Reflo
Sustainable Water Solutions

Think Health Act Now!
CITY OF MILWAUKEE
HEALTH DEPARTMENT

RAINWATER HARVESTING GUIDE FOR MILWAUKEE-AREA URBAN AGRICULTURE

April 2019

ACKNOWLEDGMENTS

We would like to thank the following individuals and organizations for their contributions to rainwater harvesting for urban agriculture in Milwaukee and the development of this guidebook:

- Savannah North
- Lindsey Page
- Nick Tomaro
- Jose Rodriguez
- Justin Hegarty
- Margaret O'Connell
- Andrew Plier
- Michael Timm
- Barbara Richards
- Rose Kuzj
- Eric Bunke
- Tim McCollow
- Center for Climate Change & Health
- Public Health Institute
- The City of Milwaukee's Health Department
- Reflo - Sustainable Water Solutions
- The City of Milwaukee's Environmental Collaboration Office and HOME GR/OWN Initiative
- The Redevelopment Authority of the City of Milwaukee
- The Milwaukee Metropolitan Sewerage District
- University of Wisconsin - Extension
- Alice's Garden
- Cream City Farms
- St. Francis Community Gardens
- Teens Grows Greens
- The GreenHaus
- The Guest House
- Arts at Large
- Milwaukee Area Science Advocates
- Milwaukee Environmental Sciences Academy
- Parkside School for the Arts
- Longfellow Community School
- Clement Avenue School
- Maryland Avenue Montessori
- Paliafito Park
- Hepatha Orchard

TABLE OF CONTENTS

1

Alice's Garden - 2 acre community garden/farm at 21st and North Avenue, Milwaukee

INTRODUCTION

The healthy food access movement has been active in the Milwaukee-area for decades. Community gardens have been inspired and supported by local nonprofits, the University of Wisconsin Extension, and City of Milwaukee's Home GR/OWN initiative which have spurred a new age of urban agriculture across the region. These community-supported spaces have proven to be a successful strategy in activating vacant properties while also providing low-cost, healthy food for urban communities.

Since the 2008 financial crisis, the City of Milwaukee received ownership of thousands of foreclosed and vacant properties. Vacant properties not only require on-going maintenance, but they also reduce surrounding property values, tax revenues, and overall quality of life for urban communities.

When vacant buildings are demolished, their municipal water supply line is abandoned. New potable water connections can cost as much as $10,000 and starting in 2010 the City of Milwaukee voiced a policy to transition urban gardens off of fire hydrants as a source of water. With an increased demand for water, rainwater harvesting has become the preferred alternative for many urban gardens due to its relatively low cost and water quality, but also because of its ability to manage stormwater.

This guide is intended to support Milwaukee-area urban gardeners and farmers in their pursuit to build rainwater harvesting systems that are appropriately sized for their needs and accomplish important social, environmental, and economic objectives. The following three categories serve as the basis for the organization of this guide and can be used as a quick reference for which rainwater harvesting system is typically employed given a garden's watering needs:

Residential - Smaller Scale - 55 gallons:
Supporting approx. 2 to 3 raised bed gardens or about a 100 square foot garden

Community Garden - Medium Scale - 550 gallons:
Supporting approx. 25 raised bed gardens or about a 900 square foot garden

Urban Farm - Larger Scale - 5,000+ gallons:
Supporting approx. 8,000+ square foot garden/farm

IMPORTANT WATER TERMS

"Potable water" is free from impurities present in amounts sufficient to cause illness and is safe for drinking, personal or culinary use.
"Harvested rainwater" is not potable and often requires treatment (filtration or otherwise) before becoming safe to use for urban agriculture.

TYPICAL PROJECT TIMELINES

Step 1: Conceptual planning

Includes understanding the overall needs and objectives of the project. Are you planning on growing food and harvesting rainwater for a small backyard garden or are you working on supporting a larger community garden or urban farm? And if so, what are the plans for expansion? Who is planning on supporting the project and what are their roles? Where is the water going now, how can you capture it, and where can you store it? Given the scope of the project, what are the estimated costs and feasible timelines? These are all important questions that should be answered during the conceptual planning process and then for medium and large scale projects, should be documented in a set of plans that can be used to garner additional partner and funding support.

Step 2: Fundraising

There are a few local granting organizations available that can help to financially support rainwater harvesting projects - see the final chapter of this guide. It should be noted that for larger, more complex projects it may be necessary to phase in additional components as project funding is secured.

Step 3: Detailed Design, Permitting and Approvals

Includes the creation of detailed project drawings, needed especially for larger projects that have additional permitting requirements and require contractors to provide cost estimates. Chapter 5 of this guide further explains what typical permissions are necessary based on the scale of the project.

Step 4: Construction

Volunteers can assist with some aspects of rainwater harvesting projects, such as building raised garden beds, installing rain barrels, or assembling specific types of cisterns. However, larger projects may require significant amounts of earth moving or the construction of structures which would require professional contractors. The construction season in Wisconsin typically runs from late April through November; however success in the fundraising and approval steps will effect construction starting dates.

Step 5: Maintenance

Long term maintenance can often be overlooked and underestimated. The following sections include important maintenance considerations for each scale of rainwater harvesting.

It is important to note that larger, farm scale (5,000+ gallon) projects can take over an additional year of planning and fundraising due to the complexity and scale of the project.

COMMUNICATION IS KEY

Especially if the project is not on land that you personally own, it is important to secure permission for the project early on and then to maintain communication throughout the lifespan of the project with all stakeholders (owners, funders, partners, neighbors, etc.).

CO-BENEFITS OF RAINWATER HARVESTING

As the Earth's climate continues to warm, we will see an increase in more intense and frequent storms and extreme heat events. In Milwaukee, large rainfall events can threaten our drinking and recreational freshwater resources through increased stormwater runoff. These large storms can also damage and overwhelm old and stressed sewerage infrastructure, leading to combined sewer overflows and flooding. Rainwater harvesting is an effective strategy that can help manage stormwater where it falls. In addition, rainwater harvesting has numerous other co-benefits:

INCREASED ACCESS TO HEALTHY FOOD AND IMPROVED URBAN ENVIRONMENT

Harvested rainwater can be used to water fruit and vegetable gardens, rain gardens, and trees that improve the urban landscape. As a water source for urban agriculture, harvested rainwater supports food security by making gardens more sustainable and less reliant on city water. Green infrastructure helps clean the air through removal of carbon dioxide; protect water resources through reduction of stormwater runoff; encourage exercise and healthy eating; and beautify, connect and revitalize neighborhoods.

REDUCED CARBON FOOTPRINT AND WATER CONSERVATION

Supporting locally sourced food will help decrease carbon emissions associated with the transportation of food, water treatment and conveyance. Decreased carbon emissions means cleaner air reducing exposure to air pollutants that contribute to a number of chronic conditions including cardiovascular disease, asthma and other respiratory illnesses.

MORE RESILIENT FRESHWATER RESOURCES

Stormwater runoff and combined sewer overflows threaten Lake Michigan, Milwaukee and the surrounding region's freshwater resource. Stormwater runoff can become contaminated with agricultural waste, chemicals (i.e. pesticides and fertilizers), raw sewerage, and other pollutants. This increases exposure to water-related infection and contaminants that can otherwise affect health. Harvesting rainwater before it collects these pollutants is one way to protect freshwater resources.

INCREASED URBAN GREEN SPACE IMPROVES COMMUNITY HEALTH

Well supported urban agriculture projects increase green space which can help address the urban heat island effect. Helping to reduce surface and air temperatures can ease the burden of extreme heat and heat-related illness on individual households and the community. Increased green space has been associated with reduced stress and tension; improved mental health; reduction in asthma and other respiratory conditions; decreased obesity and diabetes rates; increased ability to concentrate in children with attention deficit disorder; decreased rates of crime and poverty; increased property values; and reduction in noise pollution.

2

Rain barrel workshop where home owners learn how to install rain barrels and diverter kits

RESIDENTIAL - SMALLER SCALE - 55 GALLONS

According to the EPA, across the United States residential lawn care makes up about 40% of summertime residential water use. In Milwaukee, employing rain barrels (55 gallon containers) can help alleviate the demand on potable water systems, reducing residential potable water bills. By capturing rainwater where it falls through green infrastructure like rain barrels, homeowners can help reduce the demand on the sewer system, which can reduce flooding and lead to improved river and lake water quality.

Typically, a single rain barrel can support 1 to 2 raised garden beds, or about 128 square feet of gardens. Multiple rain barrels can be connected together or attached to multiple downspouts to support larger garden areas.

Rain barrels can come in varying shapes and materials. New, plastic rain barrels are readily available at home improvement stores and re-purposed, food-grade barrels can be sourced from breweries or recycling centers.

TYPICAL COSTS

New rain barrels can be purchased with installment kits for approximately $60 from home improvement stores or through the Milwaukee Metropolitan Sewerage District. More decorative oak barrels can be purchased from landscaping companies for $100+.

Additional costs may be incurred if homeowners would like to elevate the rain barrel by building a stand to allow for a watering can to fit below the outlet or to allow for a hose to drain the barrel to the nearby garden via gravity. Costs for concrete block or wooden stands can range between $10-$100. Decorating the rain barrel with paint or banners can also increase the project cost by another $10-$100.

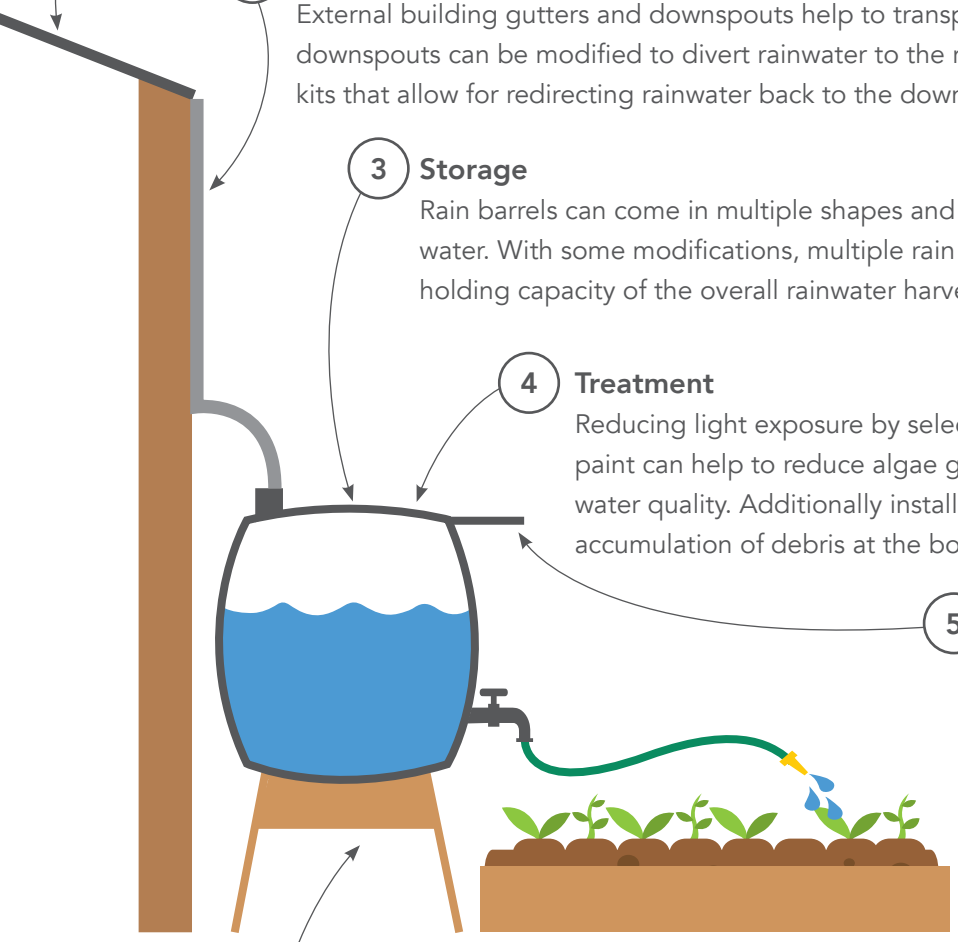
In general project costs can be expected to be <$150

POTENTIAL PARTNERSHIPS

The Milwaukee Metropolitan Sewerage District (MMSD) has ongoing rain barrel programs where homeowners can purchase rain barrels, learn how to install them, and learn how to direct excess stormwater (overflow) to other types of green infrastructure such as a rain garden.

DESIGN AND CONSTRUCTION CONSIDERATIONS

Typically, the most ideal location for the rain barrel is at the downspout nearest the garden where the harvested rainwater will be used. Also locating the rain barrel at a higher elevation than the garden will save significant effort in having to transport the water.



1 Catchment Area

Roofs of homes, garages, and sheds are all viable options for rainwater harvesting. The size and material of the roof will directly impact the quantity and quality of rainwater runoff. Additionally, debris that accumulates on roofs such as leaves, berries, or loose shingle particles will also runoff, adding to maintenance considerations.

2 Conveyance

External building gutters and downspouts help to transport the rainwater down the sides of buildings where downspouts can be modified to divert rainwater to the rain barrel(s). Most rain barrels come with diverter kits that allow for redirecting rainwater back to the downspout during months when there is risk of freezing.

3 Storage

Rain barrels can come in multiple shapes and sizes, but typically hold approximately 55 gallons of water. With some modifications, multiple rain barrels can be connected together to increase the holding capacity of the overall rainwater harvesting system.

4 Treatment

Reducing light exposure by selecting opaque rain barrels or covering them with paint can help to reduce algae growth inside the rain barrel which can impair water quality. Additionally installing mesh screens at the inlet can help reduce the accumulation of debris at the bottom of the barrel where it is harder to clean.

5 Overflow

Rain barrels generally capture a portion, not all, of most rain events. Some diverter kits can direct excess rainwater back into the downspout. A better option to further reduce flooding is to disconnect the downspout, if feasible, and direct the overflow into a rain garden or lawn where rainwater can soak into the ground as opposed entering the sewer system.

6 Distribution

Most rain barrels come with a spigot for the barrel's outlet. If the rain barrel is elevated significantly higher than the garden, hoses can be connected to drain the barrel via gravity and irrigate the garden. The higher the height difference, the greater the pressure at the end of the hose. Stands made of concrete blocks or wooden structures can help elevate the rain barrel that can weigh 460+ pounds when full.

MAINTENANCE CONSIDERATIONS

Freezing water expands and can damage rainwater harvesting systems if they are not "winterized". Typically in October, during garden harvesting activities, systems should be drained and modified so that rainwater does not accumulate in rain barrels and freeze during winter. Debris should also be removed from mesh screening and/or from the bottom of the rain barrel. Typically, in April/May systems can be set back up to harvest rainwater.

RAISED BED GARDENS

Smaller scale agricultural projects like the typical 4' x 8' raised bed garden is a great entry point for learning about and producing healthy, local food. In urban areas, raised bed gardens are recommended so clean, fertile soil can be used to separate roots from urban soils and jump start garden growth. Handicap accessible beds can be constructed to provide access for diverse audiences. Gardens like these are also great opportunities for schools to engage students and the community in promoting healthy food access and learning about the seasons, life and water cycles, etc.

OPPORTUNITIES FOR THE ARTS

Monochromatic rain barrels can be viewed as a "blank canvas" and an opportunity for homeowners to personalize their rain barrel. Many rain barrel workshops have made painting rain barrels common place with inspiring designs from local artists. Arts activities like these can be a good entry point towards engaging community around harvesting rainwater for urban agriculture.

RAIN BARREL OPTIONS

New, standard 55-gallon rain barrels, like those obtained through the Milwaukee Metropolitan Sewerage District, come with diverter kits that have all of the parts needed to set up a rain barrel. Some kits also provide parts for modifying other types of 55-gallon barrels so they can be used for rainwater harvesting. Other types of recycled barrels have been known to hold pickles, olives, soda, whiskey, and beer. Common features of the barrels are that they are water tight and food-grade so the harvested rainwater can confidently be used for irrigating gardens.

COMMUNITY ENGAGEMENT

Rain barrel painting is one way to engage audiences in rainwater harvesting. Other activities shown include a student docent activity at Parkside School for the Arts where students created songs and exhibits on green infrastructure, a conference exhibit on healthy food access and stormwater management, and a community workshop where attendees learned about rain barrel options and installation.

3

St. Francis Community Garden

COMMUNITY GARDENS - MEDIUM SCALE - 550 GALLONS

Shared community gardens are an excellent opportunity to promote positive community relationships, increase a neighborhood's access to low-cost healthy food, and manage significant amounts of stormwater. Community gardens are often built on vacant, city-owned properties. Having a regular, active community presence can help improve the overall safety for the surrounding neighborhood as well.

These gardens are significantly larger than a typical residential garden and can accommodate multiple raised bed and/or in-ground gardens. With increased food production, there is an increased demand for water. At this scale, harvested rainwater can provide a significant economic benefit by supplying an inexpensive water source that is free of chlorine found in potable water, which can lead to increased crop yield. Additionally, potable water sources may be infeasible. A new water service can cost as high as $10,000, compared to building a rainwater harvesting system nearby for a fraction of the cost.

TYPICAL COSTS

Rainwater harvesting systems that can be used in medium scale projects like community gardens typically consist of two, 275-gallon totes that can hold a total of 550 gallons of water, enough to support approximately 20 raised bed gardens or 12,000 square feet of in-ground gardening.

Costs for tote systems can vary based on configuration, site-specific demands, existing structure modifications, and need to hire expertise to assist with design and construction.

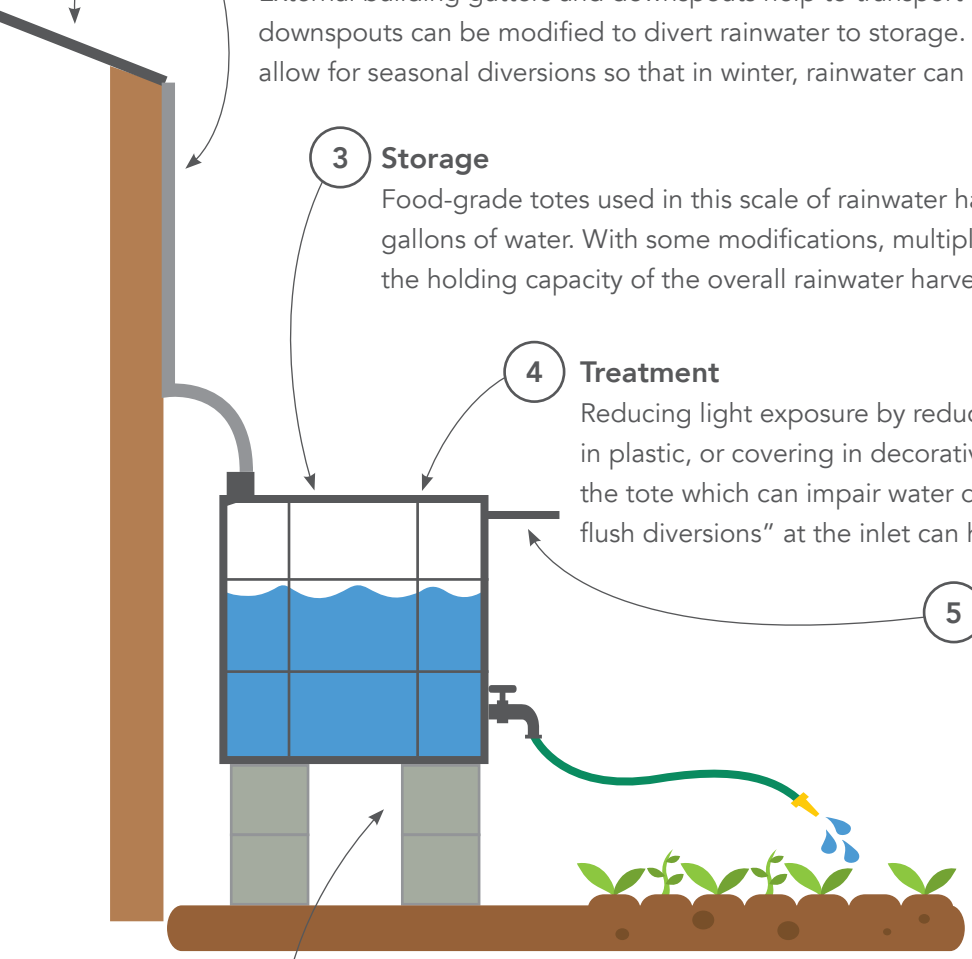
Typical costs can be expected to range between $500 and $4,500 (not including costs associated with constructing pavilions, which are sometimes used in conjunction with this scale of rainwater harvesting).

POTENTIAL PARTNERSHIPS

The nonprofits Reflo and Groundwork Milwaukee can assist with the design and construction of 550-gallon rainwater harvesting systems. City of Milwaukee's HOME GR/OWN program and UW-Extension have several initiatives that can assist community gardens. The Southeastern Wisconsin Watersheds Trust ("Sweet Water") and Neighborhood Improvement Development Corporations have grant programs that can support these projects.

DESIGN AND CONSTRUCTION CONSIDERATIONS

As with rain barrel installations, typically the most ideal location for the rainwater harvesting system is at the downspout nearest the garden where the water will be used. Also locating the tote system at a higher elevation than the garden will save significant effort in having to transport the water. In some community gardens, new pavilions can serve as an opportunity to harvest rainwater as well as support community activities.



1 Catchment Area

Roofs of homes, garages, sheds, and pavilions are all viable options for rainwater harvesting. The size and material of the roof will directly impact the quantity and quality of rainwater runoff. Additionally, debris that accumulates on roofs such as leaves, berries, or loose shingle particles will also runoff, adding to maintenance considerations.

2 Conveyance

External building gutters and downspouts help to transport the rainwater down the sides of buildings where downspouts can be modified to divert rainwater to storage. Conveyance piping should also be designed to allow for seasonal diversions so that in winter, rainwater can bypass the totes to prevent damage from freezing.

3 Storage

Food-grade totes used in this scale of rainwater harvesting typically hold approximately 275 gallons of water. With some modifications, multiple totes can be connected together to increase the holding capacity of the overall rainwater harvesting system, typically 550 gallons.

4 Treatment

Reducing light exposure by reducing the opacity of the totes by painting, wrapping in plastic, or covering in decorative banners can help to reduce algae growth inside the tote which can impair water quality. Additionally installing mesh screens or "first flush diversions" at the inlet can help reduce the accumulation of debris in the tote.

5 Overflow

When the storage is full, it is important to manage overflowing water. Some configurations can route rainwater back to the downspout. A better option to further reduce flooding is to disconnect the downspout, if feasible, and direct the overflow into a rain garden or lawn where rainwater can soak into the ground as opposed to enter the sewer system.

6 Distribution

If the tote is elevated significantly higher than the garden, hoses can be connected to drain the system via gravity and irrigate the garden. The higher the height difference, the greater the pressure at the end of the hose. Stands typically made of concrete blocks on a stabilized surface can help elevate the totes.

MAINTENANCE CONSIDERATIONS

Freezing water expands and can damage rainwater harvesting systems if they are not "winterized". Typically in October, during garden harvesting activities, systems should be drained and modified so that rainwater does not accumulate in the tote and freeze during winter. Debris should also be removed from treatment systems and the bottom of the tote. Typically, in April/May systems can be set back up to harvest rainwater.

COMMUNITY GARDENS

Community gardens by definition, serve the community and are ample opportunities to promote healthy food access. These spaces can also become outdoor learning laboratories where students of all ages can experiment with growing different fruits and vegetables and experience real world lessons related to seasonal variability, the carbon cycle, life cycles, and the water cycle. As these often otherwise vacant spaces are activated, they can grow community and wellbeing as well as significant amounts of low-cost, local, healthy food.

OPPORTUNITIES FOR THE ARTS

Creative applications of rainwater harvesting can provide exciting opportunities for various forms of art. The re-purposed shipping container that now harvests rainwater can also serve as a canvass for local artists, project signage can be framed and graphically arranged to engage with new audiences, and students can act as docents to help tell the story of why they harvest rainwater.

CONFIGURATIONS AND OPTIONS

Community garden scale rainwater harvesting systems can be configured to best fit the constraints of the site. The pavilion shown is at the Guest House of Milwaukee and has a decorative shed that houses the storage components of the system. Banners have been used to improve the aesthetics and support community activities. And some systems are able to divert excess stormwater into grass and rain gardens, effectively disconnecting downspouts from the sewer system and helping to prevent combined sewer overflows.

COMMUNITY ENGAGEMENT

Construction of these community-based projects can engage diverse audiences. The picture to the left demonstrates the opportunity for youth to be engaged during planting activities. The ribbon cutting event was for the rainwater harvesting project to support food production at a homeless shelter and the picture on the bottom left is a job training program for green infrastructure career pathways.

4

20,000 gallon cistern constructed with the help of over 150 volunteers at Alice's Garden (2 acre community garden/farm)

URBAN FARMS - LARGER SCALE - 5,000+ GALLONS

Urban farms (for purposes of this document) are considered to be significantly different from community gardens because of their order of magnitude increase in triple bottom line impacts (economic, social, and environmental). At this scale, urban farms can become an important source of income and provide fulfilling employment opportunities, positively transform entire city blocks, provide safe spaces for community, and have significant impacts on improving healthy food access and urban biodiversity.

Gardens/Farms at this scale require large quantities of water and most rely on potable municipal sources. There is an increasing trend to install large scale rainwater harvesting systems to offset or replace potable water use (and costs) and reduce inflows into the sewer system. To store enough water to meet a farm's needs, large scale rainwater storage is typically underground. This increases design and construction costs and often necessitates additional project components such as solar powered pumps and enhanced water treatment.

TYPICAL COSTS

Project costs can range widely based on many site-specific factors. However, systems this large have included rainwater storage for 5,000 to 40,000 gallons. 20,000 gallon systems are typically the point where project costs begin to decrease with each additional gallon of storage. The following is a summary of the Alice's Garden project costs for a 20,000 gallon rainwater harvesting system:

Project Management and Misc.: $15,000
Engineering and Permitting: $30,000
Bioswale: $35,000
Cistern, Vault, and Plumbing: $75,000
Solar Power System: $35,000
Pump and Water Treatment: $5,000

Total Est. Costs: $195,000
Total Est. Value w/ In-Kind Contributions: $260,000

POTENTIAL PARTNERSHIPS

Rainwater harvesting at this scale can take multiple years to conceptually plan, raise funds, design, and construct. The nonprofit Reflo is able to partner with project owners to help guide the project throughout the process. Additionally, the Milwaukee Metropolitan Sewerage District and City of Milwaukee's Environmental Collaboration Office are common partners on these types of projects.

DESIGN AND CONSTRUCTION CONSIDERATIONS

The water *demand* for the farm/garden is determined by the size of the growing area, type of crops grown, and irrigation method. The *supply* of water provided by the catchment area can be estimated by assessing the size, type, and ground condition of the contributing area as well as the rainfall frequency, quantity, and intensity (factors impacted by climate change). A cistern's storage capacity can be determined by *supply* and *demand*.

1 Catchment Area

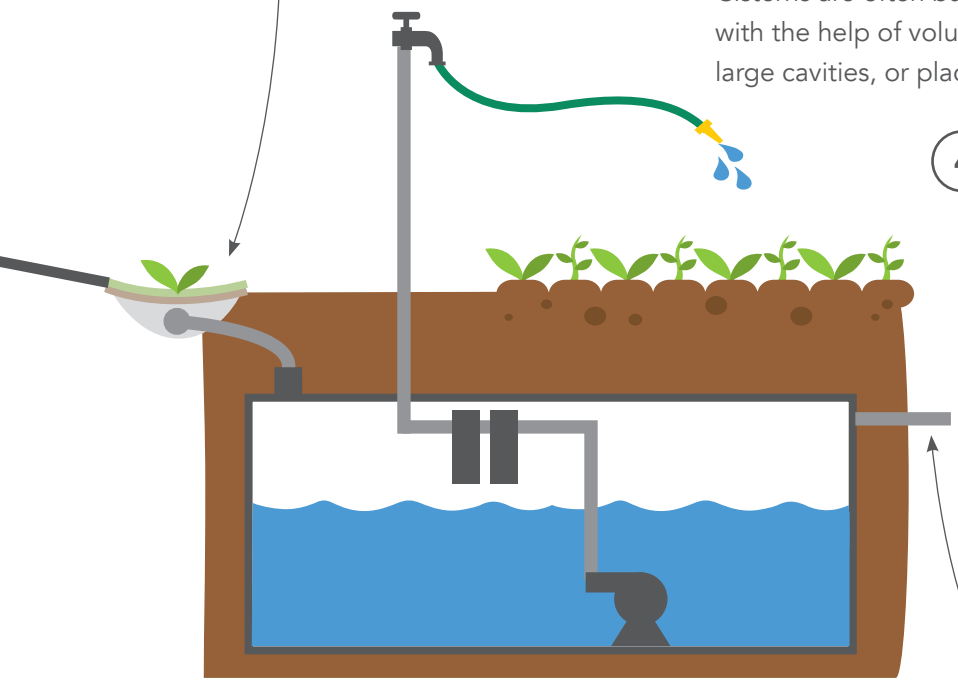
Because the storage for large scale rainwater harvesting is typically underground, buildings as well as ground surfaces such as lawns, farm lands, or asphalt schoolyards can be directed to the rainwater harvesting system. The condition of the contributing areas will directly impact the quality of the rainwater runoff. Streets and parking lots often have poor water quality because of pollutants from cars and are typically avoided for rainwater harvesting.

2 Conveyance

The design of systems at this scale can vary depending on site-specific details and type of storage system used. Most large scale systems include a bioswale to help remove sediment from rainwater runoff before entering storage. In some cases, a vault is included to accept rainwater and to house the pump etc.

3 Storage

Cisterns are often built by: assembling many plastic crates (in some cases with the help of volunteers), installing concrete or plastic structures with large cavities, or placing gravel with high void spaces to hold water.



4 Treatment

Bioswales help to remove sediment from rainwater runoff and are easily accessible for maintenance considerations. Given that storage is typically underground, the water will be cooler and out of direct sunlight which will help to reduce microbial growth. Filters (20 um and 0.5 um) and sometimes ultraviolet (UV) systems are used downstream of the pump to further treat harvested rainwater prior to use for irrigation. Note that this level of treatment does not make the water potable/drinkable.

5 Overflow

Given the depth below the ground surface at this scale of rainwater harvesting, overflows are typically connected to sewer infrastructure either on site or in the street.

6 Distribution

Pumps (sometimes powered by solar panels) are used to bring water out of the cistern's storage, through treatment devices, and to spigots and hoses in the garden/farm or to drip irrigation systems. Monitoring and control strategies are often used to manage these systems.

MAINTENANCE CONSIDERATIONS

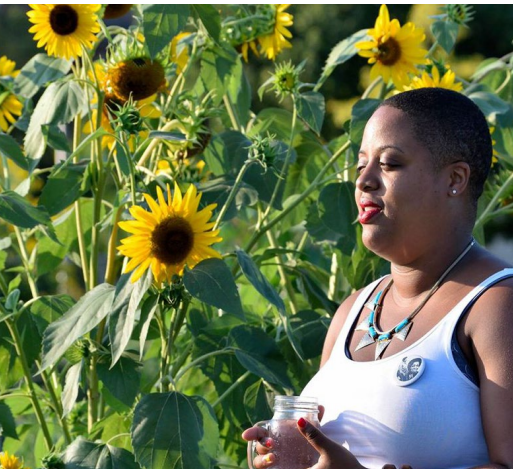
Rainwater harvesting systems at this scale typically include a detailed, site-specific, maintenance plan. Primary components of that plan can include regular (monthly) debris removal and maintenance of vegetation in the bioswale, replacement of cartridge filters and UV lamps (typically on an annual basis), and draining or "winterizing" above ground or shallow distribution lines. Successful projects include annual budgets for ongoing maintenance.

URBAN FARMS

Because of the size of urban farms (typically a city block+), projects have an opportunity to create positive change for their neighborhoods. Cream City Farms in the 30th Street Industrial Corridor was an abandoned brownfield site that is now a commercial and socially responsible, learning farm. Alice's Garden transformed vacant properties from an abandoned freeway project (formally a flourishing residential and commercial area) into an inclusive large-scale garden that is nationally recognized and regularly sees thousands of visitors for educational and spiritual activities.

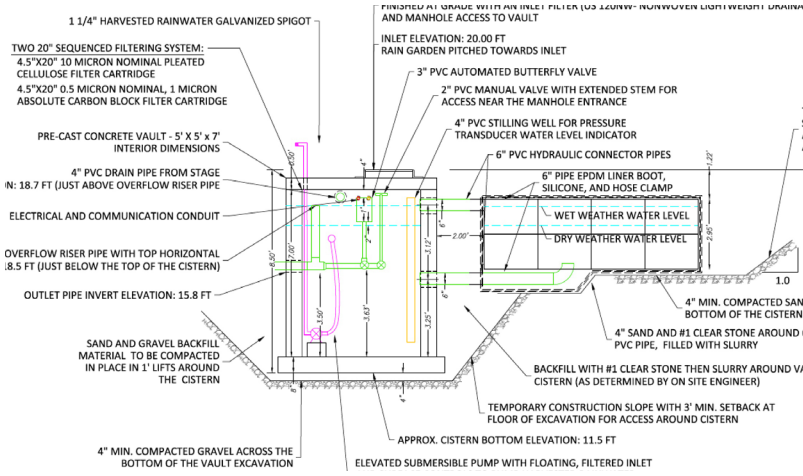
OPPORTUNITIES FOR THE ARTS

The most impactful projects are those that support a diversity of uses and perspectives. Paliafito Park has a 7,000 gallon cistern that supports decorative raised bed community gardens. Neighborhood meetings take place at the park and a small stage supports intimate music and theater performances. Alice's Garden regularly supports yoga, meditation, and spiritual gatherings and has inspired photographers and visual artists.



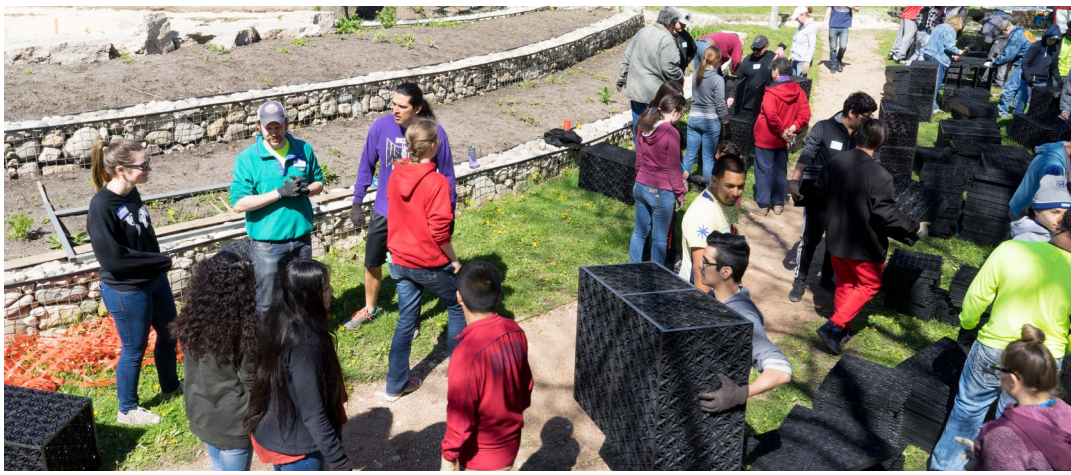
PROJECT DESIGNS

These larger scale rainwater harvesting projects can be complex and require professional expertise to support detailed engineering and permitting requirements. Important design details that significantly impact the project include: the location and elevation of connecting sewer infrastructure for the cistern's overflow, water treatment requirements (regulated by the state of Wisconsin), maintenance needs, and water demands at the garden/farm such as the location of spigot(s), flow rate, and pressure.

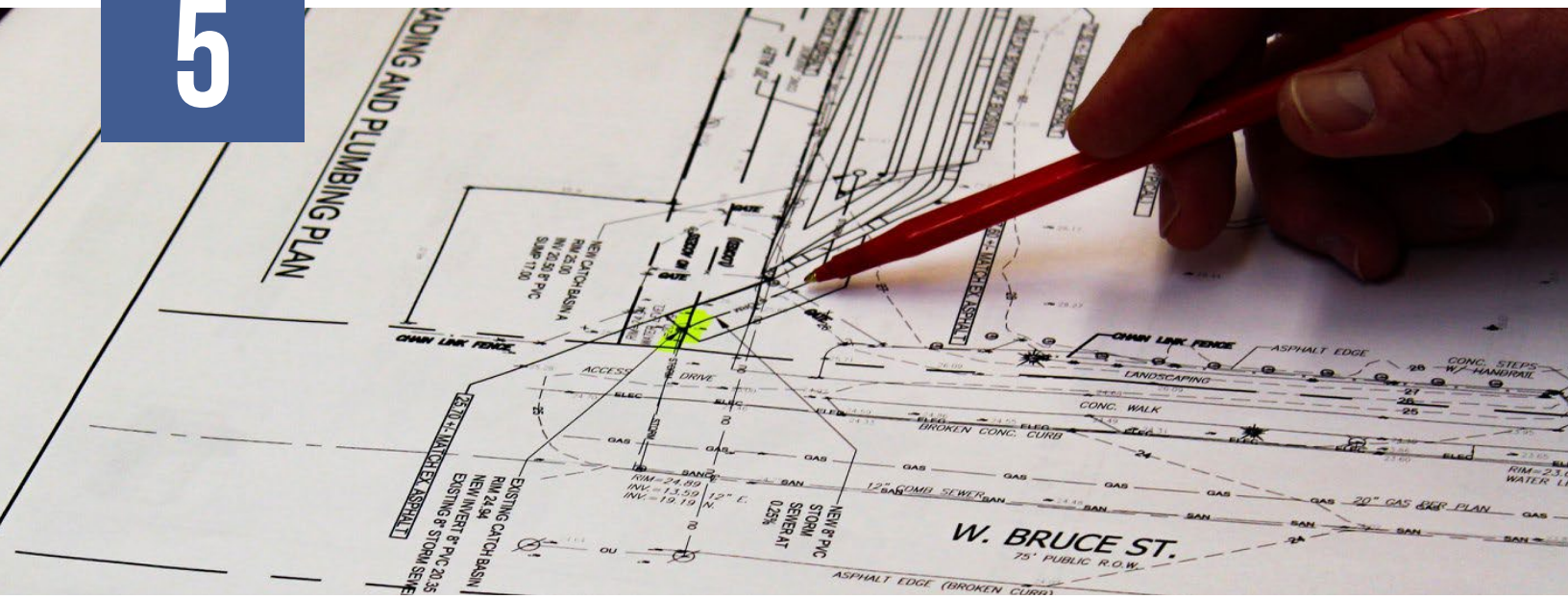


COMMUNITY ENGAGEMENT

Because of the transformational potential of these projects, many have strong connections with the surrounding neighborhood and project stakeholders. Most of the projects have a community gathering space where students and community members can learn about agriculture and volunteer for cistern build events and/or site maintenance.



5



PERMITTING AND APPROVALS

Local and state authorities regulate rainwater harvesting systems to help protect human health and to prevent system designs that could lead to potential water damage of buildings and sewer infrastructure. Concerns about water quality, specifically the bacteria legionella, have lead the State of Wisconsin's Department of Safety and Professional Services (SPS) to require additional review of larger scale rainwater harvesting systems and in some cases, review of water quality testing.

In the City of Milwaukee, permits are not required for small or medium scale projects (residential rain barrels or community garden tote systems). Permits are required for larger scale rainwater harvesting systems that have underground storage.

Further discussion and guidance of the relevant codes and ordinances can be found in a guidebook produced by Eric Bunke and the City of Milwaukee's Environmental Collaboration Office titled: "RAINWATER COLLECTION GUIDELINES FOR MILWAUKEE RESIDENTS & PROPERTY OWNERS", dated August 2017.

LARGE SCALE RAINWATER HARVESTING

The Wisconsin Administrative Code "SPS 382: Design, Construction, Installation, Supervision, Maintenance, and Inspection of Plumbing" is typically applied to larger scale rainwater harvesting systems. Local permits are typically required for systems that have significant plumbing components, such as overflow connections to sewer infrastructure.

Although there are several successful large scale rainwater harvesting examples in the Milwaukee-area, the practice is not yet common. Currently, obtaining the necessary permits and approvals can be costly and take several months to complete. Often, professional engineers are required to design and certify that projects have taken measures to protect human health and the environment. Hiring an engineering firm that is familiar with local and state permitting procedures can help expedite the approval process for larger scale rainwater harvesting projects.

SPECIAL REMINDER: HARVESTED RAINWATER IS NOT POTABLE / DRINKABLE

It is important to recognize that while each scale of rainwater harvesting has a treatment component, the level of treatment is not to the same level as municipal potable water and harvested rainwater should not be used for drinking or for other purposes where it may be consumed.

ADDITIONAL RESOURCES

City of Milwaukee Health Department

MDH supports many public health initiatives including healthy food access and climate resiliency.

Milwaukee Metropolitan Sewerage District

MMSD has multiple rain barrel programs, an annual native plant sale, and a green infrastructure partnership program for larger scale projects.

City of Milwaukee Environmental Collaboration Office

ECO supports several sustainability related initiatives through various programs including HOME GR/OWN, Water Centric Cities, etc.

Reflo - Sustainable Water Solutions (nonprofit)

Reflo partners with community garden groups and schools each year to support rainwater harvesting projects of all scales.

Southeastern Wisconsin Watersheds Trust (nonprofit)

SWWT's annual mini-grant program awards up to $5,000 per project and has provided funding for many rainwater harvesting projects.

Neighborhood Improvement Development Corporation

Projects can receive up to $4,000 in match funding through NIDC's Community Improvement Program (CIP).

Clean Wisconsin (nonprofit)

Clean Wisconsin works with MMSD to install rain barrels and rain gardens within the 30th Street Industrial Corridor.

University of Wisconsin-Extension

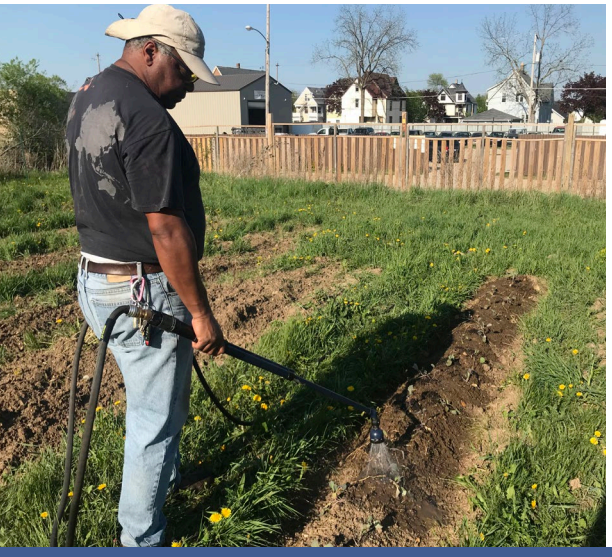
UW-Extension supports gardening and farming projects throughout the County and provides in-depth training opportunities.

Groundwork Milwaukee (nonprofit)

Groundwork and its Milwaukee Urban Gardens program (MUG) helps to establish and maintain community gardens throughout Milwaukee.

Victory Garden Initiative (nonprofit)

VGI's Garden Blitz and Fruity Nutty programs have built many raised bed gardens and orchards throughout the Milwaukee-area.



FOR MORE INFORMATION PLEASE CONTACT

Justin Hegarty, P.E., LEED A.P.

justin.hegarty@refloh2o.com

Reflo
Sustainable Water Solutions