess damage after an event. Instead of paying for damage that has occurred, parametric insurance pays out if certain agreed-upon conditions are met. If coverage is triggered, a payment is made, regardless of damage. Parametric insurance offers an opportunity to increase funding for NBS. For instance, TNC recently issued a parametric insurance policy for coral reefs in Hawai'i, which pays up to \$2 million when windspeed reaches 50 knots—if sufficiently close to reefs—to allow rapid reef repair and restoration after storm damage. Parametric insurance policies have also been used insure mangroves against coastal storms and to encourage wetlands restoration projects on agricultural lands.



Financing and Delivery Mechanisms for MMSD's RWR Program

Delivery Framework for NBS Scale Up

A CBP is a long-term partnership between a public and private entity to design, build, finance, operate, and/or maintain (DBFOM) stormwater infrastructure. The partnership provides a flexible, adaptive project delivery model that can provide long-term project financing, at risk upfront investment into capacity building to incorporate socio-economic goals, provide predevelopment for more shovel ready projects, expedite competitive procurements, and lower-cost implementation of NBS. The model will allow MMSD to undertake a CBP as either a region-wide program, or some subset of MMSD's member and non-member communities.

A CBP is easily scalable and uses at risk capital for project financing, which defers upfront costs and can enable MMSD to immediately implement significant NBS. In addition, by developing a partnership structure that drives surety of execution and lifecycle asset management, MMSD can access a wider variety of funding options and is not limited to either public or private financing. Instead, MMSD can choose a hybrid of funding types that offers the best value for money. As discussed later in this

chapter, a majority of CBPs across the country currently use state revolving funds, and the private partner in a CBP is typically agnostic to the type of financing or funding used by the partnership.

The legal framework of a CBP can be structured in many ways, and Figure 5-2 outlines one such method – a special purpose entity (SPE). A partnership that is constructed as a SPE has the right to carry out the construction and operation of the CBP. This enables the partnership to obtain a highly efficient, low-cost form of financing known as “limited recourse” or “non-recourse” financing (Prince George's County, 2016). This type of financing is not treated as an MMSD borrowing. Instead, it resides within the partnership structure and therefore limits liabilities and investor recourse. With this type of structure, a dedicated revenue or funding stream can be leveraged to raise the debt required to fund the entire program with no recourse back to MMSD. Historically, this type of project financing has raised capital at 10-to-1 leverage ratios (Lueckenhoff and Brown, 2015).

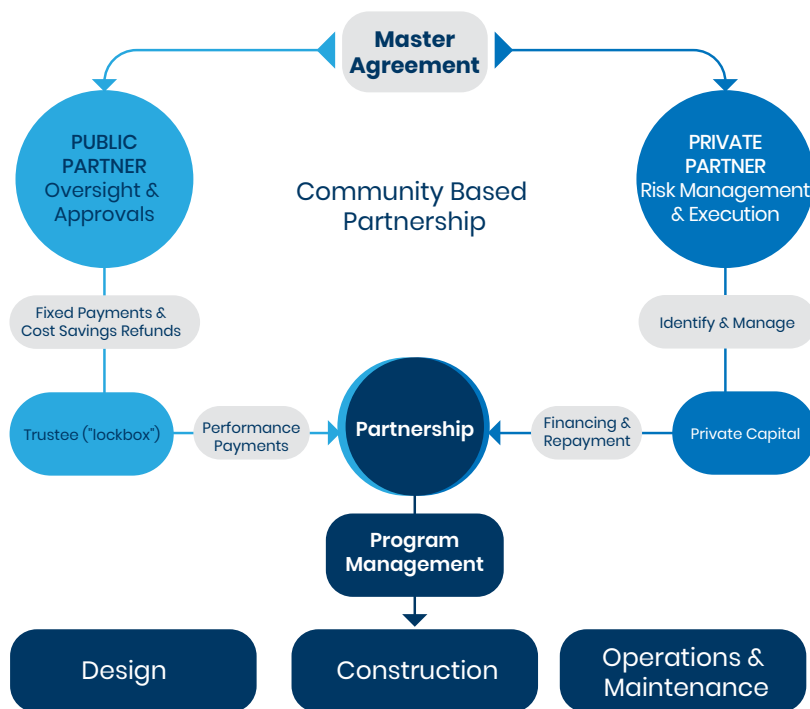


Figure 5-1 Legal framework structure of a CBP partnership.

Transactional Frameworks and Revenue Sources

After reviewing the information provided by MMSD, the team identified two possible transactional frameworks that could be pursued to initiate a public-private partnership into NBS that include a CBP, with or without an EIB.

Option 1: CBP

This option proposes the formation of a 10-year to 30-year, formal, CBP with MMSD to design, build, finance, operate, and maintain (DBFOM) NBS on behalf of MMSD. Such a partnership typically includes the implementation of a tailored, socio-economic plan that provides local economic development and community revitalization benefits as outlined by MMSD. For more information on the types of benefits a socio-economic plan can provide, please refer to Section 5.3.1.1 of this report.

The partnership can be in the form of a project or special purpose entity (SPE), typically in the form of a Limited Liability Company (LLC). The SPE is structured specifically for the public purpose and benefit; allowing for the SPE to be flexible and take on a variety of structures such as a Joint LLC, where both the public and private partner serve as members in the LLC, or a Service Concessionaire Agreement (SCA) where the public entity retains full ownership and contracts with the private sector to design, finance, construct, maintain and/or operate varying facilities or assets for a specified length of time. It is the uniqueness of this partnership structure that allows MMSD to separate itself from the financial risk of the program while still maintaining an appropriate amount of control and oversight. The partnership will be a separate entity with independent financial accountability and rights of access to implement the actual work for contract/project performance. MMSD will retain control over funding through a lender-appointed, third-party lockbox that is set up on behalf of the partnership and managed according to a mutually agreed-to servicing and lockbox agreement.

The partnership structure allows for access to a variety of low-cost financing structures, including SRF/WIFIA, tax-exempt bond financing and grant funding sources, which can provide debt to the project at very low interest rates and, more importantly, may not impact MMSD's debt capacity or rating. This leaves MMSD free to pursue other programs that may require debt financing. Utilizing a revenue stream that is determined during the collaboration phase with MMSD, the partnership will leverage the funds and raise the debt required to implement these programs with no recourse back to MMSD. While the revenue stream has not yet been quantified, historically this type of partnership has raised capital/annual revenue at 13.5-to-1 leverage ratios (Lueckenhoff and Brown, 2015).

The private partner's compensation will be in the form of performance-based incentive fees to be awarded with approval of MMSD based on the achievement of key performance indicators to be determined by the partnership and will only be paid if the parties perform. Unpaid fees will be invested back into these programs to be used as a source for construction or for future infrastructure upgrades at the discretion of MMSD. Limiting and incentivizing return, as opposed to sharing in the overall profitability of the project, accomplishes several important goals: aligned interests rather than competition for cash flow, maximized project funds to be reinvested, a sustainable financing structure, and a flexible approach.



Financing and Delivery Mechanisms for MMSD's RWR Program

Option 2: CBP with an EIB

A CBP could also be implemented with an EIB. A typical EIB would fund a \$20-50 million GSI project but is flexible so MMSD could evaluate a larger project or a portfolio of smaller projects. Regardless of the size of the EIB, this structure reduces MMSD's performance risk for the project, as their pay back is dependent on the project's effectiveness. It also provides a rich data set to assess the cost effectiveness of various types of NBS.

An EIB is similar to a social impact bond, allowing the government to transfer the risk of trying something new partially or wholly to the private sector. Private-sector investors, typically motivated by impact investments, would provide capital to fund the construction, and, if desired, a portion of the maintenance of GSI projects, and the government would repay the loan based on how successful the program was at generating stormwater retention and management.

An EIB could be issued as a traditional tax-exempt municipal bond, depending on investors available, at MMSD's long-term cost of capital. A successful EIB would require MMSD to work with all other relevant actors – including investors, bond counsel, project developers, and, potentially, philanthropy or private property owners – to agree upon what metrics should be used to determine the "success" of the project. Generally, with NBS this would be related to the ability of the project to control stormwater at a given cost, but other metrics could be related to the actual implementation of the project, such as workforce development. Based on these

metrics, the parties would need to agree on several scenarios (e.g., "underperformance," "performance," "overperformance") that would correspond to differing levels of return to the investor. These parties would also need to agree on how and when those metrics should be measured, and what different levels of repayment should be based on each scenario.

A potential challenge with reimbursement programs is lack of transparency as to what constitutes a cost-effective project. Projects applying for MMSD's program cannot be expected to be comparable to large GSI projects led by the District, as they are of different scale. However, this does not mean that all projects are an equal use of MMSD's limited grant budget. EIBs are the ideal financial tool for assessing which types of SCMs or locations are most cost-effective for managing stormwater and could be used to either assess requests or, ideally, to offer a flat amount based on gallons retained that would incentivize the most cost-effective projects and deter high cost, low impact projects.



CBPs: Case Studies:

Seattle Public Utilities (SPU) in Washington: A \$15 Million Program Funded by SPU General Funds

In 2023, the Seattle Public Utilities set up a CBP – the RainCity Partnership – to expand the use of GSI solutions to deliver high quality green stormwater retrofit projects as well as riparian restoration and other demonstrable community-based outcomes in BIPOC communities in Seattle to meet the flow, water quality, and racial and social equity objectives of the program. The program will incorporate no less than ten community-driven projects, at least one acre of riparian restoration, a minimum of 40 percent of the total workforce, hours worked, from priority hire zip codes, mentorship of at least twelve Minority Enterprise or Community Based Organizations and an anticipated inclusion of at least 28% Minority or Women Enterprise firms.

Los Angeles Bureau of Sanitation and Los Angeles Department of Water and Power: A \$14 Million Program Funded by County Stormwater Fees

In 2019, LA Sanitation and Environment (LASAN), in partnership with the Los Angeles Department of Water and Power (LADWP) and the California State Coastal Conservancy (SCC), set up a program to capture, filter, and recharge stormwater to increase groundwater replenishment in the San Fernando Valley Basin and improve water quality downstream in the Los Angeles River. The CBP allowed the aggregation of four green streets together to provide a guaranteed maximum price for the design, construction, monitoring, and maintenance of the program. More than 50% of contracted firms were Small, Minority and Women Owned Business Enterprises (SMWBEs). In 2021, the American Society of Civil Engineers (ASCE) Metropolitan Los Angeles Branch awarded this program the Outstanding Roadway and Highway Project of the year.



Milwaukee Metropolitan Sewerage District in Wisconsin: A \$29 Million Program Funded by State Revolving Funds

In 2020, the Milwaukee Metropolitan Sewerage District set up a CBP – the Fresh Coast Protection Partnership – to expand the use of GSI solutions to capture more than 11 million gallons of stormwater across 19 municipalities in the Greater Milwaukee Region. The partnership will not only mitigate flood risks but will also build local capacity and participation in the region and contribute to improved equity – awarding 25 percent of contracts to small, minority, and women-owned enterprises and siting many projects in low-to-moderate income areas.

City of Chester in Pennsylvania: A \$46 Million Program Funded by PennVest's Clean Water State Revolving Funds

In 2018, the Stormwater Authority of the City of Chester set up a CBP to meet the City's stormwater challenges and restore aging infrastructure. Located on the Delaware River, Pennsylvania's oldest city has been impacted by deteriorating infrastructure, localized flooding, and polluted waterways. With an annual per capita income of just over \$15,000 and about one-third of the population living below the poverty line, the CBP was structured with the goal of utilizing the needed environmental improvements as a catalyst for local economic growth and community involvement. To date, 52% of program expenditures have gone to minority-owned businesses. Local resident participation is approximately 35%, well above the goal of 15% under the program. The program has evaluated, restored, and repaired the City's 1,700 catch basins and is capturing harmful pollutants.

Prince George's County in Maryland: A \$350 Million Program Funded by Maryland Department of Environment's Clean Water State Revolving Funds

Since 2015, Prince George's County, MD has invested \$350 million to set up and maintain GSI across nearly 6,000 acres through a CBP called the Clean Water Partnership (CWP). The county needed a cost-effective and immediate solution to treat and manage stormwater runoff to meet its regulatory compliance under the Clean Water Act. To date, installed GSI removes more than 55,700 lbs. of nitrogen, 7,700 lbs. of phosphorous, and 5 million lbs. of suspended solids annually. The CWP is structured such that the program funds are to be used to contract with small, local, and minority-owned businesses, enabling them to participate in projects. To date, 79% of all funds have been awarded to target-class businesses, comprising of small, local, and minority-owned entities and 63% of the hours are worked by county residents.

6.

Public Input and Engagement



The project team interviewed four community organizations from three priority areas located in the MMSD service area (Figure 6-1). These priority areas are made up of 34 communities and municipalities that:

1. Include census tracts with an Environmental Justice Index (EJI) score greater than 0.8, and
2. Have the highest Flood Susceptibility Index (FSI) score of 10 for most of the community.

The project team developed a stakeholder list containing contact information for local community organizations, places of

worship, community leaders, and municipal community liaisons. The project team held 45-minute informal interviews with interested community members to understand community priorities, flood mitigation and NBS needs, and recommend engagement strategies. Representatives from the following organizations were interviewed:

1. [Martin Drive Neighborhood Association](#)
2. [Groundwork Milwaukee](#)
3. [Menomonee Valley Partners](#)
4. [Harambee Community Organization / MKE Black Inc.](#)

Key Themes and Recommendations Identified Through Stakeholder Interviews:

Communities recognize that addressing urban flooding is crucial and acknowledge the challenges posed by intense rain events. Green infrastructure and flooding emerged as intertwined themes. The interviews shed light on the challenges posed by urban flooding due to intense rain events. Groundwork Milwaukee described the combined sewer system in Milwaukee and its contribution to flooding concerns, especially in areas with limited green spaces for water absorption. Harambee Community Association echoed these concerns, emphasizing the need for managing runoff and directing water away from homes, which could be hindered by a lack of permeable surfaces.

Groundwork Milwaukee stressed that proper management of runoff is crucial to prevent water-related damage. Additionally, both Groundwork Milwaukee and Martin Drive Neighborhood Association indicated that community perceptions and awareness about tree planting and green infrastructure could be barriers. They called for education and awareness campaigns, stating, "Educating the community about the benefits of green infrastructure is essential to overcome misconceptions." Menomonee River Valley also discussed their collaborative efforts with MMSD in addressing flooding concerns and enhancing green infrastructure.

Community organizations emphasize the importance of community engagement and collaboration with entities like MMSD to build trust and overcome organization funding/capacity restraints. Community engagement and collaboration stood out as central themes across the interviews. Groundwork Milwaukee stressed the importance of understanding and addressing community concerns in a collaborative manner. According to Groundwork Milwaukee, "Effective engagement requires a personal touch, where face-to-face interactions often yield more meaningful outcomes."

Smaller resident-led organizations like the Harambee Community Organization and Martin Drive Neighborhood Association often struggled due to limited funding and capacity. This makes partnerships with larger entities like MMSD crucial. The Martin Drive Neighborhood Association highlighted the success of potluck-style picnics as engagement tools due to budget constraints. This showcased how financial considerations influence engagement strategies. All four organizations emphasized the need for open communication, consistent dialogue, and establishing trust to create an inclusive decision-making process that reflects the diverse perspectives within the community.

Communities need funding and technical support for tree planting and maintenance to improve community

well-being and environmental health. Tree planting and the enhancement of urban green spaces emerged as shared goals across the interviews. Groundwork Milwaukee underlined the significance of proper tree planting, selection, and maintenance, highlighting that the benefits of trees extended beyond aesthetics. They emphasized that trees played a crucial role in improving air quality and overall community well-being. Harambee Community Organization emphasized the need to prioritize tree planting, but the challenges of funding and execution remained.

The desire for more trees was evident in Menomonee River Valley as well, where low tree canopy and interest in shaded spaces along riverfronts were discussed. They stated, "Increasing tree canopies was essential to provide shaded areas and enhance the riverfront experience." Tree planting was recognized as not only contributing to environmental health but also enhancing community well-being through aesthetics and shade. Additionally, Martin Drive Neighborhood Association discussed their proactive efforts to address tree planting and maintenance challenges. They highlighted their pursuit of additional plantings when trees fall or face issues like Dutch elm disease. Despite recognizing the importance of timely replacements, they noted persistent delays.

The neighborhood, with a mix of residents from various backgrounds and income levels, expressed a sense of inequality compared to areas receiving more attention and faster tree replacements. They cited the financial burden of covering sidewalk improvements through residents' tax bills. The interviewee recounted an instance where tree replacement was postponed even after removal due to sidewalk problems, leading to frustration.

Collaboration between the MMSD and community organizations is necessary to tackle flooding concerns and reforestation initiatives. Collaboration between MMSD and community organizations emerged as a crucial priority throughout the interviews. Both Groundwork Milwaukee and Menomonee River Valley emphasized the significance of MMSD's engagement in addressing flooding concerns and supporting green infrastructure initiatives. Menomonee River Valley discussed their ongoing partnership with MMSD and how it has historically led to joint projects aimed at managing stormwater and enhancing green spaces. They emphasized, "Our collaboration with MMSD has empowered us to implement innovative projects that greatly benefit our community and environment." However, it was also noted that awareness of the programs and grants offered by MMSD remains limited among many organizations, and in the absence of pre-existing relationships, it can be challenging for organizations to become aware of and access these opportunities.



Public Input and Engagement

Priority Environmental Justice Communities in the MMSD Service Area

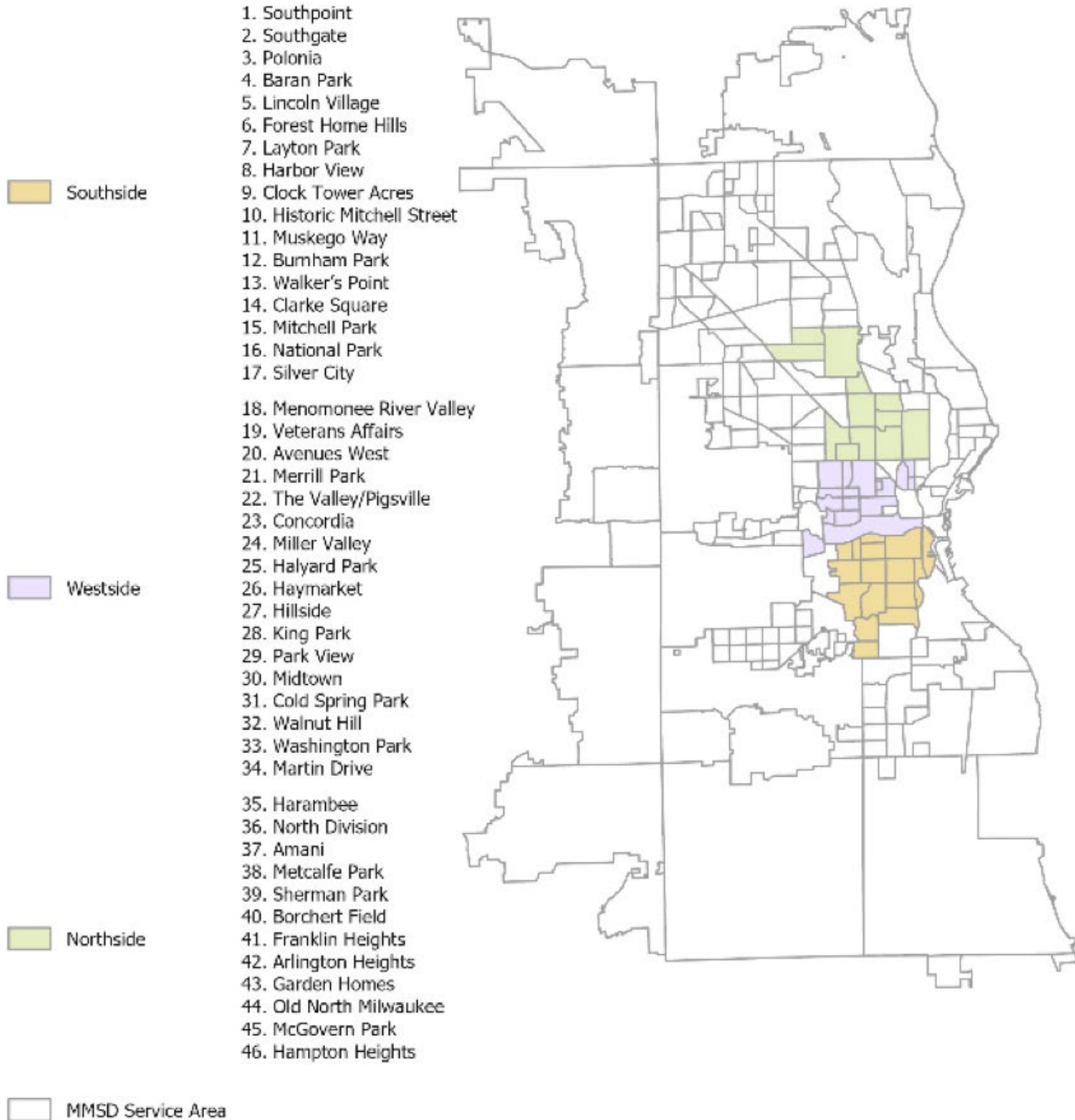
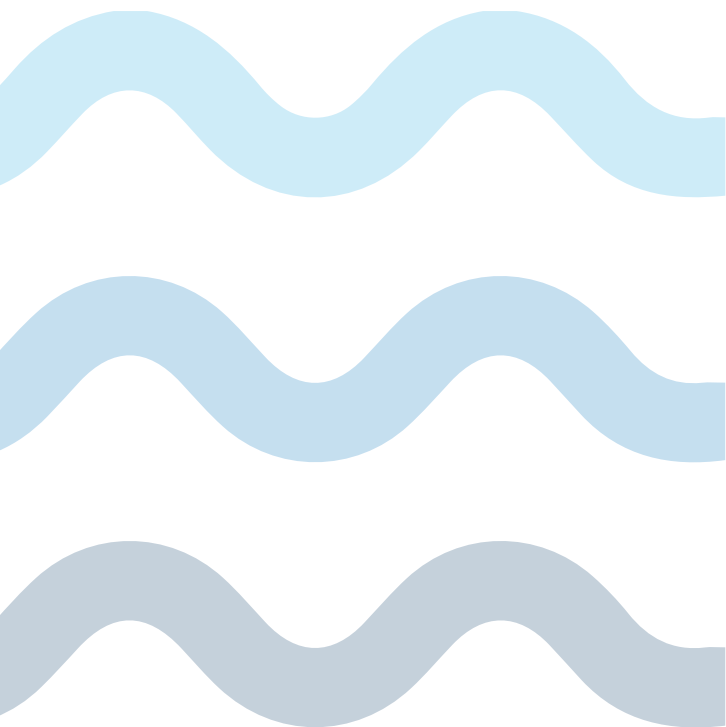


Figure 6-1 Priority Environmental Communities in MMSD's Service Area



7.

Conclusion



The RISC Project Team undertook a review of the MMSD planning documents, projects, and finances along with climate projections, relevant literature, and stakeholder mapping to assist MMSD with expanding its RWR program. This report presents a summarized version of RISC’s recommendation to scale up reforestation, wetlands restoration, and other GSI in underserved areas across the MMSD service area. This Blueprint includes various recommendations for public and private funding sources and proposes the use of CBPs as a delivery framework for GSI scale up. We also suggest two transactional frameworks and revenue sources using this delivery framework – first is the use of a CBP, and second is the use of a CBP with an EIB. Finally, we performed preliminary community engagement activities to generate insights and recommendations to guide this scale up in RWR across MMSD’s service area, prioritizing projects in underserved communities.

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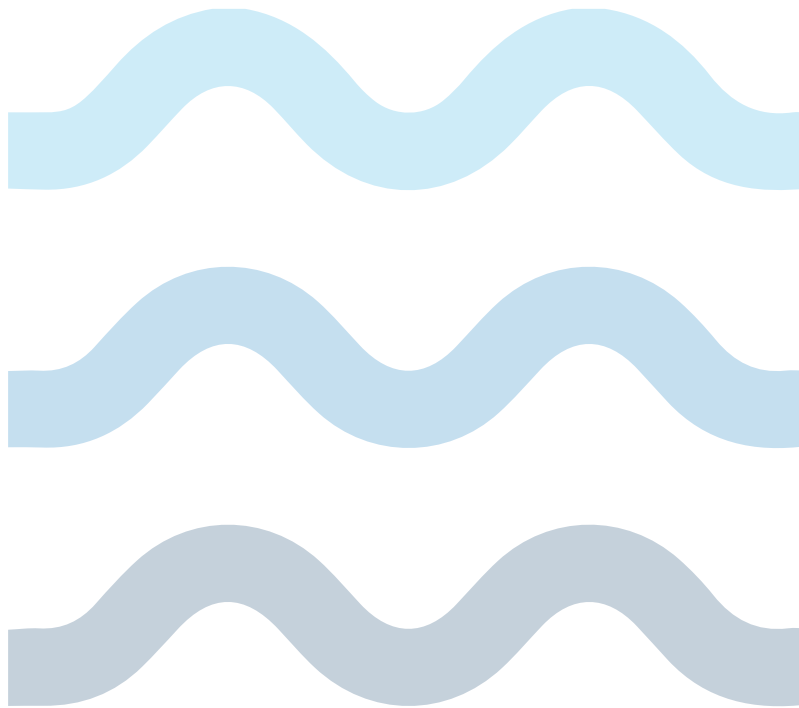
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November 2023

