



WATER NEEDS ASSESSMENT

PATHWAYS TO EMPLOYMENT IN A WATER CENTRIC CITY



UWM Center for Economic Development

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ABOUT THIS REPORT

The primary author of this study is Lisa Heuler Williams, Policy Researcher at the Center for Economic Development, University of Wisconsin-Milwaukee. Additional contributions were made by Catherine Madison and graduate project assistant Shuayee Lee. The Center for Economic Development (CED) is a unit of the College of Letters and Science at the University of Wisconsin-Milwaukee.

The College established CED in 1990 to conduct university research on crucial issues in urban economic development, and to provide technical assistance to nonprofit organizations and units of government working to improve the Greater Milwaukee economy. The analysis and conclusions presented in this study are solely those of the author and do not necessarily reflect the views and opinions of UW-Milwaukee, or any of the organizations providing financial support or partnering with the Center.

CED strongly believes that informed public debate is vital to the development of good public policy and effective problem-solving. The Center publishes detailed studies of economic conditions, trends, and policies; shorter briefing papers on economic development issues; and “technical assistance” reports of applied economic analysis. In these ways, as well as in conferences and public lectures sponsored or co-sponsored by the Center, we hope to contribute to public discussion on economic development policy in Greater Milwaukee and in the State of Wisconsin.

Further information about the Center and its publications and activities is available on our web site: www.ced.uwm.edu

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INTRODUCTION

MILWAUKEE AND WATER

Milwaukee's location along the shores of Lake Michigan means that Milwaukee's industries have grown up with a constant, abundant water supply, leading to the establishment of many enterprises in our region that are water-intensive. From the great industries of Milwaukee's early development, such as brewing and tanning, to the manufacture of water heaters and water meters, to today's growing cluster of water technology industries, Milwaukee has benefitted from its fresh coast location.

Milwaukee's water sector is extensive and deep-rooted. It includes a broad array of occupations and industries responsible for the operation, maintenance, improvement, promotion, and support of water resources, drinking water, and stormwater management.

MILWAUKEE – WATER CENTRIC CITY?

Milwaukee has been called a water centric city and the "Silicon Valley of Water." While the water sector has historic importance, the impact on the local economy can be hard to estimate.

"I believe we're destined to be the global water leader. There's a little hyperbole in that right now, but I think 20 years from now people will look worldwide to Milwaukee as one of the global hubs of water technology." Rocky Marcoux.¹

Marc Levine of the Center for Economic Development at the University of Wisconsin-Milwaukee noted there have been at least 20 other areas of the country with similar concentrations of water-related companies and research and development efforts. He has questioned whether the emphasis on the growth of water-related industry is more about branding than actual economic expansion.²

At the recent Marquette Law School conference, "Milwaukee 2025: Water, Jobs and the Way Forward", it was noted that the growth in

Water equity

Equity refers to just and fair inclusion – a condition in which everyone has an opportunity to participate and prosper. Water equity occurs when all communities have access to safe, clean, affordable drinking water and wastewater services; are resilient in the face of floods, drought, and other climate risks; have a role in decision-making processes related to water management in their communities; and share in the economic, social, and environmental benefits of water systems.

US Water Alliance

water-related jobs and businesses has not reached expectations and the economic impact of the water sector on the regional economy has been flat.³

THE CHALLENGE

Manufacturing in Milwaukee today is a shadow of its former self. The loss of manufacturing jobs since the 1970s has hit vulnerable communities particularly hard, with increased poverty and unemployment and declining household incomes. Even among the employed, low wages have prevented many workers from climbing above the poverty line. The impact of job losses on vulnerable communities has been compounded by historic hyper-segregation, rising income inequality and the growth of mass incarceration.

Milwaukee's history of racial segregation is pronounced, a key factor in barriers to employment faced by members of vulnerable communities. In addition to race and ethnicity, barriers may also include immigrant status, disability status, history of incarceration, and residential location. While these barriers are not unique to the water sector, they are relevant to the water sector.

Employment in the water sector is largely white and male. It does not reflect the racial and ethnic makeup of the city. Barriers to employment may perpetuate the lack of diversity in many water-related occupations. Identifying these barriers is necessary in order to develop strategies to address diversity issues in the water sector and to promote opportunities for members of vulnerable communities.

THE OPPORTUNITY

Jobs in the water and wastewater industries will not move away. They can not be sent to another country. Opportunities may surface due to increasing public investments in water infrastructure, a tight labor market, and baby boomer retirements. Water-related occupations are projected to experience higher than average growth in the future. Many of these jobs pay higher than average wages and some have low educational barriers to entry.⁴

Milwaukee is expected to increase investments in water and wastewater infrastructure due to aging water infrastructure, public concerns about clean drinking water and impacts of climate change. Investments in water infrastructure are economically efficient - each dollar of investment creates an economic impact of \$2.62⁵— and these investments have the potential to provide employment opportunities to vulnerable communities. It is estimated that **for every \$1 million of water investment, 16 jobs are created**. This is comparable to the job creation produced by investment in military spending, clean energy, transportation, and healthcare.⁶

Wisconsin is currently experiencing historically low unemployment rates. Many employers report that they are having difficulty filling open positions. The tight labor market may present economic opportunities for **vulnerable** communities which may not have benefited from low unemployment rates and whose residents are less likely to hold college degrees or have substantial work experience.

PROJECT BACKGROUND

The US Water Alliance (Alliance) believes that water-related investments and infrastructure can create economic, environmental, and community benefits. The Alliance established the Water Equity Taskforce (Taskforce), a network of cities that are tasked with developing equitable water policies and practices. The Taskforce in Milwaukee chose to focus on the **local water workforce**. The Taskforce seeks to understand and promote inclusive and equitable pathways to jobs in the water sector that will arise from investments in water and wastewater infrastructure.

The Taskforce in Milwaukee is facilitated by the Milwaukee Water Commons(MWC)⁷. The taskforce includes representatives from public utilities, community organizations, and other stakeholders. Members include the Alliance, Milwaukee Metropolitan Sewerage District (MMSD), MWC, Milwaukee Area Technical College (MATC), Greater Milwaukee Foundation (GMF), Employ Milwaukee, Groundwork Milwaukee, Cream City Conservation, and Milwaukee Water Works. **(See Appendix for the full list of Water Equity Taskforce members.)**

PROJECT GOALS

The MWC engaged UWM's Center for Economic Development (UWMCED) to conduct a Water Needs Assessment. The goal is to understand current and future conditions of the water workforce and to develop inclusive and equitable pathways to water careers. The Force is working to ensure that Milwaukee's vulnerable communities benefit from community investments in water and water infrastructure.

The objectives of the UWM study are to:

- Delineate the water workforce job market in the Milwaukee-Waukesha-Ozaukee-Washington (MWOW) Counties.
- Analyze constraints to local employment in the water workforce.
- Identify best practices in comparable markets for connecting local low-income residents, immigrants, and communities of color to sustainable employment in the water workforce.
- Develop policy recommendations that would promote the training and hiring of local community members in the area's water workforce.

STUDY METHODOLOGY

The UWM Center for Economic Development used a combination of qualitative and quantitative methods for this study.

QUALITATIVE METHODS

FOCUS GROUPS

In Fall 2018, the MWC hosted two focus groups which were attended by 56 people. The participants included people who work in the water sector, advocacy groups focused on water-related issues, and community members. Milwaukee Water Commons provided UWMCED with the notes from the Focus Groups. The notes were analyzed by subject area and key words. Common themes were identified. These common themes were used to inform the formulation of interview questions for the next phase of qualitative research.

STRUCTURED INTERVIEWS

Milwaukee Water Commons identified key stakeholders in the water sector, including employers, educational institutions, and workforce training organizations. Together, MWC and UWMCED created an interview tool that was used in a set of structured interviews that were carried out in early 2019 (see Appendix for interview tool). UWMCED and MWC conducted 18 structured interviews with key stakeholders (see Appendix for list of stakeholder interviews).

In conjunction with the formal interviews, UWMCED gathered the following information from key water-related industries: general job descriptions, wages, educational attainment levels and/or training requirements, and pathways to attain these jobs. Where possible, we gathered information on:

- Small, Women, Veteran, Minority Business Enterprises in contracts (for utilities and municipal agencies)
- Contract hiring policies, including percentage of workforce required from different geographies (for utilities and municipal agencies)

VULNERABLE COMMUNITIES

Vulnerable communities face historic or contemporary barriers to economic and social opportunities and a healthy environment. The principal factors in community vulnerability are income, race or ethnicity, age, language ability, and geographic location. Such populations may include low-income people, communities of color, immigrants, seniors, children, people with disabilities, people with limited English-speaking ability, rural communities, tribal communities, people living in unincorporated areas, people living in public housing, and currently or formerly incarcerated people.¹

U.S. Water Alliance

Interviews were audio-taped whenever possible and transcripts were created. UWMCED analyzed the transcripts and identified common themes. The common themes informed the sections on barriers to training and employment, opportunities and challenges in the water sector, and best practices and pathways to employment in the water sector.

UWMCED also reviewed reports, news articles, and data sources with the following question in mind:

- Are the opportunities, challenges, barriers, and pathways identified by Milwaukee stakeholders consistent with research on the water sector?

In most cases, the common themes that arose from stakeholder interviews were also highlighted in the research studies and other secondary sources we identified. The identification of best practices and key recommendations were informed by this research.

INVENTORY OF TRAINING PROGRAMS IN THE METRO AREA

UWMCED created an inventory of all training programs related to water sector employment, including academic programs, trades and apprenticeship training programs, and training offered by workforce development organizations. For each program, entry requirements and connections to occupations are identified.

QUANTITATIVE METHODS

UWMCED relied on a variety of quantitative data sources, including U.S. Bureau of Labor Statistics, U.S. Bureau of the Census, Wisconsin Department of Workforce Development, and Wisconsin Bureau of Apprenticeship Standards. These databases can be accessed online. The following data was collected.

- Industry-level data
- Occupational data
- Demographic data
- Apprenticeship and Trades data

Challenges in Defining the Water Sector

The delineation of the water workforce is complicated because the sector is not represented by a single industry or occupation code. UWMCED relied on NAICS (North American Industry Classification System) codes for industries and SOC (Standard Occupational Classification) codes for occupations. NAICS is used to classify business establishments for collecting, analyzing, and publishing statistical data. The NAICS code is used to describe industries and does not describe occupations held by people within that industry.

Unlike some sectors (Finance and Insurance), the water sector does not fit neatly into one NAICS code. Water-related industries can be found in many NAICS codes. Similarly, water-related occupations do not fit neatly into one occupational code. Caution must be used because not all jobs in each of the selected NAICS codes are water-related and not all jobs in each of the selected SOC codes are water-related.

DEFINING THE WATER SECTOR

To come up with a reliable estimate of the water workforce, UWMCED relied on the definitions of the water sector found in the Brookings Institution study, *Renewing the Workforce: Improving Water Infrastructure and Creating a Pipeline to Opportunity*. Some modifications to the Brookings Institution methodology were made in response to suggestions from the Water Equity Task Force. Industrial data was gathered from the Bureau of Labor Statistics by NAICS Code (North American Industrial Classification System). Occupational data was gathered from BLS Occupational Employment Survey and Projections.

Water-related industries

Eight water industries were identified by the Brookings Institution. UWMCED collected data on each of these industries. Two additional industries, (Architectural, Engineering Services and Research and Development in Bio-Technology) were added based on feedback from project partners and key stakeholders. Where possible data on employment, wages, and training and employment projections were gathered. Data on water utilities was gathered directly from the utilities themselves.

Water-related Industries	
NAICS code	Meaning of NAICS code
23711	Water and Sewer Line and Related Structures Construction
2379	Other Heavy and Civil Engineering Construction
23822	Plumbing, Heating, and Air-conditioning Contractors
23891	Site Preparation Contractors
5413	Architectural, Engineering, and Related Services
54162	Environmental Consulting Services
54171	Research and Development in the Physical, Engineering, and Life Sciences ⁸
56173	Landscaping Services
5629	Remediation and Other Waste Management Services
	Utilities – Water and Sewer*

*** NAICS Code was not used for Utilities**

WATER-RELATED OCCUPATIONS

The Brookings Institution found that 15 water occupations represent 2/3 of all employment in water-related occupations. UWMCED expanded the list to include 17 occupations, listed in table below.

Water-related occupations (based on Standard Occupational Classification)
Meter Readers, Utilities
Operating Engineers and Other Construction Equipment Operators
Pipelayers
Plumbers, Pipefitters, and Steamfitters
Helpers - Plumbers, Pipefitters, and Steamfitters
Septic Tank Servicers and Sewer Pipe Cleaners
Heating, Air Conditioning, and Refrigeration Mechanics
Water and Wastewater Treatment Plant and System Operators
Hydrologists
Landscaping and Groundskeeping Workers
Environmental Scientists and Specialists
Environmental Engineers
Environmental Science and Protection Technicians
Environmental Engineering Technicians
Hazardous Materials Removal
Conservation Scientists
Construction Laborers

REVIEW OF STUDIES PROVIDED BY THE WATER EQUITY TASKFORCE

UWMCED reviewed the following studies as part of the research process. Additional reports, studies and articles that were consulted are listed in the Bibliography.

- *Renewing the Workforce: Improving water infrastructure and creating a pipeline to opportunity.* Brookings Institution, 2018.
- *Water Works: Rebuilding Infrastructure Creating Jobs, Greening the Environment.* Green for All, in partnership with American Rivers, Economic Policy Institute, and Pacific Institute. 2011.
- *The Economic Benefits of Investing in Water Infrastructure.* US Water Alliance. 2017.
- Global Water Center Jobs Assessment.
- *Beneath the Streets: The outlook for metro Milwaukee's largest water and sewer infrastructure assets.* Wisconsin Public Policy Forum.
- US Water Equity Roadmap: Background Profile for Milwaukee.
- Information on programs aimed at increasing hiring members of underserved local communities in Washington, DC; Louisville, KY; and San Francisco, CA,
- *Building the Blue Economy: Opportunities for Community-Based Organizations in Stormwater Management.* PUSH Buffalo and The Partnership for the Public Good. 2015.

MILWAUKEE: SOCIAL AND ECONOMIC INDICATORS

This section presents data on population by race and ethnicity, income, poverty, employment, educational attainment and transit use for the city of Milwaukee and Milwaukee Metro Area. These key economic and demographic indicators provide the context in which barriers to employment exist in this region.

Milwaukee has some of the widest racial and spatial disparities—in employment, income, and poverty—of any metropolitan area in the country. Race and ethnicity are strongly correlated with disparities in health, wealth, employment, and incarceration rates. City-suburban economic disparities have grown over the past 30 years, as many of the region’s most affluent households fled from the central city to suburban and exurban communities.⁹ Add to this the loss of manufacturing employment and the result has been a high concentration of poverty and unemployment in the city.

POPULATION BY RACE AND ETHNICITY

Each of the metro area’s four counties has experienced population growth in the last eight years, while the City of Milwaukee has seen a slight population decrease.

Milwaukee is now a majority-minority city. In Metro Milwaukee, the white share of the population is decreasing. While the Milwaukee Metro Area is slowly becoming more diverse, the exurban counties are still very white (about 9 out of 10 people living in Ozaukee, Washington and Waukesha counties are white).

Total Population			
Geography	2009	2017	% Change
Milwaukee City	603,338	599,086	-0.7%
Milwaukee County	953,864	956,586	0.3%
Milwaukee Metro Area	1,546,312	1,575,101	1.9%

White Alone, not Hispanic Population				
Geography	Number		Share of Total Pop	
	2009	2017	2009	2017
Milwaukee City	252,737	214,553	41.9%	35.8%
Milwaukee County	554,836	499,245	58.2%	52.2%
Milwaukee Metro Area	1,104,318	1,058,740	71.4%	67.2%

Black or African American Population

Geography	Number		Share of Total Pop	
	2009	2017	2009	2017
Milwaukee City	226,023	233,178	37.5%	38.9%
Milwaukee County	240,015	252,712	25.2%	26.4%
Milwaukee Metro Area	247,481	261,429	16.0%	16.6%

Hispanic or Latino Population

Geography	Number		Share of Total Pop	
	2009	2017	2009	2017
Milwaukee City	90,899	110,388	15.1%	18.4%
Milwaukee County	109,570	139,469	11.5%	14.6%
Milwaukee Metro Area	126,891	164,219	8.2%	10.4%

EMPLOYMENT

UNEMPLOYMENT

Racial and ethnic disparities in unemployment are stark in the Milwaukee area. Black residents of the city, county, and metro area are more than three times as likely to be unemployed as non-Hispanic whites. Hispanic residents are almost twice as likely to be unemployed as non-Hispanic whites.

Unemployment Rate, 2017

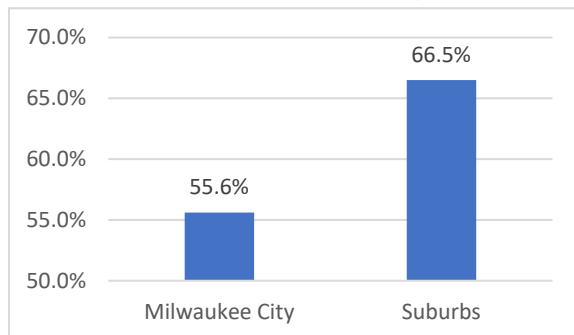
Geography	White alone, not Hispanic	Black or African American alone	Hispanic or Latino origin (of any race)
Milwaukee City	4.6	15.1	7.8
Milwaukee County	4.4	14.2	7.0
Milwaukee Metro Area	3.7	13.9	6.9

NON-EMPLOYMENT AND UNDEREMPLOYMENT

Chronic, long-term non-employment is a major challenge in the City of Milwaukee. As UWMCED's Marc Levine observed, "as work has disappeared, non-employment has become a chronic characteristic of community life."¹⁰ 45% of residents of the City of Milwaukee lack full-time, full-year employment. This

stands in contrast to the suburbs, where 33.5% of the working age population does not have full-time, year-round employment.

PERCENTAGE OF POPULATION (AGED 25-54 YEARS) WORKING FULL-TIME, YEAR-ROUND



POVERTY

Racial and ethnic disparities in poverty rates are even more stark than employment disparities. Black residents of Milwaukee County are more than three times as likely to live in poverty as non-Hispanic Whites. Black residents of the Metro Milwaukee area are nearly five times as likely to live in poverty as non-Hispanic Whites. Disparities between whites and Latinos are likewise substantial.

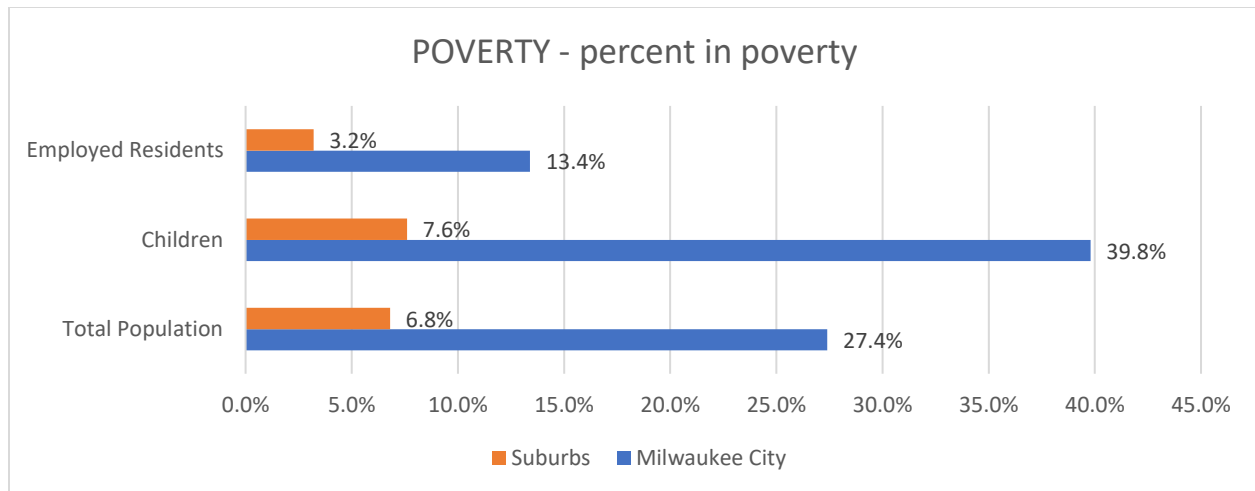
Percent of Population below Poverty – 2017

Geography	White alone, not Hispanic	Black or African American alone	Hispanic or Latino origin (of any race)
Milwaukee City	14.6%	36.3%	31.4%
Milwaukee County	10.7%	35.0%	27.9%
Milwaukee Metro Area	7.5%	34.5%	25.6%

WORKING POVERTY

Poverty is not simply a function of employment status; for many city residents, low wages and/or underemployment translate into poverty-level income. In other words, there is a high level of “working poverty” in Milwaukee.

The lack of full-time, family-supporting employment contributes to concentrated poverty in many city neighborhoods. As shown in the table below, employed city residents are more than four times as likely to live in poverty as employed suburban residents. Residential segregation in Milwaukee contributes to the concentration of poverty in certain areas of the city.



INCOME

Data on household income also reveal racial and ethnic disparities. As the table below indicates, Black household income for the metro area is less than half that of white households, while income for Hispanics is somewhat higher but still well below that of whites.

Median household income in the past 12 months

Geography	White alone, not Hispanic	Black or African American alone	Hispanic or Latino origin (of any race)
Milwaukee City	\$ 53,043	\$ 27,669	\$ 34,444
Milwaukee County	\$ 58,595	\$ 28,526	\$ 36,399
Milwaukee Metro Area	\$ 67,768	\$ 28,928	\$ 38,970

EDUCATION

High school and college graduation rates have steadily risen in both the city and the suburbs. Still there are differences in educational attainment by residence, as seen in the chart below. 95% of suburban residents have a high school degree, compared to 83% of city residents. 40% of suburban residents have a college degree, compared to only 24% of city residents. Racial differences in educational attainment are also pronounced.

EDUCATIONAL ATTAINMENT

High School Degree or GED			
Geography	White alone, not Hispanic	Black or African American alone	Hispanic or Latino origin (of any race)
Milwaukee City	28.3%	38.6%	33.5%
Milwaukee County	27.2%	37.0%	33.9%
Milwaukee Metro Area	25.6%	36.5%	32.4%

Some College or Associate's Degree			
Geography	White alone, not Hispanic	Black or African American alone	Hispanic or Latino origin (of any race)
Milwaukee City	27.2%	33.2%	22.8%
Milwaukee County	27.1%	34.3%	23.7%
Milwaukee Metro Area	28.4%	34.4%	24.3%

Bachelor's Degree or Higher			
Geography	White alone, not Hispanic	Black or African American alone	Hispanic or Latino origin (of any race)
Milwaukee City	38.1%	11.8%	7.8%
Milwaukee County	40.5%	13.1%	11.7%
Milwaukee Metro Area	41.8%	13.6%	14.7%

INCOME BY EDUCATIONAL ATTAINMENT

Disparities in employment and earnings cannot be explained simply by educational attainment. As seen in the table below, city residents with a bachelor's degree earn only slightly higher income than Waukesha County residents with a high school diploma. In addition, according to research by UWMCED's Marc Levine, minorities with a bachelor's degree earn only slightly higher income than whites with a high school diploma.

“Racial discrimination in hiring and promotion decisions, the impact of mass incarceration on employment prospects, entrenched segregation, limited regional transit service, and the geography of metro area job growth have meant that many Milwaukee residents, no matter what their educational background, have low or relatively low earnings.”¹¹

Income by Educational Attainment ¹²				
	Less than H.S.	High School Degree	Some College	Bachelor's Degree
Milwaukee City	\$ 24,258	\$ 30,206	\$ 33,836	\$ 49,464
Waukesha County	\$ 34,311	\$ 44,578	\$ 52,223	\$ 78,886

SEGREGATION

Studies have consistently identified Milwaukee as one of the most racially segregated metropolitan areas in the country.¹³ Segregation has a profound impact on economic opportunity in vulnerable communities. It affects access to employment, educational attainment, exposure to crime, environmental pollution, access to food, and more.¹⁴

Milwaukee has the lowest rate of African-American suburbanization in the U.S. In 2010, just 8.8% of Metro Milwaukee African Americans lived in the suburbs.¹⁵ Because the majority of new job growth is occurring in the suburbs, because transit connections between the city and suburban job locations are generally poor, and because many African American residents are reliant on public transit for access to employment, segregation is a major barrier to employment for many of the city's most vulnerable residents.

DESCRIPTION OF WATER SECTOR

Milwaukee's water sector includes a broad array of jobs responsible for operation, maintenance, improvement, promotion, and support of water resources, drinking water, and stormwater management. It includes a "vast array of industries—from engineering and design firms to construction companies and contractors—and each relies on a different mix of occupations and workers".¹⁶ In this study, UWMCED looks at the water sector from two perspectives: water-related industries and water-related occupations.

HOW TO ESTIMATE THE SIZE OF THE WATER SECTOR

Since the water sector is not designated by a single NAICS code¹⁷, estimating the size of the water sector can be difficult. Key stakeholders who were interviewed for this study emphasized the need to "right-size" the sector – in other words, to produce a realistic and defensible estimate of the size of the sector. The Brookings Institution has provided a vital guide to estimating the size of the water sector in metropolitan areas.¹⁸

UWMCED selected the eight NAICS sectors identified by the Brookings Institution and added two additional sectors based on feedback from key stakeholders. Still, no estimate is perfect. Water jobs cross many industries and each job in a "water industry" may not be exclusively a water-related job.

INDUSTRIES AND OCCUPATIONS THAT WERE **NOT** INCLUDED IN THE ESTIMATES

Stakeholders recommended several sub-sectors for inclusion in the water sector that were not included in the estimates because the data were not available for the geographic area.

Water recreation: Milwaukee is seeing an increase in water-related recreation as a result of many years of investment in improving the health of the region's waterways. Unfortunately, it is difficult to collect data on employment in water recreation sector.

Water recreation is included under the NAICS Code which represents "all other amusement and recreation industries." This sub-sector primarily includes industries that do not touch water. For this reason, the employment estimates are not included in this study.

Marinas: Data for employment in Marinas (NAICS 713930) were only available for Milwaukee County, where total employment is 84.

Urban and Regional Planners: Urban and Regional Planners are represented by SOC 19-3051, which includes all planners, not just those connected to water. Data were only available for Milwaukee County and Waukesha County for which total employment was 60 in 2010.

Environmental or Water Lawyers: Environmental and Water Lawyers are included in the occupational code for all lawyers, SOC 23-1011. Since this category encompasses all lawyers, it cannot be used to estimate environmental or water lawyers. The Water Sector estimates do include Environmental

Consulting Services (NAICS 541620) which include establishments that provide advice and assistance on environmental issues, which may include legal assistance provided by water or environmental lawyers.

KEY FINDINGS

- UWMCED estimates that the water sector represents between **1.6 – 2.2% of the metro area economy**.
- The estimated size of the water workforce is based on analysis of water-related jobs by Industry and Occupation.
- Estimated Employment by **Industry**:
 - Employment in water-related industries in Metro Milwaukee is estimated to be in the range of **12,682 – 16,472 jobs**.
 - Job growth: Total employment in the U.S. is forecast to grow by 7.4% between 2016 – 2026. Several water-related industries are expected to see higher than average growth.
- Estimated Employment by **Occupation in Metro Milwaukee**:
 - Employment in 17 key water-related occupations is estimated to be 12,069 jobs.
 - Estimated employment in all water-related occupations is **18,013 jobs**. This represents 2.2% of total Metro Area employment.
 - Job growth: It is estimated there will be 1,402 annual openings in the 17 water-related occupations

WATER-RELATED INDUSTRIES

Description: Water-related industries vary in terms of their connection to water. Some industries, such as water and wastewater, are clearly part of the water sector. Other industrial categories, such as “plumbing, heating and air conditioning” have a less direct link to the water sector. Employers in the water workforce can include utilities, private companies (contractors, consultants, service companies, equipment manufacturers and suppliers), non-governmental organizations, and community-based organizations. Public utilities are key employers, employing 1,381 water and sewer utility workers in metro Milwaukee.

- UWMCED analyzed employment **10** industrial sub-sectors, identified by NAICS code in the estimates of water-related industries.¹⁹
- Data on employment by NAICS code was gathered from the U.S. Bureau of Labor Statistics.

Water sector industries	
NAICS code	Meaning of NAICS code
2213	Water and Sewer Utilities ²⁰
23711	Water and Sewer Line and Related Structures Construction
2379	Other Heavy and Civil Engineering construction
23822	Plumbing, Heating, and Air-conditioning contractors
23891	Site Preparation Contractors

54162	Environmental Consulting services (includes environmental law)
56173	Landscaping Services
5629	Remediation and Other Waste Management services
Additional Industrial categories added by UWMCED	
5413	Architectural, Engineering, and Related Services (including Landscape Architectural Services)
54171	Research and Development in the Physical, Engineering, and Life Sciences

WATER-RELATED OCCUPATIONS

Description: Water-related occupations span multiple industries. Water-related occupations include jobs in planning, facility operations and maintenance, construction, green infrastructure (GI), engineering, laboratory science, as well as water-related occupations in education, landscaping, information technology, advocacy, and recreation.

- The Brookings Institution identified 212 water-related occupations but estimated that 15 key occupations represent 2/3 of all water jobs.²¹
- UWMCED studied 17 water-related occupations (15 key occupations identified by the Brookings Institution and an additional 2 water-related occupations that are particularly relevant to this Water Needs Assessment and which have been cited in other studies).
- Data were gathered from the U.S. Bureau of Labor Statistics according to Standard Occupational Codes (SOC).

Occupation
Operating Engineers and Other Construction Equipment Operators
Plumbers, Pipefitters, and Steamfitters
Helpers - Plumbers, Pipefitters, and Steamfitters
Heating, Air Conditioning, and Refrigeration Mechanics
Water and Wastewater Treatment Plant and System Operators
Hydrologists
Landscaping and Groundskeeping Workers
Construction Laborers
Environmental Scientists and Specialists
Environmental Science and Protection Technicians
Environmental Engineers
Environmental Engineering Technicians

Hazardous Materials Removal Workers
Conservation Scientists
Meter Readers
Pipelayers
Septic Tank Servicers and Sewer Pipe Cleaners

WATER SECTOR ESTIMATES

Nationally, there are 1.7 million water-related jobs.²² In most of the country's metro areas, water-related jobs represent 1-2 percent of total employment.²³

ESTIMATE OF WATER-RELATED INDUSTRIES

In metro Milwaukee, it is estimated that employment in water-related industries ranges between 12,682-16,472 jobs. This represents 1.6-2.1% of the economy. This estimate is based on total employment in 8-10 industry sub-sectors (according to NAICS codes).

Water Sector Employment as a Share of Total Employment in Metro Milwaukee (based on employment by industrial sector)		
Water Sector Employment	Employment	As % of Total Metro Employment
Low Estimate (Selected industries, excludes NAICS 5413 and 541711)	12,682	1.6%
High Estimate (Selected Industries, includes NAICS 5413 and 541711)	16,460	2.1%
Total Metro Milwaukee Employment	802,769	100%

EXPLANATION OF LOW ESTIMATE

At the lower range, UWMCED estimated that 1.6% of metro area jobs are water-related. The following industrial sub-sectors were included:

NAICS	Description
2213	Water and Sewer Utilities ²⁴
23711	Water and Sewer Line and Related Structures Construction
2379	Other Heavy and Civil Engineering Construction
23822	Plumbing, Heating, and Air-conditioning Contractors
23891	Site Preparation Contractors

54162	Environmental Consulting Services
56173	Landscaping Services
5629	Remediation and Other Waste Management Services

EXPLANATION OF HIGH ESTIMATE

At the high end, UWMCED estimated that 2.1% of metro area jobs are water-related. The following industrial sub-sectors were added to the sub-sectors in the low estimate:

NAICS	Description
5413	Architectural, Engineering, and Related Services (includes Landscape Architectural Services)
54171	Research and Development in the Physical, Engineering, and Life Sciences

ADDITIONAL NOTES ABOUT THE ESTIMATES

Employment at The Water Council Member Companies

The Water Council is a member organization that primarily serves water technology businesses and water-related businesses. While it has more than 200 member companies, not all of these companies are located in the Metro Milwaukee area. Not all members are water-related businesses as determined by NAICS codes. If The Water Council members are in the selected NAICS, their employment has been included in our estimates of the Milwaukee water sector. If member companies are not covered by the selected NAICS codes, their employment is not included in the water sector estimates.

Employment weights

Employment weighting is used to determine the percent of total employment in each NAICS sector that is water-related. The Brookings Institution developed employment weights for targeted sectors which reflect the “percent of total employment that is water-related” in that sector.²⁵ Using the employment weights, UWMCED was able to estimate the number of jobs in each of the NAICS codes that are water-related. There are three NAICS codes for which there are no applicable employment weights. In these cases, 100% of the jobs in the sector are added to the total. The three sectors are:

- Architectural, engineering, and related services (incl. Landscape Architectural Services)
- Research and Development in Physical, Engineering and Life Sciences
- Landscaping Services

Employment by Water-related Industry – Metro Milwaukee				
NAICS	Description	Employment	% of Employment that is Water-related[1]	Revised Employment
	Utilities[2]	1,179	100%	1,179
23711	Water and Sewer Line and Related Structures Construction	330	100%	330
2379	Other Heavy and Civil Engineering Construction	294	100%	294
23822	Plumbing, Heating, and Air-Conditioning Contractors	5,135	34%	1,746
23891	Site Preparation Contractors	803	100%	803
5413	Architectural, Engineering, and Related (incl. Landscape Architectural Services)	6,098	NA	6,098
54162	Environmental Consulting Services	158	100%	158
54171	Research and Development in the Physical, Engineering, and Life Sciences	1,391	NA	1,391
56173	Landscaping Services	3,722	NA	3,722
5629	Remediation and Other Waste Management Services	840	88%	739
	Total	19,950		16,460

[1] Based on Brookings Methodology

[2] Utility employment data was gathered directly from the individual utilities.

Source: County Business Patterns

ESTIMATE OF WATER-RELATED OCCUPATIONS

The Brookings Institution found that 15 key water occupations represent 2/3 of all employment in water-related occupations in the U.S. ²⁶ UWMCED studied 17 key water-related occupations. In Metro Milwaukee, total employment in the 17 water-related occupations equaled 12,069 workers in 2016.

Assuming these key occupations represent 2/3 of total employment in water-related occupations, estimated employment in Milwaukee-area water-related occupations comes to **18,013 workers**.

Construction laborers represent the greatest share of these occupations, followed by plumbers, pipefitters, steamfitters; operating engineers and landscaping workers. Caution should be used in interpreting this data because not every job in these occupations is water-related. For example, not all construction laborers are employed in water-related positions.

Metro Milwaukee	
<i>Selected occupations with high shares of employment in the water sector</i>	
Occupation	Employment, 2016
Operating Engineers and Other Construction Equipment Operators	1,787
Plumbers, Pipefitters, and Steamfitters	2,075
Helpers - Plumbers, Pipefitters, and Steamfitters	77
Heating, Air Conditioning, and Refrigeration Mechanics	1,298
Water and Wastewater Treatment Plant and System Operators	369
Hydrologists	40
Landscaping and Groundskeeping Workers	1,890
Construction Laborers	3,236
Environmental Scientists and Specialists	348
Environmental Science and Protection Technicians	110
Environmental Engineers	301
Environmental Engineering Technicians	26
Hazardous Materials Removal Workers	157
Conservation Scientists	19
Estimated Employment for three Occupations: • Meter Readers • Pipelayers • Septic Tank Servicers and Sewer Pipe Cleaners²⁷	336
Total Metro Area	12,069

DRILL DOWN: WATER-RELATED INDUSTRIES IN METRO MILWAUKEE

Public Water and Sewer Utilities

Water and Sewer Utilities employ about 1,179 people within the metro Milwaukee area. This represents between 7-9% of total employment in water sector industries. On the *drinking water side*, 37 public utilities in the four-county metro area directly support about 632 jobs (see table and chart below). 338 of public utility jobs are with Milwaukee Water Works, while 282 are with the other combined 35 municipalities. On the *wastewater side*, Milwaukee Metropolitan Sewerage District employs 225 people and Milwaukee's Department of Public Works employs 118 in the division responsible for sewers.

Additionally, private operator Veolia Water, which maintains the largest contract within the region to operate the Milwaukee Metropolitan Sewerage District's water reclamation plant, employs 216 people.

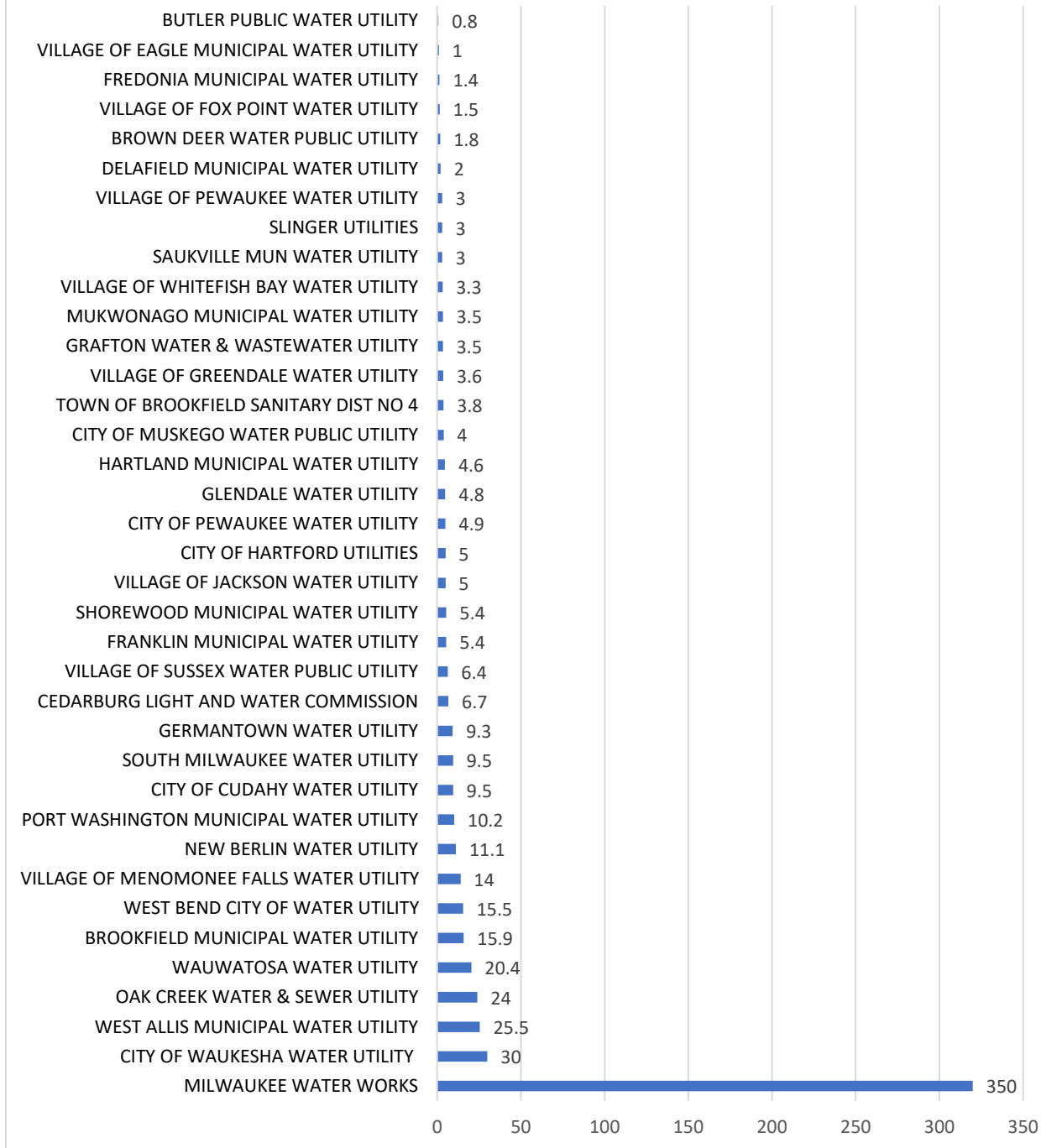
Utility	# Employees
Milwaukee Water Works	338
35 Other Municipalities (Water and Sewer)	282
City of Milwaukee - Dept of Public Works, Sewer Division	118
Milwaukee Metropolitan Sewerage District	225
Veolia	216
Total Employment in Metro area Utilities	1,179

While public utilities represent a small share of all water-related jobs, they are responsible for nearly all public spending on water operations and capital improvements annually.²⁸ These public utilities are “anchor institutions” in the Milwaukee Metro Area and their objectives in relation to their public spending can impact the degree to which spending in the region is equitable.

Milwaukee Water Works

Milwaukee Water Works is the largest provider of drinking water in Wisconsin, providing both retail and wholesale drinking water to Milwaukee and 15 additional communities in the region. Milwaukee Water Works employs **338 people**.

Number of Employees By Water Utility in Metro Milwaukee



Source: Public Service Commission²⁹

Department of Public Works – Environmental Engineering Section

The Environmental Engineering Section, housed in DPW’s Infrastructure Services Division, is responsible for the programming, funding, design, and installation of sanitary, storm and combined sewer facilities. Total employment in DPW Environmental Engineering Section is **118 people**.

Key operations include:

- inspection, maintenance, and repair of the City’s sewer mains, manholes, catch basins, and storm inlets
- stormwater management
- design and installation of GI
- implementation of the Wisconsin Pollutant Discharge Elimination System permits.
- management of activities required to meet MMSD Rules

Metropolitan Milwaukee Sewerage District (MMSD)

MMSD provides wastewater and flood management services for 28 municipalities within Milwaukee County and portions of the surrounding counties. It serves 1.1 million people in a 411 square mile area. It has two water reclamation facilities – Jones Island and South Shore – which are operated by Veolia Milwaukee. MMSD was established by state law and has taxing authority. MMSD employs **225 people**.

Veolia Milwaukee

Veolia Milwaukee is a private company which maintains the largest contract within the region to operate the MMSD’s water reclamation facilities. It cleans wastewater at the Jones Island and South Shore water reclamation facilities and returns the water to Lake Michigan. Veolia Milwaukee employs **216 people**.

Other key employers in water-related industries

Engineering firms, contractors, and other related businesses carry out specific water projects and activities and represent water-related jobs. In fact, these “other employers” represent the majority of water-related jobs. The key industries representing the water sector are listed in the table below. The sector with the largest share of water-related jobs is Architectural and Engineering services (including Landscape Architectural Services).

Water and Sewer Line and Related Structures Construction
Other Heavy and Civil Engineering Construction
Plumbing, Heating, and Air-Conditioning Contractors
Site Preparation Contractors
Architectural, Engineering, and Related Services (incl. Landscape Architectural Services)
Environmental Consulting Services
Research and Development in the Physical, Engineering, and Life Sciences
Landscaping Services
Remediation and Other Waste Management Services

Employers that Support the Water Sector:

Employment totals for the following employers were ***not included*** in the quantification of water-related jobs. While these employers may support the water sector, the jobs within them are not primarily water-related. Employment totals for these establishments can be found in the appendix.

- Academic Institutions
 - Colleges, technical schools, and educational institutions provide coursework, certification, training and apprenticeship programs
- Economic development organizations and workforce development boards work to connect water workers with employment opportunities.
- Unions and labor groups provide worker protections during the hiring process and wage negotiations. They also partner with employers and the state on apprenticeship programs.
- National- and State-level actors are involved in water sector:
 - Department of Natural Resources
 - U.S. Environmental Protection Agency (EPA) regulates utility activities and guiding workforce needs—via the Clean Water Act and Safe Drinking Water Act
 - Great Lakes Restoration Initiative (See Opportunities Section for more detail)

WATER SECTOR FORECAST

NATIONAL FORECAST

Water has a significant impact on job creation in the U.S. **For every \$1 million of water investment, 16 jobs are created.** This is comparable to the job creation produced by investment in military spending, clean energy, transportation, and healthcare.³⁰

WATER-RELATED INDUSTRIES

Employment growth in water-related industries is forecast to grow at a faster pace than total employment growth. According to the U.S. Bureau of Labor Statistics, total employment in the U.S. is forecast to grow by 7.4% in the 10-year period from 2016 – 2026. The following water-related industries are expected to see higher than average growth:

Industrial sub-sector	% employment change (2016-2026)
Water, Sewage and Other Systems	9.4%
Engineering Services	12.7%
Plumbing, Heating and Air Conditioning	18.3%
Landscaping	11.8%
Remediation and Waste	22.0%

WATER-RELATED OCCUPATIONS

Several water-related occupations are forecast to grow while a few are forecast to decline.

HIGH GROWTH OCCUPATIONS

Each of these occupations is expected to experience above average growth over the next decade - more than 10% from 2014-2024.³¹ These occupations represent the largest number of workers in the water sector. While they do not require a college degree, they may require significant training, such as an apprenticeship. They pay higher than average wages.

- Construction laborers;
- Plumbers, pipefitters and steamfitters;
- Operating engineers

MEDIUM GROWTH OCCUPATIONS

Each of these occupations are projected to experience moderate employment growth over the next decade. These occupations represent a significant share of the water sector. These occupations do not require a college degree and they pay higher than average wages.

- Pipelayers
- Construction equipment operators
- General maintenance and repair workers

Declining Occupations

These occupations are projected to experience declines:

- Water and wastewater treatment plant and system operators
- Meter Reader

Employment of water and wastewater treatment plant and system operators is projected to decline 3% over the next decade, as water and wastewater treatment plants become more automated.³² Meter reader jobs are already decreasing. The positions that remain will require technology training. Meter readers will no longer physically go to each house to read the meter. Meter reading will be done remotely using software technology.

STATE FORECAST

Projections on the fastest growing occupations in the state of Wisconsin suggest that several water-related occupations will grow faster than the state average. In most cases, these occupations provide entry wages that are significantly higher than average entry level wages. Occupations with the highest projected growth are Helpers for Pipelayers, Plumbers, Pipefitters and Steamfitters; and Environmental Scientists and Specialists.

Annual job openings for Environmental Scientists and Specialists are expected to be relatively low, at 130 openings per year through 2026. In contrast, the number of openings for plumbers, pipefitters and steamfitters is estimated at 980 per year. These jobs have entry wages of \$47,120 per year.

While the largest number of openings will be in Landscaping and Groundskeeping, the entry wage for this sector is just \$23,870. This is just slightly higher than the average entry wage for all occupations in Wisconsin.

Water-related Occupations with Higher than Average Growth, Job Openings and Entry Wages ³³					
WISCONSIN					
Occupation	Employment 2016	Projected Employment, 2026	% Change (2016-2026)	Avg Annual Openings	Entry Wage
Landscaping and Groundskeeping Workers	20,800	22,520	8.3	2,730	\$23,870
Plumbers, Pipefitters, and Steamfitters	8,120	9,040	11.3	980	\$47,120
Operating Engineers and Other Construction Equipment Operators	7,400	8,410	13.6	960	\$49,430
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	5,320	5,900	10.9	590	\$43,990
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	2,520	2,750	9.1	270	\$44,660
Environmental Scientists and Specialists, Including Health	1,180	1,330	12.7	130	\$39,170
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	670	760	13.4	110	\$32,080
All Occupations in Wisconsin			6.7		\$22,680

LOCAL FORECAST

According to the Bureau of Labor Statistics the water-related occupations listed in the table below are expected to experience the highest growth. While growth is forecast at the national level, it is a mixed story for the Metro Milwaukee area.

Employment projections for these 17 water-related occupations estimate that there will **be 1,402 job openings in Metro Milwaukee each year** for the foreseeable future (based on retirements, attrition and new jobs). Of the 1,402 openings, nearly 20% of the job openings will be Landscapers and Groundkeepers positions. A downside of this occupation is that it pays below average wages, with an entry level wage of \$9.75/hour in 2017.

Metro Milwaukee - Occupation Projections 2016-2026		
<i>Selected Occupations with High Shares of Employment in the Water Sector</i>		
Occupation	Employment, 2016	Total Annual Openings*
Environmental Science and Protection Technicians	118	14
Operating Engineers and Other Construction Equipment Operators	1,787	202
Plumbers, Pipefitters, and Steamfitters	2,075	225
Helpers - Plumbers, Pipefitters and Steamfitters	77	12
Heating, Air Conditioning, and Refrigeration Mechanics	1,298	131
Water and Wastewater Treatment Plant and System Operators	369	30
Hydrologists	40	
Landscaping and Groundskeeping Workers	1,890	272
Construction Laborers	3,236	396
Environmental Scientists and Specialists	348	38
Environmental Engineers	301	23
Environmental Engineering Technicians	26	2
Conservation Scientists	19	1
Hazardous Materials Removal Workers	157	19
Estimated Total Openings for:		
• Meter Readers • Pipelayers • Septic Tank Servicers, Sewer Pipe Cleaners³⁴	336	37
Total Metro Area	12,077	1,402

Source: Wisconsin Department of Workforce Development, Labor Market Information³⁵

Other possible developments could have a positive impact on these estimates.

- Technology advances in the water sector will provide new opportunities. Technological innovations will lead to manufacturing of new water technology. Milwaukee has an advantage here with the innovation taking place by Water Council member companies. Such efforts may lead to new employment opportunities in the Metro area.

WAGES

Except for landscaping, the occupations in the table below pay higher than average wages. Wage rates are based on averages for the state of Wisconsin.

Water-related Occupations – Entry Wages in Wisconsin	
Occupation	Entry Wage
Landscaping and Groundskeeping Workers	\$23,870
Plumbers, Pipefitters, and Steamfitters	\$47,120
Operating Engineers and Other Construction Equipment Operators	\$49,430
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	\$43,990
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	\$44,660
Environmental Scientists and Specialists, Including Health	\$39,170
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	\$32,080
All Occupations – Wisconsin	\$22,680

Source: Wisconsin Department of Workforce Development, Long-Term Occupational Projections (2016-2026)

OPPORTUNITIES IN THE WATER SECTOR

Interviews with key stakeholders provided insight into the opportunities in the Milwaukee Metro Area Water Sector. Interview respondents cited opportunities arising from market, political, and natural forces. Many of the opportunities cited by stakeholders were also reflected in water sector studies, reports and news articles that UWMCED reviewed.

Key stakeholders cited these factors that will give rise to new and expanding opportunities in the water sector:

- Local, State and Federal Government Policies
- Age of Water Workforce
- Water Infrastructure Needs
- Locally-based Water Technology Companies
- Expansion of Green Infrastructure
- Tight Labor Market/Low unemployment
- Advantages of Water Sector Jobs

LOCAL, STATE AND FEDERAL GOVERNMENT POLICIES

Governor Evers proposed significant increases in state investment in water infrastructure, emphasizing improvements in drinking water and lead abatement. However, the state legislature did not act favorably on these recommendations and the expenditures were not included in the state biennial budget. It remains to be seen whether these investments will be made and, if so, at what pace.

The federal **Omnibus Appropriations Act of 2018** allocated \$145 million in federal funding for apprenticeship programs centered on construction, transportation, and related activities. The availability of federal dollars will allow expansion of workforce training programs in Wisconsin. Apprenticeships and workforce training programs are key pathways for individuals who are entering water-related occupations. \$20 million in funding is marked for promoting diversity and inclusion in apprenticeships.

A Wisconsin State Bill that would give thousands of workers and businesses a tax break for participating in apprenticeships is moving through the Wisconsin Legislature.

The **Great Lakes Restoration Initiative (GLRI)**³⁶ is an initiative intended to address environmental threats to the Great Lakes. It is possible that the **GLRI** will designate the Milwaukee Estuary as a priority Area of Concern which will be targeted for investment over the next five years. Areas of Concern are places designated as the most contaminated locations within the Great Lakes. If the Milwaukee Estuary is selected, it will lead to increased funding and employment for the Wisconsin DNR, the US EPA, and the US Army Corps of Engineers.

WATER INFRASTRUCTURE NEEDS

According to a study by the Public Policy Forum, aggregate capital program spending by Milwaukee Water Works (MWW) and MMSD is expected to be \$181 million in 2021. MMSD's annual capital spending is projected to be \$135 million in 2021. MWW's annual capital spending is projected to be \$46 million in 2020, of which \$34 million will be targeted to replacement of lead laterals.³⁷

According to stakeholders, MMSD and MWW will increase investments in water and wastewater infrastructure. These investments are necessary to ensure clean and safe drinking water. The scale of the investments will depend on the level of economic growth. According to one stakeholder,

“The growth area is infrastructure and it will need workforce. This will be people that are laying the pipes or building the roads... But, it's all financially dependent. If there is no money then [the workforce] is not going to be able to grow at all”.

The Metropolitan Milwaukee area has significant **infrastructure** challenges. Due to these projected investments, The Public Policy Forum expects that employment at Milwaukee's public utilities will increase.³⁸ The standards for clean water are becoming more ambitious, especially given the problem of lead service lines, which presents a public health challenge and leads to massive infrastructure challenges.

The need for increased investments in water and wastewater infrastructure arises from the age of the city sewers, the increased prevalence of major storm events, and the possibility of tighter regulations to ensure clean drinking water.

What is notable about MMSD is that they engage in very deliberate, comprehensive long-term fiscal planning with regard to their infrastructure. The bad news is that, without question, this is an expensive endeavor. And keeping it in good shape does require a big investment.³⁹

The City of Milwaukee has committed to replacement of the utility-owned **lead service lines**. About 45% of Milwaukee's service lines, or 76,000, are made of lead. The City owns the portion of the service, or lateral, extending from the main to the private property boundary for a residence or business. Current plans call for a three-fold increase in the pace of lead lateral replacements to 1,250 a year by 2022. At that pace, it would take more than 50 years to finish the job. Total annual capital spending for main and lateral replacements was \$12.4 million in 2019.⁴⁰

CLUSTER OF WATER TECHNOLOGY COMPANIES

Stakeholders shared feedback about the Water Technology Cluster in Milwaukee. Water Technology companies are exploring ways to use water more efficiently. This may lead to the development of new water technologies. Stakeholders believe that there will be high growth in software technology connected to water engineering, as cities seek to conserve water through more efficient metering and reduction in water usage. Many stakeholders and focus group participants believe that Milwaukee has a

competitive advantage in developing water technology due to Milwaukee's location on Lake Michigan and the access to fresh water.

The cluster of water companies are developing leading edge technologies to solve water problems. Given the need of cities to use water more efficiently, the market for such technology solutions will expand. According to a stakeholder, the demand for new technology will rise due to changing consumer demand, as consumers demand products that conserve water. New technologies that are developed locally and which provide solutions have the potential to be job generators in the region.

IMPACT ON BUSINESS CREATION AND EMPLOYMENT

The Water Council is actively recruiting companies to the Milwaukee region. They operate a business accelerator program called, Brew Accelerator, which is a training program aimed at entrepreneurs or small businesses in water technology. The program assists businesses with business operations, networking, marketing and sales. The objective is to grow the number of local businesses in the water sector, specifically businesses engaged in water technology.

EXPANSION OF GREEN INFRASTRUCTURE(GI)

The expansion of GI has already begun and will accelerate as MMSD expands its installation of GI across the entire water service area. GI captures stormwater and prevents it from entering the sewer system, helping to reduce the risk of sewage overflows in times of excessive rainfall. GI is also effective at reducing the risk of localized flooding.

Green infrastructure is an approach to wet weather management that is cost-effective, sustainable, and environmentally friendly. GI includes rain gardens; constructed wetlands; green roofs; bioswales; permeable surfacing; native landscaping with deeply rooted plants; cisterns; rain barrels; trees; and soil amendments. Each of these features is designed to increase infiltration and reduce the amount of rainfall from entering the sewer system.⁴¹

Stakeholders shared extensive feedback about the growing sector of GI. The City of Milwaukee will increase investments in GI to reduce stormwater runoff. The amount of non-permeable pavements in the city area must be reduced to reduce the amount of water that enters the city sewers. As the city invests in GI, there will be an increasing need for workers to maintain these installations. This will require an increased allocation of funding to hire additional crews to maintain more installations. Finally, there will be growth in the field of designing GI.

Some stakeholders reflected on the relationship between climate change and investment in GI. If policy makers accept that climate change will impact the water and wastewater systems, then the investments in GI will come sooner. If policy makers deny the impacts of climate change, then the investments will occur in an urgent and unplanned way. Either way, the impacts of climate change will have to be managed.

MMSD AND GREEN INFRASTRUCTURE EXPANSION

By 2035, MMSD intends to install or support enough GI in the region to capture 740 million gallons of stormwater. MMSD has jurisdiction over surface and stormwater in its 28 municipalities. Its activities are governed in part by a set of administrative rules. One of these rules, Chapter 13, is relevant to GI. Recently, changes were made to Chapter 13. The new rules require that:

- property owners that add 5,000 square feet or more impervious surfaces to their property are required to install GI.
- property owners that add more than 5,000 square feet and less than ½ acre of impervious surface must capture at least ½" rainfall across the impervious area.
- Any imperviousness over the ½ acre falls under the original rule.

IMPACT ON EMPLOYMENT:

MMSD is supporting workforce development efforts within the water industry, including GI. GI installation and maintenance jobs generally require a high school diploma and short-term on-the-job training. Installation and maintenance of bioretention/bioswales, rain gardens, greenways green roofs and porous pavements are labor-intensive and provide accessible employment opportunities.

WAGES IN WATER-RELATED OCCUPATIONS

Stakeholders provided feedback on wages in water-related occupations. Some suggested that entry-level wages may not be high but that entry-level occupations may provide pathways to higher earnings. Occupations accessed through apprenticeships pay wages that are markedly higher than average wages. These occupations have structured pathways and transparent wage rates.

Water-related jobs tend to pay more than the average American job. Entry-level wages are on average 40% higher for water-related occupations.⁴² Wages for water-related jobs are generally family-supporting even at the lower ends of the pay spectrum, where workers earn higher wages compared to all workers nationally. This applies to all water-related occupations except landscaping and groundskeeping.

Water-related jobs in Metro Milwaukee also pay more than the average Metro area job at both the entry level and at median. In all cases but one, water occupations have higher-than-average wages at both the entry level and median. Only landscaping and groundskeeping workers earn lower-than-average wages.

Wage by Occupation, 2017 - Metro Milwaukee		
<i>Selected occupations with high shares of employment in the Water Sector</i>		
Occupation	Entry wage	Median Wages
Environmental Science and Protection Technicians, Including Health	\$38,460	\$55,980
Operating Engineers and Other Construction Equipment Operators	\$51,220	\$72,730
Pipelayers	\$42,500	\$61,380
Plumbers, Pipefitters, and Steamfitters	\$47,480	\$81,700
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	\$32,240	\$39,150
Septic Tank Servicers and Sewer Pipe Cleaners	\$31,920	\$44,470
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	\$41,940	\$56,420
Water and Wastewater Treatment Plant and System Operators	\$45,780	\$61,410
Hydrologists	\$46,600	\$59,530
Landscaping and Groundskeeping Workers	\$18,080	\$23,500
All Occupations in Metro Milwaukee	\$22,140	\$38,670

WAGES AT MILWAUKEE WATER WORKS

An evaluation of entry-level position at Milwaukee Water Works shows the salaries that can be earned by workers with a high school education. 23% of Full-time positions at Milwaukee Water Works require high school diploma or equivalent, with no college. Each of these positions pays a salary that is above the average wage in Metro Milwaukee.

Evaluation of Full-time, Entry-Level Positions at Milwaukee Water Works				
	Number of Positions	Approximate Salary Range		Education/ Certification(s)
Water Distribution		Low	High	
- Water Utility Laborer	19	37,502	41,565	High School or Equiv
- Water Repair Worker	36	45,327	51,517	High School or Equiv
Technical Meter Services				
- Customer Service Representative	4	37,830	41,863	No college
- Inventory Assistant III	1	36,935	43,335	No college
- Water Meter Investigator	7	41,487	47,077	No college
- Water Meter Specialist	6	42,187	47,077	No college
- Water Meter Technician	4	39,220	46,567	No college
- Water Meter Specialist	1	42,187	47,077	No college

EDUCATIONAL REQUIREMENTS FOR WATER-RELATED OCCUPATIONS

Stakeholders indicated that employers are looking for entry-level workers. Many jobs will provide a path to higher earnings after a period of minimum wage employment in which the worker demonstrates commitment and good attendance. WRTP/Big Step and union representatives seek to recruit high school Juniors and Seniors to the skilled trades at high school job fairs. These occupations are accessible with a high school diploma, particularly those with some aptitude in the STEM fields (Science, Technology, Engineering and Math).

Many water-related occupations are accessible to individuals without a college degree. As seen in the table below, these occupations have low barriers to entry and often provide on-the-job training.

Selected water-related occupations		
Occupation	Education requirement	On-the job training
Environmental Science and Protections Technicians, incl. Health	Associate degree	
Operating Engineers and Other Construction Equipment Operators	High school or equiv.	Apprenticeship
Heating, Air Conditioning and Refrigeration Mechanics & Installers	Postsecondary nondegree	Apprenticeship
Plumbers, Pipefitters and Steamfitters	High school or equiv.	Apprenticeship
Pipelayers	No formal credential	Short-term on the job training
Helpers - Pipelayers, Plumbers, Pipefitters, Steamfitters	High school or equiv.	Short-term on the job training
Septic Tank Servicers and Sewer Pipe Cleaners	High school or equiv.	Moderate term on the job training
Water and Wastewater Treatment Plant & System Operators	High school or equiv.	Apprenticeship
Landscaping and Groundskeeping Workers	No formal credential	Short-term on the job training
Hydrologist	Bachelor's Degree	

RETIREMENTS

A “silver tide” of retirements will reduce the number of skilled, qualified workers in many utilities and result in staffing vacancies of up to 50 percent in some cases.⁴³ The wave of retirements is coming as employers are struggling to attract and hold onto skilled workers, particularly younger and more diverse workers.⁴⁴

The Clean Water Act was enacted in 1972. Its passage led to an increase in jobs, with many people entering water occupations at that time.

According to the Bureau of Labor Statistics, the median water sector employee is 48 years old—six years older than the national median employee age of 42. The typical water and wastewater employee retires at age 56.⁴⁵ Over the next decade, it is estimated that 37 percent of all water utility workers in the U.S. will retire.⁴⁶ The following occupations are forecast to see higher than average attrition, which may provide new opportunities for younger workers.

- Septic tank servicers and sewer pipe cleaners
- Water and Wastewater treatment plant and system operators
- Industrial machinery mechanics
- Environmental Engineers
- Civil Engineers

CLIMATE CHANGE

According to stakeholders, the changing climate will present opportunities for employment in the metro area. MMSD reports that their service area is susceptible to more intense storms punctuated by longer periods of drought, which may increase the need for infrastructure to adjust to these extreme weather events.⁴⁷ The occurrence of 100-year floods has become increasingly commonplace. New projects and technologies will be developed to address these climate events. In their Strategic Plan, MMSD outlines strategies to reduce run-off and protect water quality. One of their key initiatives to mitigate the impact of climate change is to increase GI.

CHALLENGES IN THE WATER SECTOR

The water sector faces many challenges. Some relate specifically to the water sector, such as the lack of visibility of water-related jobs. Others include increasing retirements and age of the workforce, are more general. Finally, Milwaukee faces systemic challenges in relation to its racial and ethnic disparities, which give rise to a lack of diversity in the water workforce.

- Lack of Visibility of Water-related Jobs
- Age of Water Workforce
- Decreases in Federal Funding for Water and Wastewater Infrastructure
- Increasing Technology in Water-related Occupations
- Lack of Diversity in Water Workforce

LACK OF VISIBILITY OF WATER-RELATED JOBS

Stakeholders observed that there is a lack of awareness of the good jobs that are available in the water sector, also suggesting that there is a need to re-brand the sector. The lack of visibility of water-related jobs raises the following kinds of questions:

- Are water-related jobs invisible because some of these jobs are actually “underground”?
- Are they not visible to the average person?
- Do people who have an interest in environment and sustainability understand that jobs in the water sector are environmental jobs?

AGE OF WATER WORKFORCE

Water and wastewater workers are older than the national median for all workers. This is true both nationally and in Metro Milwaukee. According to MMSD, over 30% of MMSD employees are eligible for retirement in the next three years. As these people advance toward retirement, the sector will face challenges in replacing experienced workers. The skilled trades will be especially hard hit by the wave of retirements.

DECREASES IN FEDERAL FUNDING FOR WATER AND WASTEWATER INFRASTRUCTURE

The Clean Water Act of 1972 led to federal government funding of local water and wastewater infrastructure. In the last 20 years, these federal funds have diminished, causing increased financial burdens on local utilities. In some cities, it has led to a downgrading of water and wastewater infrastructure and increasing water rates.

INCREASING TECHNOLOGY IN WATER-RELATED OCCUPATIONS

As technology becomes an ever-growing feature of water-related occupations, many jobs will require experience in software technology. Technical training will be needed for these workers, presenting a new barrier to entry to these occupations.

LACK OF DIVERSITY IN WATER WORKFORCE

The lack of diversity in the water sector impacts recruitment, hiring, and retention. Minorities and women are under-represented in most water-related occupations. In the Utilities, women are concentrated in administrative support positions and minorities are concentrated in service maintenance positions. It is difficult to get data on employee diversity from businesses other than public utilities because they are not required to report such information.

Some stakeholders are seeking more effective strategies to recruit a diverse pool of applicants for training programs and employment. However, if applicants do not see people who look like themselves, they may not see a place for themselves in the company.

Dorceta Taylor of the University of Michigan studies diversity in environmental organizations. Despite increasing racial diversity in the U.S., environmental organizations remain largely white and male. Her research found that people of color often place high importance on staff diversity in considering positions with employers.⁴⁸

HIRING AND PROCUREMENT PRACTICES

Public investments in water and wastewater infrastructure should provide employment opportunities for city residents, along with the other benefits they provide for the community. This includes the hiring of vulnerable populations and contracting with small, women, veteran, and minority-owned businesses in the procurement process. Public utilities exist to serve every citizen and are funded taxpayer dollars. There is a commonly held belief that public entities that should seek to achieve an employee base that is representative of the population that they serve. MMSD states in its Affirmative Action Plan that the representation of each racial, ethnic and gender group in each major job classification should approximate their labor market availability.

For this study, the City of Milwaukee and MMSD provided information on their hiring practices and programs, in addition to their procurement policies. Private companies generally do not provide detailed information on hiring and procurement practices.

HIRING PRACTICES

CITY OF MILWAUKEE

Hiring policies at Milwaukee Water Works and Department of Public Works are governed by City of Milwaukee policies. These hiring policies are public documents that can be accessed online.

The City of Milwaukee conducts background checks and pre-employment testing. The background check includes the evaluation of State of Wisconsin conviction records, driving record the verification of college degree(s) and licenses/certifications.

The Wisconsin Fair Employment Act (WFEA) prohibits discrimination based upon arrest and/or conviction record.⁴⁹ “The WFEA states that it is not employment discrimination to refuse to employ or terminate from employment any individual who has been convicted of any felony, misdemeanor or other offense(s) ONLY when the circumstances of the offense(s) substantially relate to the circumstances of the particular job.”⁵⁰

Milwaukee Water Works provided a summary of workforce positions, demographics of the workforce, and salaries by occupation. The Department of Public Works (DPW) provided total employment but not a breakdown by race and gender.

The most recent data by race and gender are based on total employment of 332 at Milwaukee Water Works. Of this, 120 employees are minority, which represents 36% of total employment. 74 employees are female, which represents 22% of total employment. As the table below shows, minorities are under-represented in all job titles except service maintenance.

Milwaukee Water Works - Employment by Race, Ethnicity					
	White	African American	Hispanic	American Indian	Asian
Officials and Administrators	16.5%	11.0%	13.3%	25.0%	0.0%
Paraprofessionals	3.3%	1.2%	16.7%	0.0%	0.0%
Professionals	16.0%	6.1%	10.0%	25.0%	33.3%
Service Maintenance	16.5%	53.7%	16.7%	25.0%	0.0%
Skilled Craft	18.9%	13.4%	30.0%	25.0%	33.3%
Technicians	22.2%	3.7%	3.3%	0.0%	33.3%
Administrative Support	6.60%	11%	10%	0%	0%

Pre-Employment Testing

Hiring policies include pre-employment testing which may present barriers to employment such as Civil Service Exam, drug screening, and background checks that include conviction reviews. First time employees of the City of Milwaukee must pass a pre-employment medical examination and a drug test.

EXAMINATIONS

The City of Milwaukee conducts merit-based hiring and administers an exam to job applicants to determine merit. Individuals who pass the exam are ranked and put on an eligible list. The ranked list of eligible candidates is provided to the hiring department which selects individuals for departmental interviews.

According to the City of Milwaukee City Civil Service Rules, all examinations shall be:

- Based upon actual job tasks to be performed and/or knowledge, skills, and abilities required to perform job tasks,
- Developed in such a manner as to establish the relationship between knowledge, skills, and abilities required for successful performance on the test and knowledge, skills, and abilities required for successful performance on the job.⁵¹

DRUG TESTS

The drug screening test is especially relevant to water-related occupations since it is required for all employees who are:

- directly responsible for assessing and preventing **environmental** and other health hazards;
- responsible for activities related to the quality, distribution, and safety of potable **water**.

DRIVER'S LICENSE

The City of Milwaukee obtains driving records from the State of Wisconsin Department of Motor Vehicles (DMV). The City ensures that candidates for positions requiring a valid driver's license meet the requirement.

RESIDENCY REQUIREMENT

Several water-related positions in the City of Milwaukee continue to be subject to a residency requirement. According to the City of Milwaukee Civil Service Rules, the following positions require the employee to meet the residency requirement:

- Water Distribution Utility Investigator
- Water Field Supervisor in the Department of Public Works, Milwaukee Water Works
- Sewer Field Investigator and Sewer Crew Leader in the Department of Public Works

TARGETED HIRING

Residents Preference Program

The City of Milwaukee's Residents Preference Program (RPP) is the region's most prominent targeted hiring program to promote local hiring and racial diversity on projects that receive public funding. Public works projects that receive more than \$1 million in City funding must comply with RPP rules. The program enables unemployed or underemployed city residents to gain access to construction employment opportunities. Under RPP, 40% of hours worked on public works contracts must be completed by city residents who meet specific unemployment or underemployment qualifications.

The 40% resident participation requirement is being met for most public works contracts. The Department of Public Works found that 67% of the active RPP workers were people of color, while only 17% of the non-RPP workers employed on public works projects during the same period were people of color.

Wages for these construction positions are higher than average wages and most positions do not require a college degree. The initial construction experience can be a stepping stone to apprenticeships which lead to journey worker status. The construction industry offers family-supporting jobs and a pathway to the middle class.

Residents from high poverty zip codes

Of the total hours completed by RPP workers, 25% must be worked by RPP workers from high poverty zip codes.⁵²

Projects with apprenticeship requirements must award 40% of apprentice hours to workers living in high poverty zip codes.

High poverty zip codes defined by the City of Milwaukee are: 53204, 53205, 53206, 53208, 53210, 53212, 53215, 53218, 53233.⁵³

Transitional Jobs Program

The Transitional Jobs Program offers paid employment to unemployed residents of the city of Milwaukee and a subsidy to the companies who employ the participants. The program is funded by the State of Wisconsin-Department of Children and Families. The objective of a transitional job is to provide a pathway to full-time, unsubsidized employment.

Most of the participants in City's Transitional Jobs Program are employed in the Department of Public Works.

Transitional Jobs help individuals overcome employment barriers and transition into work by using wage-paid, short-term employment that combines real work, skills training, education and supportive services.

In order to be eligible for Transitional Jobs Program, an individual must be a resident of Milwaukee County who is 18 or older and has been unemployed for the last 4 consecutive weeks. The participant must be below 150% of the poverty rate.

Since 2014, more than 2,000 individuals have been placed in transitional jobs. Over 90% of program participants are ex-offenders.

MILWAUKEE METROPOLITAN SEWERAGE DISTRICT

All policies of MMSD are established and enforced by the MMSD's Commissioners. It is the goal of MMSD that the workforce reflects the demographic balance of the service area.

Affirmative Action Plan

The agency's Affirmative Action Plan provides detailed data on the composition of its workforce.⁵⁴ Of the total workforce:

- 81% of employees are white
- 19% of employees are minority
- 40% of employees are female

The minority share of employment at MMSD does not reflect the minority share of Metro Area population, which is 33%. The female share of the MMSD workforce has increased slightly (from 35% to 40%) over the last 10 years but it has not reached parity with female share of the population.

MMSD also reports on the racial and gender composition of their workforce by Job Titles. The greatest gender imbalance is in office and clerical positions. The greatest racial imbalance is in professional positions.

MMSD Positions by Race and Gender						
	Service & Maintenance	Office & Clerical	Technicians	Professional	Officials	Total
Total	4	24	67	111	19	225
% Minority	50%	29%	18%	16%	21%	19%
% Female	25%	92%	28%	38%	42%	41%

MMSD acknowledged these gaps in the Affirmative Action Report and highlighted the following strategies to increase workforce diversity:

- Increase education of MMSD's hiring managers regarding the benefits of a diverse workforce
- Attend job fairs that specifically target minority populations
- Partner with educational institutions and training agencies, especially those that serve women and minorities
- Advertise jobs with minority associations
- Develop co-op and internship opportunities
- Continue training for employees on diversity and anti-discrimination laws (including discriminatory harassment).
- Gather and analyze exit interview data to identify barriers to attracting and retaining minority and female employees

TARGETED HIRING

Targeted Area Program

This is an established a policy for construction contracts to promote local hiring. The Targeted Area Program stipulates that 45% of workers on qualifying projects reside in the MMSD's service area. MMSD reports that on average, local workers work more than 50% of hours on all MMSD construction projects each year.

Apprenticeship Utilization

MMSD established an apprenticeship utilization requirement for construction contractors. The goal of this program is to train, place, and retain "nontraditional participants" in construction jobs and construction apprenticeships. Non-traditional participants are understood to mean representatives of demographic groups that are under-utilized in construction sector, this includes women and minorities.

MMSD may require a contractor to hire the maximum number of apprentices permitted by law on contracts of more than \$1 million. Contractors are encouraged to use WRTP/BIG STEP to recruit apprentices.

VEOLIA WATER MILWAUKEE

Veolia is contracted by MMSD to operate and maintain the Jones Island and South Shore water reclamation facilities. Veolia provided information on workforce composition and salaries by title but did not provide information on racial and gender breakdown by position.

Veolia employs 216 people, of which 80% are white, 13% are African American, 6% are Hispanic and 1% are Asian.

PROCUREMENT

This section provides information on hiring and procurement policies for utilities and municipal agencies. This includes targeted hiring policies and procurement policies that relate to Small, Women, Veteran, and Minority Business Enterprises (SWMBE).

Public Procurement

Public procurement is a transparent process. There is an expectation that procurement will add social value to the contracting process, for example, by awarding of contracts to minority and women-owned business enterprises. Public procurement often requires a certain percentage of contracts to be awarded to minority and women-owned businesses.

Private Procurement

Private procurement refers to procurement practices of privately-owned companies. Private sector procurement is not as transparent because it is not regulated in the way that public procurement is. Private companies do not need to publish their contract awards in the same way that public entities do.

CITY OF MILWAUKEE

Spending on capital projects related to City water and sewers is estimated to be nearly \$80 million in 2022.⁵⁵ One potential benefit of public investments in water and wastewater infrastructure is providing contracting opportunities to small, minority and women owned businesses.

The following city programs assist local business enterprises, small business enterprises and socially-responsible contractors.

Incentives for Local and Small Business Enterprises

Local Business Enterprises can be awarded a contract with the City if their bid does not exceed the lowest bid by more than 5% and the difference does not exceed \$25,000.

If the LBE is also certified as a Small Business Enterprise (SBE) it may be awarded the contract provided its bid does not exceed the lowest bid by more than 10% and the difference does not exceed \$30,000.

The City of Milwaukee's Office of Small Business Development certifies SBE's and assists these businesses in obtaining contracts with the city. It provides financial assistance, training, and educational programs – including mentoring programs.

Socially-Responsible Contractors Ordinance

City of Milwaukee adopted a new procurement policy in 2018. The purpose of this ordinance is to ensure that socially-responsible contractors are recognized and rewarded. It gives an incentive to bids from contractors who hire felons, help workers earn high school diplomas, or provide other “socially responsible” employee incentives.⁵⁶ All formal competitive bids and purchases over \$50,000 are subject to the ordinance.⁵⁷

To qualify for the city's socially-responsible contractor ordinance, employers can:

- Hire people with felony convictions
- Help employees earn high school diplomas
- Provide internships, job shadowing, on-the-job training or similar opportunities
- Help employees obtain instruction and training in math, construction and budgeting
- Help employees obtain driver's licenses, transportation vouchers, work clothes and safety gear, legal aid, career training, school supplies and other benefits
- Provide breast-feeding centers for employees who are nursing children.
- Provide a minimum of 120 hours of paid sick leave or a minimum of 5 paid sick days.

MILWAUKEE METROPOLITAN SEWERAGE DISTRICT

MMSD has specific goals in order to promote supplier diversity in its contracting. The agency aims to spend 20% of all its procurement with SWMBE firms annually. MMSD reported that they exceeded this goal in the past five years.

SWMBE firms, once certified, are included in the MMSD Vendor Directory and receive notification of procurement opportunities. Their Business Capacity Development Program provides training and mentoring to SWMBE firms to help them bid on MMSD contracts.

Awarded contracts

In 2018, MMSD awarded contracts totaling \$63 million. According to the MMSD 2018 Annual Performance Report, more than 20% of contract dollars went to Disadvantaged Business Enterprises (DBE) and more than 50% went to local companies.

Companies that are awarded contracts with MMSD are required to report on their workforce, including minority and gender status. MMSD provided detailed information on 22 companies that were awarded \$33 million in MMSD contracts in 2018. These 22 companies employed a total of 19,935 people. Of the total employed in these companies, 17% were minorities and 28% were female.

VEOLIA WATER MILWAUKEE

Veolia does not provide incentives in the bidding process to small, minority and women-owned businesses. SWMBE companies compete in the procurement process on an equal basis with all business enterprises.

Data provided by Veolia show 215 Metro Area companies have registered with Veolia as SWMBE Vendors. Of the 215 companies, 45% were Minority Business Enterprises and 55% were Small Business Enterprises under nonminority ownership.

In 2018, 46 SWMBE Vendors were awarded contracts with Veolia. Of these 46 contracts, 78% were awarded to Small Business Enterprises owned by non-minorities, either male or female. 22% were awarded to Minority Business Enterprises.

PATHWAYS TO WATER-RELATED JOBS

When manufacturing jobs dominated the US economy, only one-third of entry-level jobs required some college. Now nearly two-thirds of jobs require some college⁵⁸. Given rising educational requirements, workers must be attuned to which jobs are accessible based on a given level of education.

The Center on Education and the Workforce at Georgetown University has provided a framework to think about pathways to good paying jobs in the U.S. The pathways are: High School pathway, Middle-skills pathway and bachelor's degree pathway. The key water-related occupations highlighted earlier in the report can be categorized according to these three pathways.

HIGH SCHOOL PATHWAY

The *High school pathway* provides access to jobs that require a high school diploma. Many of these jobs require some previous work experience.

A large share of the population has a high school diploma or less. The wages for workers with this level of education lag significantly behind the median wage. Most family-supporting jobs require more than a high school diploma.

- 39% of US workers over the age of 25 years have a high school diploma or less.
- The median annual wage for workers with a high school is \$27,020.
- The national median wage is \$38,640.

Several water-related occupations are both accessible to those with a high school diploma and pay higher than average wages.

OCCUPATIONS THAT ARE ACCESSIBLE WITH HIGH SCHOOL DIPLOMA

More than half of workers in the following water-related occupations have a high school diploma or less. Many of these occupations are entered through apprenticeship (see list below). Some of these occupations can be entered directly, such as Landscaping and Groundskeeping workers.

An apprenticeship is a collaboration between an employer and a labor union and a trainer (which could be the labor union or a Technical College). Apprenticeships provide structured training in accordance with the Bureau of Apprenticeship Standards. They combine classroom instruction with ***paid*** on-the-job training. An apprenticeship provides a clear pathway from apprentice to journeyman. A journeyman is a nationally recognized certification with master level skills and provides a near-guarantee of living wages and employability.

Apprenticeship Programs that are connected to water-related occupations include: ⁵⁹

- Construction Trades apprenticeships
 - Laborer
 - Environmental Systems Technician
 - Heavy Equipment Operator

- HVAC Installer-Technician
- Operating Engineer
- Pipelayer
- Plumber
- Roofer and Waterproofer
- Sprinklerfitter
- Steamfitter
- Utility trade apprenticeships
 - Metering Technician
 - Wastewater Treatment Plant Operator
- Industrial Trades apprenticeships
 - Industrial Pipefitter
 - Maintenance Technician

HIGH WAGES AND HIGH GROWTH

The following water-related occupations pay higher than average wages: Pipefitters, Steamfitters, Hazardous Materials Removal Workers, Operating Engineers and other construction equipment operators, and Construction Laborers. They are also projected to have higher than average employment growth.

Water-related occupations with higher than average entry wages - Wisconsin⁶⁰

Occupation	Entry Wage
Landscaping and Groundskeeping Workers	\$23,870
Plumbers, Pipefitters, and Steamfitters	\$47,120
Operating Engineers and Other Construction Equipment Operators	\$49,430
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	\$43,990
Environmental Scientists and Specialists	\$39,170
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	\$32,080
All Occupations in Wisconsin	\$22,680

METRO MILWAUKEE WATER-RELATED OCCUPATIONS ACCESSIBLE WITH HIGH SCHOOL DIPLOMA

The occupations in the table below combine higher than average hourly wages and higher than average projected growth. The occupations that are forecast to experience significant growth in the metro area are: Plumbers, Pipefitters, Steamfitters; Operating Engineers and other construction equipment operators; Hazardous Materials Removal Workers and Construction Laborers. (While Landscaping and Groundskeeping workers are projected to see the highest growth, these occupations pay lower than average wages.)

Milwaukee Metro Area Employment Projections 2016-2026 ⁶¹				
Occupation	2016 Employment	Projected Employment (2016)	% Change (2016-2026)	Total Annual Openings
Environmental Science and Protection Technicians	110	118	7.3%	14
Construction Laborers	3236	3702	14.4%	396
Operating Engineers and Other Construction Equipment Operators	1600	1787	11.7%	202
Plumbers, Pipefitters, and Steamfitters	1835	2075	13.1%	225
Hazardous Materials Removal Workers	157	166	5.7%	19
Total, all occupations	885,838	936,257	5.7%	104,245

PROFILE OF TWO HIGH SCHOOL PATHWAYS

Pathway: Water Meter Technician to Water Meter Specialist

Individuals with a high school diploma can apply for Water Meter Technician positions with the City of Milwaukee. The city employs a total of 22 full-time Water Meter Technicians. This position requires a high school diploma or equivalent and basic plumbing skills and knowledge, which can be attained in high school. The starting wage is \$39,220 per year, above the median wage for all occupations.

After several years of employment, a Water Meter Technician generally has the necessary experience to advance to the position of Water Meter Specialist. The City employs a total of six full-time Water Meter Specialists. This position requires a high school diploma or equivalent, plus two years of experience in water meter repair or related repair techniques, which can be gained as a Water Meter Technician. The starting wage for this position is \$42,187 per year.

Pathway: Water Utility Laborer to Water Repair Worker

An individual with a high school diploma or equivalent is eligible to apply for a position in the City's Department of Public Works (DPW) as a Water Utility Laborer. DPW employs a total of 25 full-time Water Utility Workers. The starting wage for this position is \$ 37,502, above the median wage for all occupations.

After two years on the job, a Water Utility Laborer may advance to a position as a Water Repair Worker. DPW employs a total of 36 full-time Water Repair Workers. This position requires a high school diploma or equivalent plus a minimum of two years of underground construction experience and operation of heavy equipment. The starting wage for Water Repair Worker positions is 45,327.

Descriptions of additional pathways can be found in the Appendix.

MIDDLE SKILLS PATHWAY

The *middle-skills pathway* provides access to jobs for individuals with an Associate's degree, postsecondary certificates or licenses, as well as those participating in Apprenticeships. This pathway leads to skilled technical jobs and traditional blue-collar jobs. **24% percent of all good-paying jobs** in the U.S. are accessible through the middle-skills pathway.⁶²

The following water-related occupations fall in the Middle Skills Pathway: Environmental Scientists and Specialists, Environmental Science Protection Technicians, Environmental Engineering Technicians, Water and Wastewater Treatment Plant and System Operators.

TECHNICAL DEGREES AND ASSOCIATE'S DEGREES

These degrees are pursued at Technical Colleges. Technical Degrees in Preparatory Plumbing, Boiler Operator and Power Engineering can provide a pathway to water-related occupations. Associate's Degrees in the following fields can provide a pathway to water-related careers: Environmental Health and Water Quality Technology, Environmental Sciences, Environmental Engineering, Water and Wastewater Technology, Water Quality Technology, Civil Engineering Technician, Civil Engineering Technology-Fresh Water Resources.

- Environmental Health and Water Quality Technology
- Civil Engineering Technician (Structural Engineering)
- Preparatory Plumbing
- Boiler Operator
- Power Engineering

POSTSECONDARY CERTIFICATES AND LICENSES

Technical Colleges, Workforce Development Agencies, and Community based Organizations can provide structured on-the-job training. Several Milwaukee agencies provide on-the-job training that is specific

to a water-related occupation. This training can be paid or unpaid and generally leads to a recognized certification or license. On-the-job training that is connected to water-related occupations includes:

- Herbicide Applicator's License
- National Green Infrastructure Certification
- Water Technician Certificate
- Boiler operators Certificate

An example of on the job training for water-related occupations is Cream City Conservation's Green Infrastructure Training. The four-month training program is paid. Upon completion, participants may earn the following accreditations: chainsaw certification, Herbicide Applicator's License and the National Green Infrastructure Certification.

THE BACHELOR'S DEGREE PATHWAY

The *Bachelor's degree pathway* provides access to fields that require a bachelor's degree or higher. Demand for workers with at least a bachelor's degree is rising. **56% of good-paying jobs** now require a bachelor's degree or higher.⁶³

The following water-related occupations require a bachelor's degree or higher: freshwater scientists, conservation scientists, hydrologists, engineers (civil, environmental, water resources, architectural); lawyers (environmental, water).

Bachelor's Degrees that provide a pathway to these careers include: Engineering (Environmental and Civil), Freshwater Sciences, Waste Management, Conservation Science, Environmental Science, Integrated Natural Sciences.

Master's and Doctoral Programs in the following fields lead to water-related careers: Freshwater Sciences, Engineering (Environmental, Water Resources, Civil Engineering), Environmental Law, Water Law.

INVENTORY OF EDUCATION AND TRAINING PROGRAMS

Local educational institutions, workforce development programs, and community organizations create pathways to water-related jobs. They provide certifications, licenses, and degrees through a variety of academic and other training programs. UWMCED gathered information on university, technical college, and on-the-job training opportunities connected to the water sector. Our sources included published reports along with interviews of, and existing data from, key area utilities, private companies, labor representatives, universities and schools, and nonprofit organizations.

WORKFORCE TRAINING

Workforce development organizations, community organizations, and apprenticeship programs provide on-the-job training in the Milwaukee Metro Area. These agencies provide a range of services that help vulnerable populations to enter a pathway to employment. Many participants in workforce development programs face significant barriers to employment. Research from the Public Policy Forum provides a snapshot of the barriers faced by participants in Milwaukee's Workforce Development Programs. Of the 8,669 individuals who participated in workforce development programs:

- 23% lacked High School Degree/HSED/GED
- 50% lacked Driver's License
- 60% of the male participants had criminal background
- 19% of the female participants had criminal background
- 39% of participants had more than one barrier to employment⁶⁴

WORKFORCE DEVELOPMENT ORGANIZATION

EMPLOY MILWAUKEE

Employ Milwaukee is the state-certified Workforce Development Board (WDB) serving Milwaukee County. It serves unemployed and under-employed workers. Through its partnerships with business, industry, government and education and training programs, Employ Milwaukee aims to connect these individuals to employment opportunities. The organization works with partners to design education and training opportunities in targeted high-growth sectors. Its objective is to help provide a skilled and diverse workforce for regional businesses.⁶⁵ It provides programs for Youth and Adults and wrap-around services for individuals with specific barriers to employment.

WRTP/BIG STEP

WRTP/Big Step offers a bridge from high school to the skilled trades. It works closely with the Construction Trades to help prepare individuals for apprenticeships. The preparation includes individualized plans, including classroom and on-the-job training, to prepare for the Apprentice Test. The organization also provides case management services. Its aim is recruit and train a diverse

workforce for construction, manufacturing and emerging industries. Participants in training programs must be at least 18 years old, have a high school diploma or equivalent and a valid driver's license.⁶⁶

UMOS - UNITED MIGRANT OPPORTUNITY SERVICES

UMOS is the lead of Milwaukee County Transitional Jobs Program which offers transitional jobs to unemployed, low-income adults, including formerly incarcerated individuals. Transitional jobs are temporary, paid positions in local companies and city departments. The employer receives a state subsidy to hire the transitional employee. Ideally, the employee will move into a permanent, unsubsidized position after the 6 month transitional job has ended.

COMMUNITY BASED ORGANIZATIONS

Several Milwaukee area community organizations provide workforce training that leads to employment in water-related jobs. Four examples are provided below: Blue Skies Landscaping Program, Cream City Conservation, Milwaukee Job Works and Groundwork Milwaukee.

BLUE SKIES LANDSCAPING PROGRAM

Blue Skies Landscaping is a social enterprise started by the non-profit organization, Walnut Way Conservation Corp. Blue Skies provides landscaping services for residential, municipal, and commercial properties. The earned revenue provides financial support for the training program. The team installs and maintains traditional landscaping and GI. Half of its employees are employed for the summer season only.

Blue Skies trains and employs individuals from the community who have barriers to employment. These individuals become mentors to neighborhood youth.

Certified training includes the National Green Infrastructure Program and Landscape Horticulture Training. Additional training is provided in small engine maintenance and repair.

CREAM CITY CONSERVATION

Cream City Conservation provides paid training and work experience to Milwaukee County residents, aged 16-24 years. Cream City Conservation recruits individuals from vulnerable communities, such as "Promise Zones," which are the most marginalized neighborhoods in Milwaukee. Participants must meet at least one of the following conditions: low income, foster youth, youth offender, disabled youth, migrant youth, or child of an incarcerated parent. The youth are trained in conservation, agriculture, and GI.

Upon completion of the training, participants receive certifications in:

- Chainsaw certification
- Herbicide Applicator's License (Test administered by Department of Natural Resources)
- National Green Infrastructure certification (in partnership with MMSD).

MILWAUKEE JOBS WORK

Milwaukee Jobs Work is a collaboration between business and community leaders. The organization provides career readiness workshops to individuals from vulnerable communities, including a 35 hour training program in soft skills and job readiness. Incoming participants complete a “trauma screening” which helps to inform what wrap-around services the organization provides. The organization’s objectives are job placement and job retention and advancement. Milwaukee Jobs Work maintains long-term contact with the individuals that they train and on-going mentoring services.

GROUNDWORK

Groundwork provides workforce training programs in the environmental field. Participants can start in middle school and continue to participate in Groundwork programs through high school and young adulthood. While Groundwork does not presently offer certifications, they are working with their national body, Groundwork USA, to establish them for their training programs.

The organization operates several training programs. The Young Farmers Program had 79 participants in 2018. It educates the middle schoolers in gardening. Students grow and sell produce, while learning agricultural and financial skills. The Green Team provides service-learning to 30 high school-aged participants. Students learn environmental leadership and GIS skills through Groundwork projects, and mentor neighborhood youth. The Young Adult Green Team targets 18-25-year-olds and provides year-round employment in Environmental Stewardship and Community Development.

MMSD PROGRAMS IN WORKFORCE DEVELOPMENT

MMSD’s Fresh Coast Ambassadors Pilot Program: This program is a partnership between MMSD, Cream City Conservation and Employ Milwaukee. Participants in the program are residents (aged 14-24 years) of the 30th Street Corridor and Kinnickinnic River neighborhoods. They are introduced to water industry careers, watercourse issues, and green infrastructure.

MMSD’s Internship program hires at least 30 interns and co-op students for a summer term. The interns and co-ops work in Water Quality Protection, Laboratory Services, Engineering, Construction, and Sustainability. MMSD has hired several former intern participants as permanent MMSD employees.

The RISE program is a partnership between MMSD and Prism Technical. Participants are college engineering students who attended high school or are currently residing in the MMSD service area. Students receive paid work experience and build relationships with MMSD service providers (construction contractors, engineering designers, consultants, and planning firms) that may provide post-graduation employment opportunities.

APPRENTICESHIP

An apprenticeship provides a structured pathway to jobs in the skilled trades. These occupations pay high wages and provide reliable employment. The apprenticeship is a nationally recognized

accreditation and is often sometimes referred to as “the other four-year degree” because the depth of training.

Apprentices acquire a portion of their skills in a traditional classroom setting, but most of their training is on-the-job. Apprentices receive good wages while working for an employer in their chosen trade. Classroom instruction is usually provided through the Wisconsin Technical College system. Upon completion of an apprenticeship, participants receive a nationally recognized completion certification.

Apprenticeship is an industry partnership between an employer, state agencies, and labor unions. It creates career pathways in which the apprentice can move from entry level positions to higher-paid, more specialized positions in the unionized workforce.

Apprenticeship can lead to short-term industrial or occupational certificates which enable the participant to access entry-level skilled jobs. Apprenticeship may also lead to a 1 or 2-year technical diploma which enables participants to access an entry-level technical job.⁶⁷

PATHWAY TO APPRENTICESHIP: PRE-APPRENTICESHIP TRAINING, APPRENTICE TEST, LETTER OF OFFER, APPRENTICESHIP

The path to an apprenticeship often begins with a pre-apprenticeship program which provides job readiness skills and wraparound support. It also provides introductory technical skills and additional skills in math and literacy. Participants attend classes and engage in hands-on training opportunities. Pre-apprenticeship programs are an important tool that enables members of historically underrepresented groups to enter and succeed in the construction trades.⁶⁸ Participants need a high school diploma or GED.

“Pre-apprenticeship programs are an important tool that enables members of historically underrepresented groups to enter and succeed in the construction trades. Indirectly, these programs also provide recruitment, screening, and training services for the construction industry.”⁶⁹

The next step is to take the Apprentice Test, which includes basic reading and math. Once an individual passes the test, he or she will receive letter of introduction which allows the individual to start as an apprentice. With the letter of introduction, the apprentice can go to any company on the list of contractors to request a position as an apprentice or be put on the “Candidate” list and wait to be called. Some apprenticeships may have a significant wait time due to high demand.

APPRENTICESHIP: TRAINING AND ADVANCEMENT

Once an individual is accepted as an apprentice by a contractor, s/he will begin the years of training that, if completed, will lead to Journeyman status. The training process may last four or five years. As indicated above, training is comprised of a certain number of hours of classroom instruction and on-the-job training, both of which are paid. While apprentices are taking the classes and working on the job site, they continually advance. After completing each year of apprenticeship, they receive a pay increase. Upon completion of this process, the individual becomes a journey worker.

PARTNERS

- Workforce Development Organizations
 - W RTP/Big Step - Pre-Apprenticeship Programs.
- Technical Colleges
 - Wisconsin Technical Colleges offer the following water-related apprenticeships
 - Wastewater Treatment Plant Operator
 - Plumbing
 - Arborist
 - Environmental Service Technician
 - Industrial pipefitter
 - Refrigeration and Air Conditioning
 - Sprinkler Fitter
 - Steamfitter

Water-related apprenticeships are connected to the following trades

- Construction Trades Apprenticeships
 - Laborer
 - Environmental Systems Technician
 - Heavy Equipment Operator
 - HVAC Installer-Technician
 - HVAC Installer-Technician
 - Operating Engineer
 - Plumber
 - Roofer and Waterproofer
 - Sprinklerfitter
 - Steamfitter
- Utility Trade Apprenticeships
 - Metering Technician
 - Wastewater Treatment Plant Operator
- Industrial Trades Apprenticeships
 - Industrial Pipefitter
 - Maintenance Technician

Examples:

Wastewater Treatment Plant Operator apprenticeship. The apprenticeship position requires approximately 6,000 hours (three years), including 432 hours in classroom instruction and 5,568 hours of job training.

Plumbing apprenticeship. There are both pre-apprenticeship and apprenticeship programs in plumbing. The apprenticeship program requires approximately 8,000 hours of job training (five years) in which a minimum of 500 hours must consist of classroom instruction. Upon completion, the apprentice must take the plumbers journeyman examination.

ACADEMIC PROGRAMS

TECHNICAL COLLEGE PROGRAMS

Milwaukee Area Technical College (MATC)

- Associate Degree
 - Environmental Health and Water Quality Technology
 - Civil Engineering Technician (Structural Engineering)
- Technical Diplomas (two semesters)
 - Preparatory plumbing
 - Boiler Operator
 - Power Engineering
- Certificates
 - Water Technician Certificate
 - Boiler operators

Gateway Technical College – Kenosha, WI

- Associate Degree
 - Civil Engineering Technology-Fresh Water Resources.

Moraine Park Technical College – Fond du Lac, WI

- Associate Degree
 - Water Quality Technology.
 - Civil Engineering Technician (Structural Engineering).

Northeast Wisconsin Technical College - Green Bay, WI

- Associate Degree program
 - Environmental Engineering Water and Wastewater Technology

OTHER CERTIFICATION PROGRAMS

Wisconsin Department of Natural Resources provides an online training course for water plant operators.

Through the Water Environment Federation (WEF), MMSD provides training for the National Green Infrastructure Certification Program (NGICP), a national certification standard for green infrastructure construction, inspection, and maintenance employees. To earn the certification, students with a high school diploma must complete 35 hours of course material and pass an exam.

UNIVERSITY PROGRAMS

There are several University based programs which provide degree and non-degree training to prepare individuals for water-related employment. While this study is primarily focused on the Milwaukee Metro Area, this listing of academic programs includes colleges and universities from outside southeastern Wisconsin. A comprehensive inventory of Academic Programs connected to the water sector can be found in the Appendix.

Alverno College – Milwaukee, WI

- *Bachelor's Degree in Environmental Science or Integrated Natural Sciences*
- *Dual Degree with University of Wisconsin Milwaukee Master of Science in Freshwater Sciences and Technology.*

Carroll University – Waukesha, WI

- *Bachelor's degree programs*
 - Civil Engineering
 - Environmental Science
 - Freshwater Sciences – in partnership with UWM

Concordia University - Mequon, WI

- *Bachelor of Science Programs*
 - Environmental Science
 - Integrated Natural Sciences
 - Partnership with MATC - Environmental Health and Water Quality Technology.

Marquette University

- *Law School*
 - *Environmental Law*
 - *Water Law*

- *School of Engineering*
 - *Environmental and Water Resources Engineering*
- *Global Water Center*
 - Marquette coordinates programming Global Water Center programs in following departments:
 - Engineering, Physics, Biology, Math, Education, Computer Science, Chemistry.

Milwaukee School of Engineering (MSOE)

- *Bachelor's Degree in Engineering (Civil, Architectural)*
- *Master of Science in Civil Engineering – emphasis on Environmental and Water Resources Engineering*

Purdue University Global - Milwaukee Campus

- *Bachelor's degree programs*
 - Environmental and Ecological Engineering
 - Agricultural and Biological Engineering Department
 - Agricultural Engineering
 - Environmental and Natural Resources Engineering
 - Environmental Geosciences
 - College of Agriculture
 - Aquatic Sciences
 - Soil and Water Sciences

University of Wisconsin-Milwaukee (UWM)

- *Master's Degree and PhD Programs – Freshwater Sciences*
- *Bachelor's degree in Conservation and Environmental Science - Water Resources concentration*
- *UWM College of Engineering and Applied Science*
 - Water Resources Laboratory focuses on water quality research
- *Certificates*
 - *Applied Urban Aquaculture*
 - *Water Technology*
- *Water SYS-STEM Internship*
 - Summer internship for Technical College students

University of Wisconsin - Stevens Point

- *Bachelor's Degree in Waste Management.*

University of Wisconsin-Whitewater

- *Bachelor's Degree in Integrated Science and Business -emphasis on Water*
- *Bachelor's Degree in Biological Sciences, Chemistry, Environmental Science*

UNIVERSITY-AFFILIATED PROGRAMS

UW Freshwater Collaborative

This new initiative represents 13 UW system campuses but will be led by UWM. The collaborative will focus on areas such as agricultural water management, Great Lakes restoration, and water business and finance. The Fresh Water Collaborative will lead to:

- 1,000 new undergraduate students studying water science;
- 400 new graduate research students;
- 100 new faculty, researchers and water professionals;
- A total of 650 new jobs.

UWM Water Equipment and Policy Center

The Center is housed within the UWM School of Freshwater Science and is a collaboration with Marquette University and local water related companies. It creates new products and processes in the water industry.

Marquette Law School- Water Law and Policy Initiative

This Law School Initiative focuses on the legal regulations surrounding water policies and issues. It has ongoing projects related to watershed issues, food-energy-water nexus, public policy and American drinking water, transboundary waters, energy and manufacturing partnerships. The program provides opportunities for low-income high school students to participate in workshops in water technology law and policy.

University of Wisconsin-Madison

UW- Madison provides professional development courses for professionals in the water sector. Programs in water distribution system and maintenance are offered.

BARRIERS/CONSTRAINTS TO ENTRY INTO THE WATER SECTOR

Water-related jobs may provide a significant opportunity for Milwaukee residents who have faced challenges in the labor market. However, vulnerable populations may be significantly disadvantaged in regional labor markets due to such factors as segregation, racial discrimination in hiring, mass incarceration, weak educational institutions, and lack of good transit connections to suburban job growth centers.

This section focuses on identifying barriers that keep minority, unemployed, and underemployed workers from entering the water workforce. Many of these barriers are not unique to the water sector. This report incorporates feedback from stakeholders on the personal, structural and cultural barriers that may prevent individuals from accessing training and/or employment.

DEFINITIONS

Milwaukee Water Commons (MWC) provided a framework for personal, structural and cultural barriers that may prevent vulnerable communities from accessing training and/or employment in the water sector. The principal factors that create such barriers include:

- income, age, race or ethnicity, citizenship status, language ability, and geographic location.

Vulnerable communities typically face many of these barriers. Vulnerable communities have historic or contemporary barriers to achieving economic and social opportunities and a healthy environment.

METHODOLOGY USED TO IDENTIFY BARRIERS

UWMCED and MWC conducted seventeen structured interviews with key stakeholder in the water sector. The complete list of interviewees can be found in the Appendix. Additionally, the Water Equity Taskforce (Taskforce) hosted two focus groups to gather feedback from community members who have an interest in this sector. During these interviews and focus groups, participants were asked to provide feedback on the barriers to training for water-related jobs and/or barriers to employment in water-related jobs. Interviews were transcribed. Note takers in Focus group sessions provided detailed records of participant comments. The barriers that were highlighted were organized by keyword and theme. The barriers were then ranked according to frequency of mention. This process led to a list of “key barriers.”

UWMCED presented the key barriers in presentations to the Taskforce. Feedback from the members of the Taskforce further informed the findings in this report.

Finally, UWMCED conducted an extensive review of literature on the water sector (see Bibliography). Publications that were reviewed provided important context and data that reinforced our findings related to barriers.

KEY BARRIERS

Based on feedback from interviews and focus group, as well as review of reports and data, UWMCED identified the following “key barriers” to training for and employment in water-related occupations.

- Job location/Access to Jobs
- Skills and Certifications Needed for Water-related Jobs
- Cultural Barriers
- Exposure to and Visibility of Water-related Jobs
- Characteristics of Water-related Jobs
- Lack of Diversity in Water-related Jobs
- Rigid Hiring Practices
- History of Incarceration

TRANSPORTATION BARRIERS

The most frequently cited barrier to jobs identified by key Stakeholders and focus group participants related to transportation. Transportation barriers may arise from the job location, the lack of public transit, the lack of a driver’s license, or a working vehicle. Such barriers affect vulnerable communities in all sectors, but certain factors are especially relevant to the water sector.

Access barriers isolate individuals in particular communities from economic opportunity. Most new jobs are located in areas that are not accessible by public transit. Residents of the City of Milwaukee face a “spatial mismatch”: the locations of available jobs often fail to align with the places where many jobless residents live.⁷⁰

The spatial mismatch is compounded by other factors, such as lack of personal vehicle and/or driver’s license, inadequate or non-existent public transit. Inner-city neighborhoods in Milwaukee include the most economically disadvantaged areas of the city. Economic disadvantage can prevent residents from being able to purchase a vehicle, maintain a vehicle, and obtain a driver’s license. 29% of households in Milwaukee's neighborhoods with high unemployment do not have access to a personal vehicle.⁷¹ Due to a history of segregation in Milwaukee, the areas with high unemployment and low vehicle access are predominantly minority neighborhoods.

The inability to access job opportunities is one of the factors leading to higher unemployment among inner-city residents. The unemployment rate in the City of Milwaukee is almost twice as high as the Metro Area unemployment rate. There is a pressing need for better transit linkages between Milwaukee’s inner city and outlying suburbs as one strategy to reduce the unemployment rate of city residents.

TRANSPORTATION BARRIERS IN THE WATER SECTOR

Veolia Water is a key employer in the water sector, employing 226 people. Its location on Jones Island makes it virtually inaccessible for those without access to a personal vehicle. The nearest bus stop is 2.7 miles from the location.

In many cases, apprentice training locations are not easily accessible. The Steamfitters Training Center is located 9 miles from downtown Milwaukee, requiring 2 buses and a ½ mile walk. The total one-way travel time from downtown is 1 hour. The Plumbers Local 75 is 14 miles from downtown, requiring 2 buses and a one-way travel time of more than an hour.

Six of the largest employers in Water and Sewer Line and Related Structures Construction are located outside the City of Milwaukee. These companies employ a total of 320 people. Their locations in Sussex, Pewaukee, and Big Bend are not accessible by public transit. Two of the four largest employers in Other Heavy and Civil Engineering Construction are located outside the City of Milwaukee. Three out of the four largest employers (representing nearly all the jobs) in Septic Tank and Related Services are located outside the City of Milwaukee. This pattern holds for most of the region's private water-related industries.

LARGEST EMPLOYERS IN SELECT WATER SECTOR INDUSTRIES		
Company	CITY	Employment
<i>Water and Sewer Line and Related Structures Construction</i>		
D F TOMASINI INC	SUSSEX	60
GLOBE CONTRACTORS INC	PEWAUKEE	60
E & W SEWER & WATER CONSTR INC	BIG BEND	50
LAYNE CHRISTENSEN CO	PEWAUKEE	50
RAWSON CONTRACTORS	PEWAUKEE	50
VISU-SEWER CLEAN & SEAL INC	PEWAUKEE	50
<i>Other Heavy and Civil Engineering Construction</i>		
PRO GREEN PLUS INC	MILWAUKEE	40
DE LUCA & HARTMAN CONSTR INC	WAUKESHA	30
MOORE CONSTRUCTION MANAGEMENT	MILWAUKEE	30
MORTENSON CONSTRUCTION CO	BROOKFIELD	25
<i>Site Preparation Contractors</i>		
ARNOLD'S ENVIRONMENTAL SVC INC	SAUKVILLE	24
DOC'S SEWER & WATER CO INC	BIG BEND	20
<i>Septic Tank and Related Services</i>		
ORCHARD RIDGE RDF	MENOMONEE FALLS	300
PORT-A-JOHN INC	GERMANTOWN	29

MILWAUKEE PORTABLE TOILET	MILWAUKEE	13
ABC SEWER & DRAIN CLEANING	MILWAUKEE	10
<i>Landscape Architectural Services</i>		
HOLMING FAN & FABRICATION	MILWAUKEE	30
INTERIOR SCAPES	MILWAUKEE	25
TREETOPS LANDSCAPE DESIGN INC	GRAFTON	25
NELSON DEVELOPMENT CORP MLWK	MILWAUKEE	15
TRIO ENGINEERING LLC	BROOKFIELD	12
FLORES AUTOMATION	MUSKEGO	11
PARKLAND LANDSCAPE MGMT LLC	WAUKESHA	10
WOODLAND LANDSCAPING	MILWAUKEE	10
<i>Landscaping Services</i>		
DAVID J FRANK LANDSCP CNTRCTNG	GERMANTOWN	300
BLUEMEL'S GARDEN & LANDSCAPE	MILWAUKEE	200
KEI	OAK CREEK	150
TRU GREEN	WAUKESHA	100
JOHNSON'S NURSERY INC	MENOMONEE FALLS	80
AMERICAN LANDSCAPE	MENOMONEE FALLS	75
AMERICAN SNOW PROFESSIONALS	MENOMONEE FALLS	75
BRET ACHTENHAGENS SEASONAL SVC	MUKWONAGO	75

DRIVER'S LICENSE

A driver's license represents much more than the ability to access a job. Having a driver's license may directly impact employability. For some employers, it may signal responsibility. The lack of a valid driver's license among individuals in low income communities is one of the biggest barriers to employment. In some cases (such as the City of Milwaukee and certain apprenticeship programs) a driver's license may be required simply to apply for the job. Some employers may review an applicants' driving record and use infractions as a means to filter or disqualify job applicants.

Driver's education is no longer part of the school curriculum, meaning that individuals may have to pay for private lessons. The cost of private driver's education is a barrier for low income populations. Even when a driver's license is obtained, economic disadvantage can continue to harm low income populations. Economic disadvantage can lead to driver's license suspension and revocation. Individuals caught driving with a suspended, revoked or invalid license may be fined. If the fine is not paid, the driver can lose driving privileges for up to two years.⁷²

In a 2015 study, UWM researchers found that driver's license recovery efforts were needed to help close the driver's license gap between blacks and whites. Given that many job openings in the Milwaukee region are not on bus lines and therefore inaccessible to individuals without a car or a valid driver's license, this is an urgent need.⁷³ According to the UWM Employment and Training Institute (ETI):

“Milwaukee central city youth, and particularly African American and Hispanic teens, too often enter the labor force handicapped by the lack of a driver's license...suburban teens most often obtained their licenses at age sixteen while few central city Milwaukee youth held licenses even by age eighteen.”⁷⁴

ETI found that 8% of African American male teenagers (16-17 years) have a probationary driver's license. This is in contrast to White Male teenagers (16-17 years), 47% of whom have a probationary driver's license.⁷⁵

Percent of 18 -year-olds with valid driver's license In Milwaukee's Inner City ⁷⁶		
	Female	Male
White	31%	36%
Black	22%	19%
Hispanic	16%	13%

The following feedback from key stakeholders and focus groups provides first-hand views of the transportation barriers:

JOB LOCATION

“The distance of employment opportunities restricts awareness of jobs.”

“People are physically separated from jobs because of geographic proximity.”

DRIVER'S LICENSE

“Driving infractions can be used a screening tool for employment.”

“Clean driving record may be used as a filter for applicants.”

“If you want to get a job in the manufacturing sector, you really have to live in the suburbs, because there's nothing in Milwaukee that's really accessible by bus.”

“The African American community is plagued with this driver's license problem.”

PUBLIC TRANSIT

“The bus doesn't drop off right here. If there was a better bus-line, I'm sure that would be better. I did hear some complaints about, “I can't get the bus. I've to get Uber.”

“It may take an hour or more to get to job if you have to take the bus.”

“Often job seekers don't have any money to get on a bus just to get to an interview.”

“If you have to wait two and a half weeks before you get your first paycheck, you may not have the money to get to work.”

BASIC SKILLS AND CERTIFICATIONS

Many water-related jobs are “entry-level” and accessible to individuals with a high school diploma or equivalent. Despite being considered entry-level, certain skills and certifications may still be necessary to obtain these jobs.

The requisite skills vary by occupation. Soft skills and basic knowledge of science and math are often necessary. Math skills were cited by interview respondents as the most significant “skill barrier” to water-related jobs. Stakeholders highlighted the need for more STEM (Science, Technology, Engineering and Math) instruction in middle and high school.

According to the Brookings Institution, 85% of people employed in water-related jobs do not have a bachelor’s degree.⁷⁷ Even though these jobs do not require a post high school education, many do require some type of work experience or training. 78% of water workers need at least one year of related work experience prior to employment, and 45% percent of water workers need at least one year of on-the-job training.⁷⁸

On-the-job training programs can provide this necessary work experience and may also lead to a certification. Certifications can help workers to gain relevant skills and knowledge and provide employers with certainty that the applicant is prepared for the job. However, getting a certification can require time and money, both of which present barriers to vulnerable populations.

HIGH SCHOOL DIPLOMA

A high school diploma is a minimum requirement for all water-related occupations, except landscaping. In Wisconsin, lower high school graduation rates in vulnerable communities means that individuals are less likely to possess this basic requirement to enter water-related occupations.

White students in Wisconsin had a 93% graduation rate in 2016 – the third highest in the country. The graduation rate for Black students was 62% - the second lowest in the country.⁷⁹

BASIC EDUCATIONAL SKILLS

Entry-level water-related jobs require certain skills, particularly in the areas of math, science and English. Stakeholders highlighted basic educational skills that should be attained in high school including:

- Math
- Reading

- Basic Plumbing
- Basic Science – including knowledge of hydraulics principles, water and ventilation systems

Disparities in reading and math continue to be an issue in the state of Wisconsin. The achievement gap between white and minority students has narrowed, but that is due more to a drop in scores among White students. Recent data show that:

- 12% of black third-graders are proficient in reading and 15.7% are proficient in math
- 46.1% of white third-graders are proficient in reading and 58.5% in math
- 8% of black seventh and eighth-graders are proficient in math.⁸⁰

If these basic skills are gained through high school coursework and/or work experience, even entry-level jobs in the water sector can be inaccessible to high school graduates.

Accessing opportunities in the skilled trades (e.g., Operating Engineers, Plumbers, Laborers) requires the passing of pre-Apprenticeship and Apprentice Tests. Stakeholders reinforced the need for basic skills in English and Math to pass these tests. If high school graduates do not have basic math, science, and English skills, they face a barrier to apprenticeship—and, ultimately, employment. According to one stakeholder: “pre-college math is the stumbling block to success in Trades training.”

SOFT SKILLS

Stakeholders pointed to the need for soft skills to obtain and retain employment. These skills include interview skills, communication skills, the ability to get along with colleagues, reliability, and punctuality. Some of these skills can be difficult to define or measure. Biases or stereotypes may affect the assessment of an employees’ soft skills. Many workforce development organizations and community organizations provide soft skills training in addition to specific job skills training.

TECHNICAL SKILLS

As the level of technology in the water sector increases, there will be a greater requirement for computer technology training and experience. Stakeholders believe that technology-related occupations are the ones that will grow and that the water sector will increase its use of sophisticated technology, meaning the water workforce will increasingly need technological skills. There will be an evolving set of qualifications for future job candidates.⁸¹

Given the rising need for technical skills, occupations that used to be open to individuals with lower skilled workers may become more difficult to enter.⁸²

CULTURAL BARRIERS

Biases or stereotypes may affect the assessment of an employees’ skills. Literature suggests that factors such as hair, clothing and language may function as a barrier to employment. Focus groups discussed barriers faced by minority employees in sectors that are primarily white. These barriers are perpetuated by a lack of understanding between employers and jobseekers, especially jobseekers from diverse

communities. A stakeholder spoke of the need for employers to adapt and become more culturally-competent, in order attract a diverse workforce.

According to one recent study, discrimination against African American job applicants has not shown improvement in 25 years. At the level of hiring, African Americans are substantially disadvantaged relative to equally qualified whites. The researchers argued this was due to racial bias in hiring decisions. They recommended active intervention, such as training in unconscious bias, to address hiring discrimination.⁸³

The Congressional Black Caucus recently issued a report on barriers to jobs in water and wastewater. They cited racism and nepotism, as well as non-inclusive unions, as barriers to employment in the sector.⁸⁴

EXPOSURE TO AND VISIBILITY OF WATER-RELATED JOBS

Stakeholders noted the limited visibility of occupations in the water sector and expressed a need for strategies to raise awareness of job opportunities, especially among under-represented groups. Many water-related jobs are “out of view.” Indeed, some of these jobs are “underground.” Water and wastewater facilities and the people who work at such places are invisible to most people.

If these jobs are out of view, individuals may not be aware of the employment opportunities in the field. As a result, they do not train or apply for positions. Greater visibility, especially among vulnerable communities, could lead to a more diverse workforce in water-related industries.⁸⁵

Stakeholder interviews provided this feedback on the visibility of water jobs.

“A lot of young people in parts of Milwaukee have never even seen Lake Michigan at all and even though they may be a mile or two miles away, they've never had that experience. That reinforces not thinking about it as a career or even as a job.”

“If they haven't done building projects with a relative or if they haven't done shop classes in school, or they haven't had a lot of chance to be outdoors, they might not realize the opportunities there are for doing construction/trades work.”

“The amount of people from urban areas, minorities in particular, who participate in water industry-type employment, is not high because the exposure that one may get from someone as a role model, for example, who works in the water industry is just not there in this region.”

Some water-related occupations lack visibility in part because they represent emerging fields. GI is an emerging field with potentially strong employment prospects. However, job seekers may be unaware of employment opportunities in this field.

Programs are needed to enhance the visibility and attractiveness of the sector. Stakeholders suggested the following strategies to raise awareness of and exposure to water-related occupations:

- Community advertising

- Internship programs
- Mentoring programs that connect individuals from vulnerable populations to mentors from diverse populations

CHARACTERISTICS OF WATER-RELATED JOBS

Interview respondents emphasized the unique qualities that are needed to work in many water-related jobs. Some characteristics of water sector jobs may present barriers for certain individuals. These are personal barriers rather than cultural barriers. Many water-related occupations, especially at the entry level, require a certain level of physical strength and endurance. Many occupations require individuals to work outside year-around in all weather conditions.

WORK HOURS

Work hours – such as early start times or second shift work – may present a barrier to some workers. Construction work often requires long hours, and sometimes unpredictable project schedules. Childcare availability may not align with work hours, creating a barrier for parents of young children and especially single mothers.

The Institute for Research on Poverty at the University of Wisconsin-Madison found that there has been a rise in precarious scheduling. Employers demand more flexibility from workers and this can disadvantage workers who are dependent on public transit and fixed childcare schedules.⁸⁶

PHYSICAL STRENGTH

Many water-related occupations require physical strength to carry out work tasks. Strength is measured in five levels, from sedentary to very heavy work. The levels are determined by how much weight a worker is required to lift or carry occasionally, frequently, and constantly, as well as standing or walking in some special cases.⁸⁷ According to the Bureau of Labor Statistics, 14% of all jobs required strength level of “heavy work.” But 45% of jobs in construction required heavy work. About a third of jobs installation, maintenance, and repair occupations required heavy work.

The job requirements for many of the Skilled Trades and GI installation include:

- begin at 7:00 AM daily, rain or shine
- stand, squat, bend, carry up to 50 pounds for distances
- walk a mile plus, any given day
- stand for over six hours in a day

Gender stereotypes regarding physically demanding occupations may present a barrier for women. While these physical requirements should be applied equitably to all job candidates, gender stereotypes may prevent women from being considered for certain positions. Stakeholders expressed the view that the lack of gender diversity in landscaping and construction jobs is partially due to stereotypes about what is a male or female job.

LACK OF DIVERSITY IN WATER-RELATED JOBS

Stakeholders reported that if workers don't see someone who looks like themselves in a company, they may not see a future for themselves in that company. Many industries, including water-related industries, are notable for a lack of diversity. Lack of diversity can impact both whether a minority candidate accepts a job and decides to stay in the job. Studies indicate that women and minorities are more likely to leave occupations in which there are large disparities according to race and/or gender.⁸⁸

DIVERSITY AT THE UTILITIES

The workforce at Milwaukee-area public utilities does not reflect the diverse demographics of the region. Minorities represent 27% of employees working at the three utilities- Milwaukee Water Works, MMSD and Veolia. Of the three, Milwaukee Water Works has the most diverse workforce, with minorities representing 40% of employees. At both MMSD and Veolia, minorities represent approximately 20% of the workforce.

Workforce Diversity at Milwaukee Utilities					
	White Employees		Minority Employees		Total
Utility	#	%	#	%	
Milwaukee Water Works	202	59.8%	136	40.2%	338
MMSD	183	81%	43	19%	225
Veolia	173	80%	43	20%	216
Total	568	73%	206	27%	779

NATIONAL

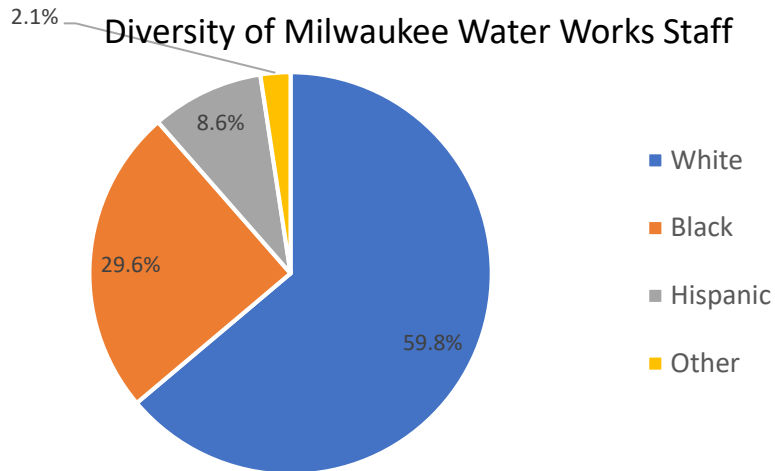
In the US, women and minorities are significantly underrepresented in many water-related jobs. More than 72% of the water utility workforce is white.⁸⁹ Women represent 47% of all workers nationally, but only 15% of the water workforce. Black and Asian workers make up only 11.5% of the water workforce, compared to 18% of the total workforce. The Hispanic share of the water workforce (22%) exceeds the national average across all occupations (16.7%), but Hispanics are primarily concentrated in the construction sector, with little representation in other areas. Women and minorities are underrepresented in the higher paying, managerial positions in the Utilities.

Milwaukee Water Works, MMSD and Veolia are all located in the City of Milwaukee, which a majority-minority city. Yet their workforces do not reflect the demographics of these neighborhoods.

“The underrepresentation among black and Asian workers overall—and Hispanic workers in certain occupations—spells a particular need to connect with a wider pool of prospective workers, particularly those living in areas with higher levels of unemployment and poverty”.⁹⁰

DRILLDOWN: DIVERSITY AT MILWAUKEE WATER WORKS

Milwaukee Water Works employs 338 workers, of which 202 are white, 100 are African American, and 29 are Hispanic. 7 individuals identify themselves as “other.” Minorities represent 40% of the employees at Milwaukee Water Works.



The highest paying positions are Officials and Administrators (\$38.08/hour). Of these positions, 70% are held by individuals who are white and 82% are held by workers who are male. The lowest paying positions are Administrative Support positions (\$19.69/hour). Fifty-two percent of these employees are African American and 90% are female. Hispanics represent 40% of Paraprofessional positions. These positions are at the lower end of average hourly pay (\$22.50/hour).

Milwaukee Water Works – Positions by Race, Ethnicity and Gender								
	White	Black	Hispanic	American Indian	Asian	Male	Female	Avg Hourly Pay
Officials and Administrators	70%	20%	8%	2%	0%	82%	18%	\$38.08
Paraprofessionals	47%	13%	40%	0%	0%	7%	93%	\$22.50
Professionals	84%	8%	5%	1%	1%	79%	21%	\$29.77
Service Maintenance	41%	52%	8%	0%	0%	91%	9%	\$22.12
Skilled Craft	57%	30%	8%	2%	4%	94%	6%	\$23.49
Technicians	82%	14%	0%	0%	5%	86%	14%	\$26.97
Administrative Support	34%	52%	14%	0%	0%	10%	90%	\$19.69

DIVERSITY IN A KEY WATER-RELATED OCCUPATION

Pipelayers, plumbers, pipefitters, and steamfitters represent a large share of water-related occupations. In 2010, there were 2,385 pipelayers, plumbers, pipefitters, and steamfitters employed in the four-county Metro area.⁹¹ This occupation represents approximately 12% of total water-related jobs.⁹² In Metro Milwaukee, these positions are filled almost exclusively by white male workers.

Pipelayers, Plumbers, Pipefitters, Steamfitters					
		Percent of total who are			
Geography	Total	Non-Hispanic White	Black	Hispanic	Male
Milwaukee County	1,445	84.8	4.5	10.4	99.7
Ozaukee County	65	100	0	0	100
Washington County	120	91.7	0	8.3	100
Waukesha County	755	96.7	1.3	2	100

Source: U.S. Bureau of the Census, American Community Survey 2006-2010. EEO Tabulation.

DIVERSITY OF UNIONS

Despite progress at the national level and the diversity goals of labor organizations, there is still work to be done to achieve equitable representation in the trades, including in Wisconsin. Focus group participants mentioned cultural barriers to union membership and a feeling of being unwelcome. Interview respondents offered the following comments:

“Some trades unions are more inclusive than others”.

“The culture of the trades union prevents entry into job training.”

“Some minorities are met knowing looks and cynicism in the trades.”

The Bureau of Labor Statistics tracks union membership by gender, race, and ethnicity. Diversity among union members in the U.S. has increased since the 1980s. In 2016, 16.3 million working-age Americans were covered by a union contract. 42% of total union members were women; 33% were minority.⁹³

Apprenticeships

To increase diversity of tradespeople in water-related construction jobs, there must first be diversity in apprenticeships. Diversity of current apprenticeships in Wisconsin determine what the demographics of future journeyworkers employed by area contractors and utilities will be.

Data on the race and ethnicity of participants in Active Apprenticeship Contracts in metro Milwaukee is shown in the table below. Despite increases in the number female, African-American and Hispanic apprentices over the past 10 years, overall diversity of Apprenticeships in the Milwaukee area is still lacking. In Milwaukee, the minority share of Active Apprenticeship Contracts fluctuated between 15-17% in the 10-year period from 2007-2017. The female share of total apprenticeships held steady at 3% during this period.⁹⁴

In water-related apprenticeships, plumbing has achieved the greatest gains in diversity. This is largely due to the increasing share of Hispanics in this trade. In 2018, 9% of Plumbing Apprentices were Black and 9% were Hispanic. Just 2% were female.

Characteristics of Active Apprenticeship Contracts (2018)						
Trades	Apprenticeship Contracts	Percent by Race/Ethnicity*				
		White	Black	Hispanic	Other	Total Minority
Wisconsin - All Committees	13,804	95%	4%	4%	2%	10%
Milwaukee - All Committees	3,737	92%	7%	7%	2%	15%
Milwaukee Area Plumbing	173	87%	9%	9%	5%	22%
SE Wisconsin Craft Laborers**	237	74%	26%	16%	1%	42%
Operating Engineers (statewide)	873	98%	1%	1%	1%	4%

*The numbers do not total 100% because individuals may belong to multiple categories

**Construction Craft Laborers perform tasks involving physical labor at construction sites. They may operate hand and power tools of all types, clean and prepare sites, dig trenches, set braces to support the sides of excavations, erect scaffolding, and clean up debris and other waste materials.

Source: State of Wisconsin – Department of Workforce Development⁹⁵

RIGID HIRING PRACTICES

According to stakeholders and focus group participants, companies and organizations need to develop workplace cultures that are understanding of vulnerable populations and their barriers to employment. Organizations that foster a workplace culture that values diversity and inclusion are more likely to have equitable hiring practices. Some stakeholders and focus group participants suggested that rigid hiring practices that include the Civil Service Exam required for city positions, background checks, and other screening tools create barriers to more inclusive workplaces.

RECRUITMENT AND INTERVIEWING PRACTICES

Some stakeholders expressed the need to develop more effective strategies to recruit applicants from vulnerable populations. They cited the need for diverse interview panels, saying that job applicants are more likely to be treated equitably if there is an interviewer from their racial or ethnic group.

Focus group participants expressed concerns about the hiring practices of some employers and highlighted the need for interviewers who have been trained in diversity and inclusion practices. It is also important that the diversity goals of the company or organization be prioritized in job postings and reinforced in job interviews.

SCREENING APPLICANTS

Focus group participants shared examples of employers screening job applicants based on characteristics or experiences that are unrelated to job requirements. For example, the possession of a valid driver's license is used by some employers as a proxy for personal responsibility. This is an unfair hiring practice since economic factors may prevent members of vulnerable populations from obtaining a driver's license. Another common "red flag" for employers is a criminal record. This is an unfair hiring practice if the criminal offense is unrelated to the responsibilities of the position.

WORD OF MOUTH HIRING PRACTICES

Focus group participants and stakeholder interviews revealed the common practice of word-of-mouth hiring. When positions are open, companies may ask existing employees to refer candidates. While this practice may not be intended to cause harm, it can lead to hiring employees that look like the existing workforce. Research from the University of Washington and University of California-Santa Cruz found that "most discrimination in the U.S. is not caused by intention to harm people different from us, but by favoritism directed at helping people similar to us".⁹⁶

The use of personal networks to secure employment can create a barrier to employment for certain groups. According to a Focus Group participant, "You have to know someone to get a living-wage job".

As this study has shown, women and people of color are underrepresented in water-related industries in Metro Milwaukee. This may mean that such individuals are less likely to have a personal contact in the industry that might be helpful to them in securing employment and less likely to become aware of opportunities in the water sector. Reliance on personal contacts and word of mouth for recruitment may be a sign of insular hiring which prevents vulnerable populations from accessing employment opportunities.

HISTORY OF INCARCERATION

Milwaukee's vulnerable communities include large numbers of formerly incarcerated individuals. A study by Marc Levine of the UWM Center for Economic Development found that Wisconsin is among the leading states in racial disparity in incarceration. Black males in Wisconsin are twelve times as likely to be incarcerated as white males.⁹⁷

“The effects of mass incarceration ripple through poor, segregated neighborhoods like 53206, increasing poverty, undermining families and disrupting the lives of children, and limiting the employment prospects of black males who have been part of the wave of mass incarceration”.⁹⁸

According to stakeholder interviews, for many companies and organizations, a criminal background is disqualifying. A criminal record may be used to filter applicants even if the criminal offense is unrelated to the job responsibilities.

Individuals who were formerly incarcerated are likely to face additional barriers to employment, such as lack of a driver’s license or lack of high school diploma. Focus group participants emphasized the need for wrap-around services for the formerly incarcerated to deal with multiple barriers, such as lack of driver’s license and gaps in work history. According to the Department of Justice, more than 75 percent of offenders across the country will be rearrested within 5 years of their release.⁹⁹ While there are many causes of recidivism, one of the most significant is the difficulty finding employment. If employed, a previously incarcerated individual is significantly less likely to commit another crime. A landmark study showed that the risk of reoffending fell 69% for individuals who were employed after release from prison.¹⁰⁰

A Stakeholder shared this story:

“A decade ago, the Milwaukee 7 did interviews with employers in the seven county region (of southeast Wisconsin). Manufacturing companies were singing the blues about how they didn't have enough workforce and that the baby boomers were retiring faster than they were able to replace them. The only organization that had successful training and placement were the ones that allowed you to have a felony on your record and they would still hire you. They were taking young men who were being released from prison or jail and bringing them right in and training them.”

BEST PRACTICES

This section highlights best practices in water-related programs in comparable markets. Each of the Best Practices addresses one or more of the employment barriers that were cited in the previous section.

To prepare this section of the report, UWMCED asked stakeholders about the most effective characteristics of programs that promote water-related jobs. UWMCED also reviewed reports and publications to gather information on Best Practices.

Much can be learned from other cities and metro areas to build inclusive pathways to water-related jobs. This section includes descriptions of best practices from San Francisco, Buffalo, St. Louis, and Louisville. The programs in these cities fall into the following areas:

- Pathway to Living Wages
- Public Utility as Anchor Institution
- Water Workforce Training Programs that Target Vulnerable Communities
- Programs to Raise Awareness about Career Opportunities in the Water Sector
- Re-entry programs for the Formerly Incarcerated
- Diversity and Inclusion programs

BEST PRACTICE: PATHWAY TO LIVING WAGES

Apprenticeship and union membership offer effective pathways to living wages. Apprenticeship is accessible with a high school diploma. Apprentices are paid from day one of training and guaranteed wage increases as they complete each level of training on the pathway to journeyworker status. Upon successful completion of the apprenticeship, an apprentice becomes a journeyworker, which is a nationally-recognized, portable credential.

An Apprentice Test must be passed before an individual can enter apprenticeship. If the individual does not have the requisite skills to pass the test, Pre-Apprenticeship programs can provide preparatory training.

Membership in a labor union lifts income for all racial and ethnic groups. Median earnings are higher for union workers than non-union workers.¹⁰¹ In Wisconsin, unions raise worker wages by an average of 12%. The impact is greatest for the lowest-earning workers, where hourly incomes are increased by 12.2% due to unionization.¹⁰² Union members also receive benefits such as health care and paid days off.

SEATTLE PUBLIC UTILITIES

Seattle Public Utilities offers two apprenticeship programs: water pipe worker apprenticeship and drainage and wastewater apprenticeship. In each program, apprentices assist journey-level workers on city of Seattle public utility projects. Water pipe workers assist in the construction, installation, maintenance, repair, and operation of water mains. Wastewater workers construct, maintain and repair sewer lines. Each of these apprenticeships provides full-time paid employment for two years. Classroom instruction takes place in the evenings and the cost is covered by Seattle Public Utilities. After the two-year apprenticeship, participants are qualified as journey-level workers with training and credentials needed for permanent, well-paid careers in this field.

ILLINOIS

The State of Illinois recently passed legislation to provide grants to labor organizations to train individuals for careers in water infrastructure. The aim of the Clean Water Workforce Pipeline program is to create a pathway to jobs in the water sector. It will target residents of economically and socially disadvantaged communities. The program is expected to provide 300 new water-related apprenticeships.¹⁰³

Economically and socially disadvantaged communities, along with women, transgender persons, foster care alumni and those returning from the criminal justice system are targeted for the apprenticeships.

BEST PRACTICE: PUBLIC UTILITY AS ANCHOR INSTITUTION

Public Utilities are anchor institutions that play a vital role in supporting community economic development. In Milwaukee, hundreds of millions of dollars will be spent on public infrastructure projects in the coming decade to upgrade aging infrastructure and address water quality issues. Key institutions like MMSD and Milwaukee Water Works can leverage these projects to benefit the local community through contracting policies and practices. Such projects have the potential to create many jobs and improve standards of living if they are accessible to people who have historically been under-represented in employment sectors that are water-related.

SAN FRANCISCO PUBLIC UTILITIES COMMISSION (SFPUC)

In San Francisco, SFPUC has leveraged public investment to benefit the local community. San Francisco Public Utilities approved the Sewer System Improvement Program (SSIP), a 20-year plan that combines investments and construction of grey, green, and clean infrastructure. Phase 1 represents an investment of \$2.9 billion in 70 grey and green infrastructure projects across the city. It includes eight green infrastructure projects to manage stormwater in each of San Francisco's eight urban watersheds.¹⁰⁴

SFPUC enacted a Social Impact Partnership Program (SIPP) to ensure that the entire community benefits from these investments through the creation of job opportunities and revitalization of low-income neighborhoods.

COMMUNITY BENEFITS

The objective of the Community Benefits Policy is to ensure that all community members benefit from improvements in water and wastewater services. The Policy guides SFPUC decision-making and provides resources to achieve diversity and inclusion goals. (The SFPUC Community Benefits Policy is included in the Appendix).

Community benefits criteria are included in Requests for Proposals (RFPs) for projects in excess of \$5 million. Investments include such projects as the construction of affordable housing and financial support for nonprofits and schools. The San Francisco Foundation helps contractors identify potential projects to which they can direct their community benefits resources.

WORKFORCE TRAINING

Through its CityBuild Academy, SFPUC runs a citywide construction program, trains local workers in construction trades, and then connects them to job opportunities. The Academy has provided 1,000 placements in 13 years.

YOUTH OUTREACH

SFPUC partners with 25-30 community-based organizations to provide paid jobs and mentorships with SSIP. Each year 1,400 youth from local schools participate in learning opportunities and internships in the Water Sector. Programs include:

CityWorks Internship Program: provides high school students with paid jobs and mentorships in SFPUC and private engineering firms that are working on the Sewer Improvement Project.

Urban Agriculture Pilot Program: SFPUC created an interactive garden where school children can learn about water, wastewater, renewable energy, and healthy food.

Urban Watershed Stewardship Program: provides grants for community projects that protect the watershed. One of the recipients is an Elementary School which created a greenhouse and water catchment system.

COMMUNITY OUTREACH

The Southeast Water Pollution Control Plant, which manages 80% of the City's wastewater, is located in the Bayview-Hunters Point neighborhood. SFPUC and Bayview partnered to provide residents with educational and job opportunities through the Southeast Community Facility and Greenhouses. The facility houses youth programs, college courses, job training, and recreational activities.

The Town of Sunol is the location of key infrastructure providing water to the Bay Area. SFPUC collaborated with Sunol to develop a Watershed Education Center to teach people about the role the regional watershed plays in the SFPUC water supply system.

BEST PRACTICES IN WORKFORCE DEVELOPMENT AND TRAINING

Stakeholders provided feedback on the key characteristics of effective workforce development and training programs. Stakeholders and focus group participants emphasized the importance of paid training programs, especially for vulnerable populations. The Best Practices highlighted below include paid training programs that focus on youth, young adults, the formerly incarcerated.

KEY CHARACTERISTICS

- *Partner with employers.* To ensure that there are jobs for the individuals once they complete their training.
- *Focus on meeting needs of under-represented groups.* Some individuals may need to develop certain basic skills, such as soft skills and financial literacy, before they can participate in structured training programs. Programs that teach these skills have been shown to have improved outcomes, including longer-term employment.
- *Training must be subsidized or paid.* Participants should not have to pay to participate in training programs. Ideally, participants receive a stipend of some kind.
- *Childcare and transportation* must be provided or subsidized. If training centers are not reachable by public transit, alternative transportation for those who need it should be arranged.
- *Short intensive courses.* Short intensive coursework leads to higher graduation/completion rates than part-time and flexible coursework schedules.
- *Job retention.* Retaining employees is more cost effective for employers than training new workers. Ongoing engagement after completion of training has a positive impact on worker retention. Strategies that enhance worker retention include ongoing job coaching, connection to childcare, and assistance with transportation.
- *Provide up-skilling.* Training programs should be informed about the next steps in gaining skills. This could be a Technical or Associate Degree or additional stackable credentials.
- *Tracking Outcomes.* Programs should track employment outcomes for their participants, including:
 - Whether the participant is employed 6 and 12 months after training
 - Wage rates
 - Whether the participant received an industry-recognized credential

AMERICORPS PROGRAMS

PowerCorps Camden – Camden, NJ

PowerCorps Camden partners with Americorps to provide opportunities to young adults in water quality, stormwater management, and green infrastructure.

The participants are *Americorps* volunteers who complete a six-month training program. Participants are paid and receive health insurance, childcare, and life skills training (living allowance of \$559 biweekly).

Upon completion of the program, the participants earn an Education Award of \$2,960 payable to a lender or educational institution, such as a technical college or university where students may receive training and credentials for water-related careers. The program recruits Camden City resident who have a high school diploma or a high school equivalency certificate and are 18-26 years old.

PowerCorps Camden provides continuing support after the 6 month training to assist with post-secondary education and/or securing work in related fields.

Urban Corps of San Diego – San Diego, CA

Urban Corps of San Diego County is a certified local conservation corps and charter school that provides young adults with education, life skills training, and paid work experience on community projects. The program focuses on underserved, low-income young adults ages 18-26, giving them the opportunity to finish high school while earning a paycheck. Corps members attend school two days per week and work in the field three days per week. They are paid to work on training projects such as environmental services, landscaping, green building construction and recycling. On average 90 percent of graduates are either placed in jobs following program completion or are enrolled in higher education. “Wrap around” support services such as day care or transportation assistance are provided. The program also provides classes for participants who need to complete high school requirements.

The Construction Program construction-related apprenticeships target young adults (18-25 years) who have not completed high school and who face numerous barriers to employment such as transportation, childcare, homelessness, and arrest records. Urban Corps is one of a handful of programs across the country that are licensed to teach the Multi-Craft Core Curriculum, or MC3. This standardized 120-hour curriculum provides an educational foundation to help students succeed in the building trades. Participants receive OSHA-10 certification and undergo training in green building technologies.

TRAINING PROGRAMS FOR THE FORMERLY INCARCERATED

A past criminal conviction can be a barrier to many jobs. These training programs target formerly incarcerated individuals and help them to secure stable employment in the water sector.

Philadelphia

PowerCorpsPHL is an Americorps program which provides paid work experience, training, and an education voucher which can be used for future educational expenses. The program targets disconnected young adults and the *formerly incarcerated* with the aim of preventing youth violence. It provides training in environmental work, such as GI installation and maintenance. Participants obtain certifications to increase their chances of finding employment. The program also provides supportive services that focus on removal of employment barriers such as criminal records.

Atlanta

The Atlanta Department of Watershed Management (DWM) and Atlanta Department of Corrections operate a program to prepare *nonviolent offenders* for water system employment.

Preparing Adult Offenders to Transition through Training and Therapy (PAT3) is a partnership with the Department of Corrections that transitions adult offenders into jobs at the DWM. The focus is on fathers who are from vulnerable communities. The goal is to reduce recidivism. In the first year of the program, 10 participants graduated, one of whom obtained a full time job with DWM.

The participants are incarcerated fathers who have 12-18 months remaining on their sentences. They receive vocational training and employment and are certified employees of DWM while they are incarcerated. Wrap-around services include financial management, parenting classes, anger management, substance abuse prevention, and workforce readiness. The Urban League provides reentry counseling and classes.

INTERNSHIPS

Massachusetts

The Massachusetts Department of Environmental Protection operates an internship program in water operator training. The program includes classroom and on-site field training for the next generation of small system drinking water operators, providing **paid** internships at public utilities and assigned mentors to interns. The training includes preparation for the certification exam and on-site field training. Many interns have become certified Water Operators and found employment in drinking water facilities.¹⁰⁵

Massachusetts recognized the silver tide of retirements that would impact water operator occupations in the state. Industry representatives estimate that 15%-20% of all drinking water operators will be retiring within the next five years.¹⁰⁶ The program seeks to prepare individuals to become the next generation of water operators in preparation for impending retirements of current water operators.

BEST PRACTICE: RAISING AWARENESS

Many stakeholders emphasized the need to raise awareness about water-related occupations among youth, including high school and middle-school students. There needs to be active, direct engagement and outreach at multiple levels, starting in middle school. Students with an interest in environmental sciences and those with aptitude in math and engineering should be made aware of the career pathways and job opportunities in these fields. It is vital to increase awareness and exposure to water-related jobs, including among under-represented groups and youth. Programs in Baltimore and San Francisco have successfully done so.

BALTIMORE PUBLIC WORKS DEPARTMENT - BALTIMORE, MD

The Baltimore Department of Public Works established a program, Y-H2O, to expose youth to water-related jobs. It matches the young workers (aged 18-24) to experienced workers at DPW who act as mentors and trainers for the young workers. The eight-month program provides additional training and support services such as opportunities to explore careers in the water industry and connection with a career coach/mentor.

The objective is to provide the youth with the skills needed to fill entry-level positions in the water industry. Program participants are given the opportunity to interview for full-time, entry-level positions with DPW or private companies. The result is a pipeline of future water industry workers.

The logo and brand of Y-H2O were specifically designed to appeal to youth.

THE CITY OF SAN JOSE AND SAN FRANCISCO PUBLIC UTILITIES COMMISSION

Teacher Externships: The City of San Jose and SFPUC have collaborated to raise awareness about employment opportunities in the water sector. This has resulted in the creation of “externships” for high school teachers. SFPUC hosted teachers in a variety of externships to encourage teachers to become champions of the water sector and to create lesson plans that teach students about the water sector. The externships are supported by a grant from the Water Career Pathways. SFPUC believes there is the potential to engage more teachers and school counselors and reach many more students.

WATER CAREER PATHWAYS

To raise awareness about water-related career opportunities, there must be clear information on pathways to water-related jobs. Water Career Pathways (WCP) Consortium created an online portal with information about pathways to water-related jobs including job requirements and links to trainers.

The Consortium was established to address the skilled worker shortages in San Francisco area water jobs. It is made up of representatives of training and educational organizations along with leaders of the water industry. The Consortium is led by a Technical College and works with public utilities to develop clear career pathways to water sector jobs.

See <https://cawatercareers.org/careers/>

BEST PRACTICES IN DIVERSITY AND INCLUSION IN PROCUREMENT AND HIRING

Diversity in hiring and procurement will not happen without a deliberate effort to reach out to underrepresented groups such as women and minorities in recruitment and procurement.

In order to achieve diversity and inclusion, organizations must understand the demographic make-up of the organization's workforce and its suppliers. A Disparity Study may be needed to fully understand the racial and gender disparities that the organization is facing, especially in relation to procurement. Another key component is to ensure that all employees are aware of the company's diversity and inclusion goals. Training in Diversity and Inclusion should be provided to all employees.

Employee feedback: Employees should be asked to suggest areas for improvement and the organization should act on their suggestions. Cream City Conservation in Milwaukee provides training in Diversity and Inclusion. They address policies, practices and performance measurements. One of the assessments, the Inclusion Survey, seeks feedback from employees. The objective is to determine if under-represented groups find the workplace environment to be inclusive. Do they feel heard? Do they feel that they belong?¹⁰⁷

Equity in recruitment: In order to ensure an equitable application and interview process, it is vital that human resources staff or others in charge of hiring have been trained in unconscious bias.¹⁰⁸ Such training can prevent subtle biases from entering and distorting the selection process. Diverse job posting sources should be used. Examples related to the water sector include: National Society of Black Engineers (NSBE), Society of Hispanic Professional Engineers (SHPE), and Society of Women Engineers (SWE).

Unconscious bias is defined as prejudice or unsupported judgments in favor of or against one thing, person, or group as compared to another, in a way that is usually considered unfair. Many researchers suggest that unconscious bias occurs automatically as the brain makes quick judgments based on past experiences and background. As a result of unconscious biases, certain people benefit and other people are penalized.¹⁰⁹

The Equal Employment Commission publishes data on diversity by gender, race and ethnicity according to occupation, which demonstrates the lack of diversity in many water-related occupations. Information provided by Milwaukee area utilities illustrates the need for greater diversity in Milwaukee's water workforce. Once diversity goals are established, they should be incorporated into all informational and promotional materials.¹¹⁰ Members of underrepresented groups are more likely to be attracted to occupations that have clear goals to improve diversity.¹¹¹

LOUISVILLE

The Louisville Metro Sewerage District (MSD) is focused on building equity in their hiring and contracting processes.

Hiring

MSD established an online portal called MSDJobLink to connect employers to job seekers. Contractors on MSD projects post job opportunities and job seekers can upload their resumes.

Contracting

The MSD conducted a Disparity Study in 2018 to examine their contracting practices over a 5-year period. MSD typically awards contracts of \$200-200 million each year for construction, materials engineering and professional services. The study found that 97% of Sewerage District contract dollars went to white, male-owned businesses. The MSD set a goal to increase the diversity amongst its suppliers.

Understanding disparities is the first step. MSD created a new Supplier Diversity Program which provides preferences to minority and women-owned businesses. The agency intends to create programs to improve access to contracts, especially among minority and women-owned businesses. Finally, MSD will monitor the awarding of contracts to ensure that disparities in contracting are being reduced.

CHAPEL HILL, NORTH CAROLINA

The Orange Water and Sewer Authority in Chapel Hill, NC has prioritized building a diverse workforce. The agency is using a collaborative planning approach to get employee feedback and involvement and to form diversity leadership, recruitment, and resource groups.

The agency's goal is to have a workforce that represents the communities they serve and to create an inclusive work environment. Following a review of their recruitment and advancement processes, the recruitment process was modified to include targets for "under-represented" groups. Interview panels are now trained in diversity and inclusion, along with supervisors and the Board of Directors.¹¹²

BEST PRACTICES: COMMUNITY BENEFITS AGREEMENTS

Community Benefits Agreements (CBAs) leverage public projects to provide certain community benefits. Employers are required to provide benefits such as local hiring and living wages. The requirements are applied to public works projects or other projects that receive public funding. They are legally-binding.

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Under CBAs, employers are required to provide certain community benefits such as paying a living wage, hiring local workers and/or providing affordable housing in new housing developments. The requirement may be applied to public works projects or other projects that receive public funding.

Milwaukee has experience with CBAs. It passed the **MORE Ordinance** (Milwaukee Opportunities Restoring Employment) in 2009 which applied to development in the Park East area, where the Park East Highway was removed. The ordinance requires that developments which receive more than \$1 million in government assistance create jobs for Milwaukee residents. Unemployed or underemployed residents must account for at least 40 percent of the total work hours. In addition, 25% of City development and public works contracts must be awarded to “emerging business enterprises”.

The MORE Ordinance paved the way for the CBA connected to the development of the **Fiserv Forum** (Bucks Arena). As a result of this CBA, 1,000 Milwaukee workers were recruited, trained and employed in living wage jobs on construction projects related to the development. The CBA had the following requirements: setting minimum wage scales for workers in the new arena other properties managed by the Milwaukee Bucks, including the surrounding plaza, practice facility, and parking structure; hiring at least 50% of employees from neighborhoods with high unemployment; and affirming the right of employees to unionize.¹¹⁴

ST. LOUIS METROPOLITAN SEWERAGE DISTRICT (MSD)

In 2013, St. Louis MSD established a CBA in response to a diversity study showing under-representation of minorities and women in public utilities jobs. The Agreement set workforce and vendor contracting goals based on the findings of the study. The CBA aims to facilitate the return of unemployed and underemployed journeymen and apprentices to sewer-related occupations, focusing especially on women and minorities. The MSD provides funding for job training for sewer-related jobs. The CBA supports targeted hiring of applicants who help meet diversity goals and reside in the MSD service area.

Unions follow CBA guidelines when referring applicants and recruiting women and minorities for MSD projects. Another key goal relates to SWMBE participation. To encourage SWMBE contractors to bid on MSD projects, the project tasks are “unbundled” into smaller sizes.

MSD encourages contractors to create and promote a workplace culture that supports inclusion. An MWBE specialist has responsibility for oversight and monitoring of job site work conditions.

RECOMMENDATIONS

Based on the findings of this report, UWMCED identified ten actionable recommendations to promote greater employment diversity in water-related sectors in Metro Milwaukee. These recommendations take into account both opportunities in water-related sectors as well as employment barriers that currently prevent vulnerable communities from accessing these employment pathways. Each recommendation addresses one or more of the employment barriers identified earlier in this report.

Systemic issues, such as transportation and incarceration, present barriers to employment and training across all sectors of the economy. These systemic challenges are well-known and there are organizations working to advance policies to address these issues. This is long-term work and improvements can be slow. The Water Equity Taskforce can look for points of leverage where they could help existing programs to make progress to impact the water sector. Some of the recommendations address these systemic challenges.

COMMON THEMES

There are common themes reflected in the recommendations:

- Increase diversity in water workforce
- Raise awareness of water-related jobs
- Provide clear pathways to water-related jobs

1. DEVELOP STRATEGIES TO ADDRESS TRANSPORTATION BARRIER

OBJECTIVE

- To address the barrier to employment caused by lack of driver's license or transportation to work
- To eliminate suspensions for non-driving violations, including truancy.
- To advocate for other transportation options

RATIONALE

Stakeholders identified transportation barriers as one of the leading barriers to employment for vulnerable populations. Lack of reliable transportation can impact one's ability to apply for a job, accept a job, and retain a job. Research indicates the turnover rate for Milwaukee workers who rely on public transit for commuting is higher than for workers who do not use transit.¹¹⁵

As indicated earlier in this report, the lack of a valid driver's license by many individuals from vulnerable communities is an additional barrier to employment. The UWM Employment and Training Institute found that 8% of African American male teenagers (16-17 years) have a probationary driver's license. This is in contrast to White Male teenagers (16-17 years), 47% of whom have a probationary driver's license.¹¹⁶

NEXT STEPS

Advocate for Policies to Increase Driver's Licenses among Vulnerable Populations

There are existing programs which address barriers that arise from the lack of a valid driver's license and/or the possession of a criminal record. The Taskforce may consider partnering with the City of Milwaukee's Office of Violence Prevention which produced the *Milwaukee Blueprint for Peace*. The Blueprint for Peace identified Driver's License Recovery as an important strategy to promote economic opportunity. The Water Equity Task Force could join with the Milwaukee Office of Violence Prevention efforts to:

- eliminate suspensions for non-driving violations, including truancy
- restore state funding for free driver's education in all high schools in the Milwaukee Public School District.

Another possible partner in the effort is the Center for Driver's License Recovery (CDLRE). CDLRE is a collaborative effort involving Legal Action, Wisconsin Community Service Milwaukee Area Technical College and the City of Milwaukee to reduce the numbers of unlicensed drivers in Milwaukee County. It assists individuals to remove driver's license suspensions. Legal Action lawyers working at MATCs downtown campus help to resolve court actions which led to the suspension.

Another Strategy to Address Transportation Barriers to Employment:

Alternatives that provide transportation for individuals without a driver's license should also be explored. Many cities are experimenting with employer shuttles and ride-hailing services to address the "last-mile problem," which is the gap between the nearest transit stop and the company location. The Public Policy Forum has recommended a pilot program in "on-demand" transportation service.

"This approach could involve a partnership with a ride-hailing company like Lyft or Uber; an independent employer shuttle; or a service with elements of both. A pilot on-demand transportation service could be designed to provide rides within a defined geographic area to serve as a last mile service."

Employer shuttle services transport workers from nearby transit stations to employment destinations. This approach works best when the employer is near a transit stop.

Ride-hailing is a small-scale transportation option that offers users on-demand, point-to-point service. A partnership is established between a local government and a ride-hailing company. Costs may be subsidized by municipalities, reducing the expense for users of the service.

2. CREATE A YOUTH APPRENTICESHIP PROGRAM IN WATER SECTOR

OBJECTIVES

- To introduce youth to water-related occupations
 - To provide paid on-the-job training to high school and college students from vulnerable populations
 - To create a first step on a career pathway that may lead to a water-related occupation
-

RATIONALE

Women and minorities are under-represented in the water workforce. While racial and gender disparities have shown some improvement, there still significant gaps, especially in certain occupations. Internships and apprenticeships can provide structured pathways to water-related occupations.

Youth Apprenticeship programs are directed toward **high school students**. They can be an effective strategy to raise awareness about the benefits of water-related careers. High school students receive paid apprenticeships and high school coursework related to the selected trade. Youth Apprenticeships are structured training programs certified by the Wisconsin Department of Workforce Development. They are developed in association with an employer.

Badger Meter and Veolia both cited the need for machinists. This is a skilled trade which is accessed through apprenticeship. A Machinist Apprenticeship program could recruit participants from vulnerable populations with a placement at Veolia.

BARRIERS ADDRESSED

- Skills and certifications needed for jobs
 - Lack of paid training opportunities
 - Lack of diversity in water-related occupations
 - Exposure to and visibility of water-related jobs
-

NEXT STEPS

Several local internship programs, such as those offered by MMSD, Veolia and Water Council members, offer excellent opportunities but could be expanded. A Youth Apprenticeship program could be developed to place high school youth in apprenticeships at water utilities.

The Wisconsin Youth Apprenticeship Action Planning Guide for Local Communities provides guidelines for how to create a Youth Apprenticeship program.¹¹⁷ The Taskforce could work with the State Department of Workforce Development to explore this possibility.

A water sector employer could partner with Milwaukee Public Schools to create a Youth Apprenticeship program. A targeted Milwaukee Public High School (MPS) high school could recruit high school students with an interest in environmental issues and/or STEM classes. Recruitment should prioritize youth from vulnerable communities.

Project partners should investigate funding possibilities such as the US EPA's Environmental Justice Small Grants Program. This program operates out of the EPA's Office of Environmental Justice. The aim is to support underserved communities by developing solutions to local environmental and public health issues.

Background on Youth Apprenticeship

Youth Apprenticeship Programs are growing in Wisconsin. Such programs served 5,000 youth in Wisconsin in 2019. This number doubled in just five years. The program combines high school coursework and on-the-job training. Youth gain the academic skills and technical competencies in a selected occupation. Youth apprentices spend at least 450 hours per year working for an employer. Their classwork is focused on their industry.¹¹⁸ Almost any employer in Wisconsin is eligible to sponsor a Youth Apprentice.

Participants in Youth Apprenticeship programs may continue working at their placement organization or pursue additional training. Upon completion of the Youth Apprenticeship, these individuals are well prepared to pursue an Associate's Degree or participate in a Registered Apprenticeship Program. 75% of Youth Apprentices continue working for their employer after completing their program.¹¹⁹

3. ADVOCATE FOR ADOPTION/EXPANSION OF TRANSITIONAL JOBS

OBJECTIVES

- To build pathways to water-related occupations for vulnerable populations
- To increase the number of Transitional Jobs at the Department of Public Works
- To explore the possibility of creating a Transitional Jobs program in GI installation and maintenance

RATIONALE

The Transitional Jobs (TJ) program was created by 2013 Wisconsin Act 113. TJ provides limited-term subsidized work to low income adults.¹²⁰ The primary goal is to help individuals with labor market barriers transition into secure stable unsubsidized employment. Employers who host TJ participants receive a state subsidy for a given number of months. After this period, the employer often hires the participant as a full-time, unsubsidized employee. TJs have been shown to be highly effective in enabling a substantial number of unemployed low-income adults to obtain permanent, unsubsidized, employment.¹²¹

The City of Milwaukee Transitional Job program was established with the aim of providing pathways to employment for people with barriers to employment while addressing pressing problems in the city, such as filling potholes. In the 2015, the City increased the number of TJs to 130 positions. Most of these jobs are in the Department of Public Works.

A Transitional Jobs Program in GI could provide re-entry populations with employment in this growing field. The short-term paid positions can teach participants skills associated with installing, maintaining and inspecting GI while also providing meaningful work experience. Upon completion of the 6-month TJ, the participant may transition to permanent, unsubsidized employment.

BARRIERS ADDRESSED

- History of incarceration
- Skills and certifications needed for jobs
- Lack of paid training opportunities

NEXT STEPS

The Taskforce could partner with the UMOS Transform Milwaukee TJ program and the City of Milwaukee to explore the possibility of expanding the TJ Program in Milwaukee. The City of Milwaukee may have a desire to expand Transitional Jobs at the Department of Public Works.

The Taskforce could partner with MMSD to initiate a Transitional Jobs Program for GI jobs.¹²²

4. EXPLORE THE POSSIBILITY OF A WASTE MANAGEMENT DEGREE AT UWM

OBJECTIVES

- To provide a local opportunity to earn a 4-year degree in Waste Management
 - To recruit diverse students to a bachelor's degree program
 - To provide local employers with the opportunity to hire locally
-

RATIONALE

Currently, the only 4-year degree in waste management offered in Wisconsin is at UW-Stevens Point, which is located 150 miles from Milwaukee. Water sector employers like Veolia and Waukesha Water typically recruit and hire from UW-Stevens Point. One of the outcomes of this practice is that most of the individuals hired in this way are white males. In order to diversify employment in this sector, there should be opportunities for people from Milwaukee to enroll in bachelor's degree programs in Milwaukee.

The Bachelor's Degree in Waste Management prepares individuals for well-paid careers as wastewater treatment plant operator, waste disposal manager, waste research specialist, environmental manager, and solid waste manager. The job forecasts for these occupations are strong and the salaries exceed national median wages.

BARRIER ADDRESSED

- Job location/access to jobs
 - Skills and certifications needed for jobs
-

NEXT STEPS

The UW Board of Regents recently announced the Freshwater Collaborative and asked the Wisconsin Legislature to provide \$26.7 million in state funding over 6 years. The initiative aims to attract 1,000 new undergraduate students and 400 new graduate students to water science degrees and anticipates the creation of 650 new jobs in the next 6 years.¹²³ The aim is to prepare students to work in water-related fields that span the state's economy, from research to tourism to business to policymaking.

Vulnerable communities face barriers that might prevent them from pursuing a 4-year degree. These barriers include the cost of tuition and books and the income foregone while pursuing a degree.

The Taskforce could partner with the UWM Freshwater Collaborative and the UWM School of Freshwater Sciences to explore whether adding a bachelor's degree in Waste Management at UWM would enhance diversity in this occupation.

5. CREATE A GI PILOT PROJECT IN VACANT LOTS IN MILWAUKEE

OBJECTIVES

- To provide paid training opportunities to neighborhood residents who have barriers to employment
- To provide pathways to higher-paying, year-round jobs

RATIONALE

A pilot program in a target neighborhood can raise awareness about water issues, provide employment opportunities and contribute to neighborhood revitalization.

The City of Milwaukee has thousands of vacant lots which often turn into derelict properties, leading to decreased property values for nearby homeowners. The City offers funding to homeowners who may want to clean up or buy vacant lots adjacent to their property. Each year 80-120 vacant lots are purchased by homeowners whose property adjoins vacant lots.

The large number of vacant lots in the city creates opportunities to develop GI projects that can provide paid training and employment, while reducing stormwater runoff and beautifying neighborhoods.

The jobs associated with installing, maintaining and inspecting GI on vacant lots and other neighborhood properties can provide entry-level jobs for neighborhood residents. A social enterprise with experience in GI could provide the training and employment for individuals who install, maintain and inspect GI.

BARRIERS ADDRESSED

- Skills and certifications needed for jobs
- Lack of paid training opportunities
- Lack of diversity in water-related jobs

NEXT STEPS

Pilot Project in GI

Blue Skies Landscaping is a social enterprise working in the field of GI. It has already installed parks in 34 vacant lots in the City of Milwaukee. A pilot program could build on this activity to measure the employment and environmental outcomes associated with GI installation on vacant lots. It could expand the program to other parts of the city. The City of Milwaukee Vacant Lots Program can identify neighborhoods with a high concentration of vacant lots.

Target neighborhood

The Taskforce could partner with the City of Milwaukee Vacant Lots Program to develop pilot program in a targeted neighborhood could expand on this model.

Target population

The pilot program could target a specific segment of the vulnerable population, such as people who were formerly incarcerated or youth with an interest in environmental occupations. The Social Enterprise would provide on-the-job training in GI installation, maintenance and inspection. If targeting youth, the Social Enterprise could collaborate with Public Allies or AmeriCorps to recruit participants. AmeriCorps and Public Allies volunteers receive paid on-the-job training and mentorship. They also earn an Education Voucher that can be used for further education. If targeting adults, the Social Enterprise could collaborate with the Milwaukee Transitional Jobs Program. Participants in the Transitional Jobs program have barriers to employment such as previous incarceration and long-term absence from labor force. Transitional workers are matched to work placements where they gain skills and work experience which enhances their ability to transition to family-supporting permanent employment.

Upon completion of their training and work experience, individuals could be connected to next-level training in Green Infrastructure or to a complementary Technical College program that will build on their skills.

Funding mechanism

The City of Milwaukee and/or MMSD may be willing to develop a mechanism to fund the initial costs of the enterprise. In time, the revenue earned from the Green Infrastructure projects could be used to fund the training program.

A model for such an enterprise is Portland's Verde Landscaping.¹²⁴ The Verde training program provides classroom and on-the-job training to individuals with little or no landscaping experience. The social enterprise earns revenue for its programs through its paid landscaping work.

6. RAISE AWARENESS ABOUT WATER-RELATED CAREERS AMONG YOUTH

OBJECTIVE

- Raise awareness among high school students about water-related careers
- Increase the diversity of the water sector by reaching out to under-represented groups
- Create an online portal for information on water-related careers, including job postings

RATIONALE

There are promising employment opportunities with large environmentally conscious employers such as Veolia, and young people should be made aware of the pathways to these jobs.

Many young people are drawn to environmental occupations, yet they may be unaware of the connection between water-related jobs and environmental sustainability. Youth who have an interest in the environment should understand the connection between environmental awareness and water-related jobs.

Job Fairs

WRTP/Big Step reaches thousands of high school students through the Jobs Fairs it hosts at MPS schools. Representatives of the water sector should use these job fairs to present information about water-related occupations. Jobs fairs occur weekly throughout the winter. Roughly one-thousand MPS high school students—both juniors and seniors—are introduced to career opportunities in the trades at these events.

The Louisville Metropolitan Sewerage District has a Job Fair that specifically focuses on water and wastewater job opportunities. It targets vulnerable populations. The annual outreach event, called “Can you Dig It”, provides information on employment opportunities connected to water and wastewater infrastructure projects.

Project Lead the Way (PLTW) in Milwaukee Public Schools

PLTW has programs in MPS elementary, middle school and high schools. It focuses on preparing the future technical and engineering workforce by allowing these students to explore STEM through an established curriculum. The program is built on national standards and provides links to post high school training programs. PLTW is very effective at reaching vulnerable populations: 88% of participants are children of color. 47% of participants are female. In 2018-19, almost 9,000 students participated in PLTW.

BARRIERS ADDRESSED

- Exposure to and visibility of water-related jobs
- Lack of diversity in water-related jobs

NEXT STEPS

HIGH SCHOOLS

Job fairs should be used to raise awareness about water-related occupations among high school students. Information provided to students should include specific occupational opportunities in the water sector, along with expected entry wages. High school counselors can help to identify students who:

- Are members of vulnerable populations
- Have taken STEM-related classes (Science, Technology, Engineering and Math)
- Have an interest in the environmental issues

MIDDLE SCHOOLS

Teachers involved with Project Lead the Way in Milwaukee middle schools should be provided with information on water-related careers they can share with students. If students are presented with information on water-related careers, beginning in middle school and continuing through high school, they are more likely to consider entering these occupations.

ONLINE PORTAL

The Taskforce may partner with Fresh Coast Guardians Resource Center to develop an online portal to access water-related jobs. The online portal could provide one-stop shopping for information on water-related careers, training requirements, links to training providers (workforce development agencies, apprenticeship programs, Technical College programs). Job postings could also be included. The Water Careers Pathways Consortium of California provides an excellent model for such a portal. See <https://cawatercareers.org/careers/>

7. IDENTIFY BARRIERS IN CONTRACTING AND PROCUREMENT

OBJECTIVE

- To increase participation of women and minority-owned businesses in sub-contracting in the water sector, both in the utilities and in private companies
- To look at procurement policies to identify barriers to entry into contracts
- To create strategies to address these barriers

RATIONALE

A first step to increase diversity and inclusion in water-related industries is to understand the policies and outcomes of the procurement process. Disparity Studies can assess whether there are disparities in the awarding of contracts. Utilities and private companies can use the information from such studies to modify their contracting processes.

Public Procurement

Public procurement is a transparent process. Equal opportunity must be provided and there is an expectation that procurement will add social value to the contracting process, for example, by awarding of contracts to minority and women-owned business enterprises. In fact, public procurement often requires a certain percentage of contracts to be awarded to minority and women-owned businesses.

The last time the City of Milwaukee conducted a Disparity Study was nearly ten years ago. The 2010 Disparity Study reviewed contracts awarded by the City and MMSD between 2005-2008 and found that women and minority-owned businesses were significantly underutilized as sub-contractors on city and MMSD contracts. It recommended that the City should implement an Outreach Program to make women and minority-owned businesses aware of subcontracting opportunities.¹²⁵

MMSD and the City of Milwaukee will significantly increase spending in the next decade to address water infrastructure needs. Total annual capital spending by MMSD and the City of Milwaukee (Milwaukee Water Works and Department of Public Works) is estimated to be \$200 million by 2022. These investments provide extensive contracting opportunities. Mechanisms should be in place to ensure that minority and women-owned companies receive an equitable share of these contracts.

Private Procurement

Private sector procurement is less transparent than public procurement because it is not regulated in the way that public procurement is, making it hard to determine whether minority and women owned business face barriers to the awarding of contracts.

BARRIERS ADDRESSED

- Inequitable procurement practices

NEXT STEPS

To Address Procurement Policies in the Utilities, Participate in the Upcoming Disparity Study

The Water Equity Taskforce could participate in the City of Milwaukee's Common Council meetings that address the upcoming Disparity Study. The Taskforce could recommend that MMSD Procurement Policies be included in the Disparity Study.

The Common Council will award a contract in December 2019 and the study will be conducted in 2020. The Disparity Study will:

- Identify barriers that may adversely impact SWMBE participation in City contracts.
- Examine the availability (readiness, willingness, and capacity) of SWMBE's.
- Analyze the contracting and procurement data of the City to determine its respective utilization of SWMBE's.
- Determine the extent to which any identified disparities in the utilization of SWMBE's by the City are due to discrimination.
- Recommend programs to remedy the effects of any identified discrimination.
- Identify best practices and implementation guide for policy recommendations.¹²⁶

To Address Procurement Policies in the Private Sector, Collaborate with the Water Council.

The Water Equity Taskforce could leverage the Water Council to influence member companies in terms of procurement policies, including the setting of certain standards for procurement for member companies. Companies might be asked to review procurement policies and meet certain objectives.

8. ADDRESS BARRIERS TO EMPLOYMENT FACED BY THE FORMERLY INCARCERATED

OBJECTIVE

- To address rigid hiring policies that negatively impact vulnerable populations
- To address the barrier to employment presented by a criminal record

RATIONALE

According to the Public Policy Forum, 42% of Milwaukee's job seekers have a criminal record.¹²⁷ Vulnerable populations include a significant number of people who have been formerly incarcerated. This arises from decades of mass incarceration, which has led to black males in Wisconsin being twelve times as likely to be incarcerated as white males.¹²⁸ When these individuals reenter society, they have numerous barriers to employment. Their criminal records may be used by employers to disqualify them from employment, even if the criminal offense is unrelated to the job responsibilities.

For this reason, some advocates for the re-entry population are advocating for the expungement of criminal records. Expungement is the term used for sealing a criminal record from easy public access.

Wisconsin is one of only a handful of states that limit eligibility for expungement to those 24 years of age or younger. Nearly 63% of all criminal cases between 2006-2017 involved offenders age 25 and above¹²⁹.

Wisconsin is one of only three states with laws that do not permit expungement of cases resulting in non-convictions. In Milwaukee County over 10 years, nonconvictions accounted for 22.5% of all criminal cases, according to the report. In Wisconsin, ex-offenders are prevented from getting licensed for many professions, including Architect, and Landscape Architect.¹³⁰

BARRIERS ADDRESSED

- Rigid Hiring Policies
- Lack of diversity in the water workforce

NEXT STEPS

Expungement of Criminal Records

The Water Equity Taskforce could partner with the City of Milwaukee's Office of Violence Prevention, which produced the Blueprint for Peace. The Blueprint recommends efforts to hire previously incarcerated individuals and the expungement of criminal records.

The Scaling Wellness in Milwaukee (SWIM) Initiative at Marquette University has expressed interest in this initiative.

The Taskforce could also explore the possibility of a partnership with The United Way of Milwaukee, which held a forum on Expungement and provided recommended steps, including support for legislative bills sponsored by Senator Alberta Darling and Representative Evan Goyke.

The proposed legislation would make the following changes to Wisconsin law:

- If a person commits a crime when he or she is under the age of 25, the record can be expunged.
- If expungement was not ordered at the time of sentencing, the person would be able to apply for expungement after completing their sentence.
- If expungement is granted, the expunged record would not be considered a conviction for employment purposes.¹³¹

9. EXPLORE STRATEGIES TO MAKE GREEN INFRASTRUCTURE JOBS SUSTAINABLE

OBJECTIVE

- To turn Green Infrastructure (GI) jobs into real sustainable living wage jobs.
 - To create a funding stream which supports ongoing maintenance and inspection of GI
-

RATIONALE

GI installation and maintenance jobs tend to pay less than the median wage. They may not provide year-round employment. If a GI worker does not see a pathway to higher paying work or does not have year-round employment, they may leave the occupation. To address these challenges, pathways from seasonal GI work to year-round employment that pays a sustainable living wage must be established.

Some cities are seeking to combine traditional Green Infrastructure with other work. PUSH Buffalo! is working to turn GI jobs into year-round, sustainable jobs by combining GI responsibilities with solar power installation/maintenance and snow removal. Others have considered combining GI certification and training with certifications in Forestry or energy auditing.

Strategies are needed to fund the ongoing maintenance and inspection of Green Infrastructure. If GI facilities aren't maintained, they won't achieve their goals of reducing runoff into sewers and preventing local flooding. Any funding stream must also prioritize sustainable year-round employment for GI workers.

BARRIERS ADDRESSED

- Low pay in Green Infrastructure occupations
-

NEXT STEPS

The Water Equity Task Force could convene GI workers to gather their ideas about how to make these occupations more sustainable.

As the leader in GI programs, the MMSD Fresh Coast Resource Center along with a workforce development agency could seek to determine which occupations could be attached to GI training in order to create year-round living wage employment.

One possibility is urban forestry. The Wisconsin Department of Workforce Development recently initiated an Apprenticeship program in Urban Forestry. This program is a potential complement to GI training.

10. IDENTIFY CULTURAL BARRIERS TO EMPLOYMENT

OBJECTIVE

- To address the barrier to employment presented by Cultural bias
- To promote diversity, inclusion and retention of vulnerable populations in water sector workforce

RATIONALE

This study has presented findings in relation to hiring policies which negatively impact vulnerable populations. Cultural bias may impact hiring and retention of vulnerable populations. While these barriers are systemic and not just connected to the water sector, addressing these barriers could have a positive impact on diversity of the water workforce.

The workforce in Wisconsin's water sector is primarily white and male. Data for the state of Wisconsin show that in 2010 approximately 90% of employees in water treatment plants, water supply and utility system construction (including water) were white. 75% of employees in remediation and other waste management services were also white.¹³²

Stakeholder interviews and focus group sessions suggested that lack of diversity can affect recruitment, hiring and job retention. It may cause members of vulnerable populations to feel unwelcome in the workplace. These companies may have internal workplace cultures that contribute to the lack of diversity. Training that raises awareness in cultural competency addresses these issues. Stakeholders emphasized the need for companies to do internal work in order to address organizational biases and cultural competency. Many organizations have a limited understanding of racial disparities and racial literacy is low. This can lead to unintentional behaviors which make the workplace seem unwelcome to diverse populations.

NEXT STEPS

Training in Cultural Competency

Organizations have their own cultures. In order to provide a welcoming environment, all employees need to understand and feel connected to the culture of the organization. The first step is to increase racial literacy of employees. A trainer in cultural competency can provide this. Training in cultural competency should be provided to all employees. This should include awareness of unintentional behaviors that may create an unwelcome environment.

Employees should understand the racial, ethnic and gender composition of the organization and the sector and how the lack of diversity in the organization or the sector create barriers for diverse populations.

Cultural bias at public utilities

Milwaukee Water Works and MMSD policies for recruiting, hiring, and employment should be reviewed with the aim of identifying cultural barriers to employment that impact members of vulnerable communities. Employee policies should include “on-boarding,” in which new employees are oriented to the culture of the organization. Another effective strategy is the “buddy system,” in which a current employee is matched to a newcomer. This can help the new employee navigate the organization and increase the probability of a successful hire and job retention. Efforts to identify possible cultural bias in utility policies and practices could become a model for private sector employers in the water sector.

Cultural Bias at private companies

The Water Equity Taskforce could partner with the Water Council to develop a program to analyze the reasons for attrition in Water Council member companies. When an employee leaves the company, he or she should be interviewed. Exit interviews can provide a rich source of information about the culture of the organization.

APPENDIX

MEMBERS FOR THE MILWAUKEE WATER EQUITY TASKFORCE

CENTURY CITY TRIANGLE NEIGHBORHOOD ASSOCIATION

- Yvonne McCaskill

CREAM CITY CONSERVATION CORPS

- August Ball

EMPLOY MILWAUKEE

GREATER MILWAUKEE FOUNDATION

- Lamont Smith

GROUNDWORK MILWAUKEE

- Deneine Powell

MILWAUKEE AREA TECHNICAL COLLEGE

- Kathy Bates

MILWAUKEE COUNTY REGISTER OF DEEDS

- Israel Ramon

MILWAUKEE METROPOLITAN SEWERAGE DISTRICT

- Kevin Shafer
- Lisa Sasso

MILWAUKEE WATER COMMONS:

- Brenda Coley
- Kirsten Shead
- Joe Fitzgerald

MILWAUKEE WATER WORKS

- Karen Dettmer
- Aaron Saeugling

US WATER ALLIANCE

- Gina Wammock

STAKEHOLDER INTERVIEWS

	Name of Organization	Description
1	MATC	Education
2	Cream City Conservation	Community Organization - Training
3	Employ Milwaukee	Workforce Development Organization
4	Skilled Trades Collaborative	Union representative
5	Groundwork	Community Organization - Training
6	Milwaukee Jobs Work	Community Organization - Training
7	MMSD	Employer
8	Milwaukee Water Works	Employer
9	Veolia	Employer
10	Green Infrastructure Trainer	Trainer
11	WRTP Big Step	Workforce Development Organization
12	Water Council	Membership OrganizatiOn
13	Liuna - Laborers Local 113	Union representative
14	Badger Meter	Employer
15	Blue Skies	Community Organization - Training
16	UMOS	Community Organization - Training
17	UWM School of Freshwater Sciences	Education

INTERVIEW TOOL – STAKEHOLDER INTERVIEWS

A. Introduce the Project

The Water Equity Taskforce’s overall project objectives include:

- Develop a framework for understanding the water sector job market in the Milwaukee area, including existing workforce demographics, baseline conditions, challenges, and opportunities.
- Identify, and formulate steps to eliminate, any existing barriers to increasing the number of minority, unemployed, and underemployed Milwaukee area residents entering the Milwaukee area water workforce.
- Using a collaborative approach, develop replicable and adaptive strategies for advancing equity conscious career pathways, and pilot selected strategies to gauge their effectiveness in connecting job seekers to existing living wage careers.

B. Stakeholder Questions

Questions for Employers

1. “Water workforce” at your organization

- How many employees do you have?
- What number would you consider to be “water sector” jobs?
 - All jobs?
 - Just certain occupations?

2. Jobs Outlook

- Do you think that the number of jobs in the water workforce will grow, decrease or stay the same?
- Which occupations will grow?
- Geographically, where will the number of jobs increase?

3. Barriers:

- Provide definition of structural and cultural barriers for interviewees
 - Structural barriers:
 - Cultural barriers:
- What are the barriers to securing employment in the water workforce?
 - What might be barriers specific to vulnerable communities?
 - For instance, are there prohibitions against hiring people with criminal records, or barriers to hiring people with disabilities?
- What are the geographic barriers?
- What are the cultural and social barriers?
 - Especially the barriers for people from vulnerable communities
 - Are there barriers based on gender?
 - Do you have positions available for disabled employees?
 - How do handle limited English speakers?

4. Training/Education/Credentials

- How necessary is a certification or degree for “water-related jobs” at your organization?

- Which occupations absolutely require certification or previous work experience?
- What training or educational programs are most relevant to your workforce?

5. Diversity Policies and Goals

- Does your company have written diversity policies and goals?
 - Can you share the document in follow up email
 - Is there a person who is in charge of enforcing those policies?
- How do you measure the success of these policies?
 - How often are these policies monitored and updated?
 - Can you share the outcomes of the Diversity policies?
 - Has your organization met its diversity goals?
 - If NO, what are the **barriers** to achieving your company's workforce diversity goals?

6. In-house training/advancement

- Do you have **mentoring** programs?
 - Can you describe them OR share the information in a follow-up email
- Do you offer **on-the-job training or apprenticeships**?
 - Can you describe them OR share the information in a follow-up email
- What are the **career pathways** for your employees?
 - How do employees learn about these pathways
 - Can you describe an employee who followed the pathway
- Do you track the **diversity** of participants in any of these programs?
 - If YES, can you share this information?
 - What are your strategies to encourage diversity in participation in these programs?

7. Follow up to Priority Questions:

- Do you hire seasonal workers, interns, part time workers, temporary or transitional workers?
 - If YES, which occupations are seasonal, part-time, temporary, transitional?
 - If NO, do you see opportunities for these types of employment arrangements at your organization?
- What is the attrition rate of your workforce?
 - What percent are nearing retirement?
 - Will they be replaced?
- How does your organization **orient** new employees?
 - Can you describe the orientation? What does it look like?
- How are the Diversity policies implemented?
- Do the diversity policies apply to all jobs/departments?
 - If NO, which jobs/departments are subject to these policies?

• UTILITIES

- **Learn about policies by department**
 - Do the policies differ by department.
- Are people of color concentrated in one department (i.e. community engagement)?
 - How can this be addressed?

Questions for Workforce Trainers/ Educational Organizations

1. Can you **describe** your training program?
 - When was it established
 - What occupations does it train a person to enter?
 - How many people participate in the program each year?
 - Is it growing?
2. Does your training incorporate **on-the-job** work experience?
 - Is it paid work experience?
3. **Recruiting** participants/students
 - What are some of the main reasons that individuals choose to enter your training/educational program?
 - How do you recruit to your training program?
 - Where do you recruit?
 - Do you have strategies to recruit from underserved communities?
 - Please describe
4. **Pathway** to employment
 - Can you describe the pathway that leads from your training/education program to employment?
 - Do you help with job placement?
 - Can they enter these occupations directly after completion/graduation or is further training necessary?
 - What percentage of your graduates find employment in this field?
 - How long do you continue to track those individuals?
 - Where do they find employment if not in the field of training?
 - For those that do not find employment in this field, what do you believe are the reasons why?
 - Training doesn't always translate to real job opportunities: How do you ensure that your program trains people for existing jobs?
5. **Barriers:**
 - What are the barriers to entering your training or education program?
 - What is the length of training?
 - Is the training time flexible?
 - What is the cost of training?
 - How do you attract applicants/participants from vulnerable communities?
 - What are the barriers to employment in the field?
 - How does race/culture impact the workforce?
 - Gender?
 - Disability?
6. **What works:** What aspects of your training program have:
 - Worked best?
 - Been less productive?

7. Are there sufficient **resources** available for your training program?
 - Are there scholarships or other programs to help with costs?
8. Your **suggestions**:
 - What questions do you think we should we ask employers?

EMPLOYMENT - ORGANIZATIONS THAT SUPPORT THE WATER SECTOR	
	Metro Area Employment
Administration of Environmental Quality Programs - Government	385
Administration of Housing Programs, Urban Planning, and Community Development – Government	104
Administration of Economic Programs - Government	1,530
Unions – Milwaukee Area Labor Council and Local 113	14
Total	2,033

EDUCATIONAL ATTAINMENT FOR WORKERS 25 YEARS AND OLDER BY OCCUPATION, 2016-17		
Occupation	Less than high school diploma	High school diploma or equivalent
Pile-driver operators ⁽¹⁾	19.9	51.7
Operating engineers and other construction equipment operators ⁽¹⁾	19.9	51.7
Pipelayers ⁽¹⁾	16.5	46.6
Plumbers, pipefitters, and steamfitters ⁽¹⁾	16.5	46.6
Helpers--pipelayers, plumbers, pipefitters, and steamfitters ⁽¹⁾	27.8	45.0
Hazardous materials removal workers	15.5	42.2
Construction laborers	33.3	39.9
Landscaping and groundskeeping workers ⁽¹⁾	35.8	36.5

Source: 2016 and 2017 American Community Survey Public Use Microdata, U.S. Census Bureau

CITY OF MILWAUKEE HIRING AND RECRUITMENT

RECRUITMENT METHODS

The City of Milwaukee advertises open positions in the following ways:

- www.milwaukee.gov/jobs
- Job announcement sheet is posted in City Hall.
- Job Information Hotline: 414.286.5555
- E-notify – receive job announcements by e-mail
 - Must sign up at www.city.milwaukee.gov/jobs/enotifyjobs

CITY OF MILWAUKEE HIRING POLICIES

CIVIL SERVICE EXAM

The City of Milwaukee administers an exam to job applicants. The City conducts merit-based hiring and the exam is used to determine merit. The exam includes job-related questions in the following areas:

- Interpersonal Skills and Customer Service
- Interpretation of Job-Related Materials
- Getting Along in the Workplace

Those who pass the exam are ranked and put on an eligible list. The ranked list of eligible candidates is provided to the hiring department which selects individuals for departmental interviews.

PRE-EMPLOYMENT TESTING

Pre-employment testing includes drug screening, conviction reviews, and medical exams.

Drug screening: Candidates for employment for safety sensitive positions must pass a pre-employment drug test. These include positions in which the employee:¹³³

- requires a commercial driver's license
- operates heavy machinery or equipment
- works with controlled substances, hazardous chemicals, or hazardous materials
- is responsible for inspection duties relative to building safety infrastructure
- is responsible for providing direct medical care and other public health interventions that ensure the health and safety of the community
- is directly responsible for assessing and preventing **environmental** and other health hazards
- is responsible for activities related to the quality, distribution, and safety of potable **water**

Background check: A pre-employment background evaluation is conducted by the Department of Employee Relations (DER). The components of the evaluation vary depending upon the nature of the vacancy, but it primarily includes:

- Evaluation of conviction records. These conviction reviews include only State of Wisconsin convictions
- Verification of education and occupational license or certification
- Confirmation of valid commercial driver's license (CDL) for jobs that require CDL

DISABILITY POLICY

When hiring, an employer may not ask questions about **disability** or require medical examinations until after a conditional job offer is extended to the candidate.

CITY OF MILWAUKEE, RESIDENT PREFERENCE PROGRAM - OUTCOMES

- The 40% resident participation requirement is being met for most public works contracts.
- *Department of Public Works*
 - 8,757 individuals were RPP-certified as of 2015. Most of these individuals are residents of central city neighborhoods.
 - For all DPW contracts closed between 2010 and 2015 that included RPP requirements, RPP workers accounted for 48% of the total hours worked.
 - RPP workers employed on public works projects are much more diverse than the workers who were not RPP-certified. During the period, 2010-2015, 67% of the active RPP workers were people of color, while only 17% of the non-RPP workers employed on public works projects during the same period were people of color.
- *Northwestern Mutual*
 - 2,600 workers were employed in the construction of the \$450 million Northwestern Mutual Tower and Commons.
 - Of the total workers, about 1,200 were local residents hired through RPP¹³⁴.
 - 43.5% of the work hours were performed by RPP-certified workers on the construction of the Northwestern Mutual Building.
- *Fiserv Forum*
 - In 2018, construction was completed on the \$524 million Fiserv Forum.
 - The most recent report showed 43 percent of the construction hours worked by unemployed or underemployed residents of Milwaukee's low-income zip codes.
 - Minority workers represented 32 percent of the project hours
 - Women represented about 7% of the worker hours
 - 33% of contract dollars went to small business enterprises, which include minority-owned companies.¹³⁵

MMSD - RACE AND GENDER BY JOB TITLE

MMSD - Race and Gender by Job Title						
	Service and Maintenance	Office & Clerical	Technicians	Professional	Officials	Total
Total	4	24	67	111	19	225
Male	3	2	48	69	11	133
Female	1	22	19	42	8	92
Minority	2	7	12	18	4	43
White	2	17	55	93	15	182
% White	50%	71%	82%	84%	79%	81%
% Minority	50%	29%	18%	16%	21%	19%
% Female	25%	92%	28%	38%	42%	41%

MMSD TARGETED AREA PROGRAM

The policy covers contracts valued at \$100,000 or more.

- Contractor must submit an implementation plan that lays out strategies for achieving worker participation requirements prior to beginning the contract.
- Contractors are encouraged but not required to hire individuals who meet one of the following criteria:
 - Certified RPP worker
 - Graduate of, or participant in, the district's workforce training and placement program
 - Resident of the Community Development Block Grant (CDBG) area or one of 17 designated, low-income zip codes
 - An income below 185% of the federal poverty level
- Contractors report on targeted hires on its payment invoices. The information includes: names and addresses, zip code, race, gender, trade, wage, and hours worked.

PATHWAYS TO WATER CAREERS

Laborers Pathway

- **BUILDING TRADES**
 - Apprenticeship
 - Starting Wage - \$26.18/hour
 - Journeyman
 - Starting Wage - \$32.73/hour
- **SEWER AND WATER**
 - Apprenticeship
 - Starting Wage - \$24.62/hour
 - Journeyman
 - Starting Wage - \$30.77/hour

Associate Degree Pathway

LANDSCAPE HORTICULTURAL PATHWAY

- Technical Diploma – 29 credits
 - Potential Jobs – Gardener, Groundskeeper, Landscape Construction, Laborer
 - Average Starting Wage - \$24,190
- Associate Degree – 70 credits
 - Potential Jobs – Landscape Designer, Grounds Manager, Landscape Construction Manager, Arborist
 - Average Starting Wage - \$30,836

ENVIRONMENTAL HEALTH AND WATER QUALITY

- Certificate – 17 credits
 - Potential Jobs – Water and Wastewater Treatment Plant and System Operator
 - Average Starting Wage - \$30,264
- Associate Degree – 70 credits
 - Potential Jobs – Water and Wastewater Treatment Plant and System Operator, Environmental Science and Protection Technicians, Environmental Engineering Technician
 - Average Starting Wage - \$47,540

PLUMBING

- Technical Diploma – 27 credits
 - Potential Jobs – Plumbers, Pipelayers, Pipefitters, Steamfitters
 - Average Starting Wage - \$47,948

POWER ENGINEERING AND BOILER OPERATOR CAREER PATHWAY

- Certificate – 4 credits
 - Potential Jobs – Boiler Operator

- Average Starting Wage - \$29,216
- Technical Diploma – 20 credits
 - Potential Jobs – Industrial Engineering Technician, Industrial Machinery Mechanic, Stationary Engineer, Boiler Operator, Maintenance and Repair Worker
 - Average Starting Wage - \$42,059

REFRIGERATION, AIR CONDITIONING AND HEATING SERVICE TECHNICIAN PATHWAY

- Apprenticeship – Steamfitter, Refrigeration, Plumbing
- Technical Diploma – 30 credits
 - Potential Jobs – Sheet Metal Worker, Heating, A/C and Refrigeration Mechanic and Installer
 - Average Starting Wage - \$40,498
- Associate Degree – 70 credits
 - Potential Jobs – Mechanical Engineering Technician, Sheet Metal Worker, Heating, A/C and Refrigeration Mechanic and Installer
 - Average Starting Wage - \$40,414

UNIVERSITY PROGRAMS

ALVERNO COLLEGE – MILWAUKEE, WI

- *Bachelor's Degree in Environmental Science or Integrated Natural Sciences*
 - 4 year degree at Alverno
- *Dual Degree Undergraduate/Graduate Program with University of Wisconsin Milwaukee Master of Science in Freshwater Sciences and Technology.*
 - Undergraduates complete a three-year program in Environmental Science or Integrated Natural Science at Alverno.
 - After 3 years of undergraduate work, the student can transfer to UWM and complete a Master's Degree in Freshwater Sciences.

CARROLL UNIVERSITY – WAUKESHA, WI

- *Bachelor's degree programs*
 - Civil Engineering
 - 4 areas of focus: structural, environmental, water resources, and transportation.
 - Environmental Science
 - Freshwater Sciences

CONCORDIA UNIVERSITY - MEQUON, WI

- *Bachelor of Science Programs*
 - Environmental Science
 - Integrated Natural Sciences
 - Partnership with MATC - Environmental Health and Water Quality Technology.
 - Students attend MATC's two-year associate program
 - Transfer to Concordia University to complete a four-year degree. The program focuses on environmental health hazards related to hazardous material, water, and wastewater.

MARQUETTE UNIVERSITY

- *Law School*
 - *Environmental Law*
 - *Water Law*
- *School of Engineering*
 - *Environmental and Water Resources Engineering*
- *Global Water Center*
 - As a member of the Global Water Center led by the Water Council, Marquette coordinates programming from various departments such as:
 - Engineering, Physics, Biology, Math, Education, Computer Science, Chemistry.
 - Marquette University currently has 13 ongoing projects at the Global Water Center.¹³⁶

MILWAUKEE SCHOOL OF ENGINEERING (MSOE)

- *Master of Science in Civil Engineering - Environmental and Water Resources Engineering emphasis*

- Focus on facilities planning, environmental law, and life cycle assessment.

PURDUE UNIVERSITY GLOBAL - MILWAUKEE CAMPUS

- *Bachelor's degree programs*
 - Environmental and Ecological Engineering
 - Coursework in water treatment, water quality, wastewater, air pollution, environmental protection, and environmental policies
 - Agricultural and Biological Engineering Department
 - Agricultural Engineering
 - Coursework in machines and technology that improve the agricultural food system
 - Environmental and Natural Resources Engineering
 - Coursework in soil, water and air quality, and the agricultural food system
 - Environmental Geosciences
 - Coursework in ground water, air and soil quality, landfill management and other environmental areas.
 - College of Agriculture
 - Aquatic Sciences
 - Coursework in marine and freshwater biology or in the research and management of fisheries
 - Soil and Water Sciences
 - Coursework in hydrology, water, and soil composition

UNIVERSITY OF WISCONSIN-MILWAUKEE (UWM)

- *Master's Degree and PhD Programs – Freshwater Sciences*
 - Graduate programs focusing on freshwater systems, both PhD and master's degree options.
- *Bachelor's degree in Conservation and Environmental Science - Water Resources concentration*
 - Housed in College of Letters and Science.
 - Water resources track studies the physical and chemical aspects of water as well as the geological and biological processes that influence its distribution, supply, quality, and ecological functions.
 - Areas of focus: Environmental Chemistry and Toxicology, Surface and Groundwater Hydrology, or Aquatic Ecology and Limnology.
 - Prepares students for graduate studies in water resources or employment in the field of water quality assessment, groundwater monitoring, and lake or stream management.
- *UWM College of Engineering and Applied Science*
 - Water Resources Laboratory focuses on research related to water quality (under the College of Engineering and Applied Science).
- *Certificate in Applied Urban Aquaculture*
 - Students are educated in techniques to evaluate water in aquaculture systems.
 - To apply, applicants must be pursuing a bachelor's degree from UWM or have received a bachelor's degree from UWM or another accredited institution.
- *Water SYS-STEM Internship*
 - 10-week summer program that matches students from MATC, Waukesha County Technical College, and Gateway Technical College for mentoring opportunities from UWM and companies associated with the Water Council.

- The goal of the program is to help technical college students transfer to UWM and promote diversity in various STEM fields.

UW STEVENS POINT

- *Bachelor's Degree in Waste Management.*
 - Graduates work at landfills, wastewater treatment plants, and other waste management facilities. Job titles include:
 - wastewater treatment plant operator
 - waste disposal manage
 - waste research specialist
 - environmental manager
 - solid waste manager

UNIVERSITY OF WISCONSIN-WHITEWATER

- *Bachelor's Degree in Integrated Science and Business*
 - This program allows students to earn a Water emphasis in their major degree program or a Water Business Minor in addition to their major.
 - Students can apply to the College of Business and Economics or the College of Letters and Sciences.
 - The integrated program educates students in “water quality issues, water technology businesses, water management companies, water-related policy development, and new ideas in water-related non-profit organizations.”

TECHNICAL COLLEGE PROGRAMS

MILWAUKEE AREA TECHNICAL COLLEGE (MATC)

ASSOCIATE DEGREES (2 YEARS)

Environmental Health and Water Quality Technology

- This degree focuses on improving the quality of water, food, and air quality.
- The program educates students in evaluating the quality of water in everyday use and wastewater.
- The program prepares students to take the Department of Natural Resources certification exam.
- Careers included water treatment operators, field monitoring and sampling, and water quality lab specialists.
- Applicants are required to have completed high school or GED, one semester of high school-level algebra, and pass a course placement assessment test.

Civil Engineering Technician (Structural Engineering)

- Planning and design in architectural/engineering/construction (AEC).

TECHNICAL DIPLOMAS (TWO SEMESTERS)

Preparatory plumbing

- Two-semester technical diploma provides basic skills for individuals seeking an apprenticeship in plumbing.

Boiler Operator

- Certificate for boiler operators. The program is situated in the School of Technology and Applied Sciences/Architecture and Construction Career Cluster.
- Applicants are required to have completed high school or GED and pass an assessment test.

Power Engineering

- Students that have completed the boiler operator certificate can also earn a two-semester technical diploma in Power Engineering and Boiler Operator.
- Future employment can include such positions as building engineers, boiler operators, maintenance mechanics, and power engineers.

CERTIFICATES

Water Technician Certificate

- Provides the necessary skills for entry-level positions within the water industry.
- Jobs: entry-level positions within the water industry.
- Applicants are required to have completed high school or GED, one semester of high school-level algebra, and pass a course placement assessment test.

Boiler operators

- Jobs include building engineers, boiler operators, maintenance mechanics, and power engineers.
- Applicants are required to have completed high school or GED and pass an assessment.

GATEWAY TECHNICAL COLLEGE – KENOSHA, WI

ASSOCIATE DEGREE

Civil Engineering Technology-Fresh Water Resources.

- Coursework in environmental assessment, water treatment, stormwater management and erosion control.

APPRENTICESHIP

Wastewater Treatment Plant Operator apprenticeship

- The apprenticeship position requires approximately 6,000 hours (3 years) including 432 hours in classroom instruction and 5,568 hours of job training.
- Plumbing apprenticeship.
 - The training program requires approximately 8000 hours of job training (5 years) in which a minimum of 500 hours must consist of classroom instruction.

- Upon completion, the apprentice must take the journeyman examination.

MORAINÉ PARK TECHNICAL COLLEGE – FOND DU LAC, WI

ASSOCIATES DEGREE

Water Quality Technology.

- The program educates students in evaluating the quality of water in everyday use and wastewater. In addition, the program prepares students to take the Department of Natural Resources certification exam.

Civil Engineering Technician (Structural Engineering).

- Coursework in planning and design in architectural/engineering/construction (AEC)

APPRENTICESHIP

Wastewater Treatment Operator

- 3-year apprenticeship program as a wastewater treatment plant operator. Applicants must be 18 years old and pass an aptitude test or the Accuplacer test. The program requires approximately 5,568 hours of job training and 432 hours of paid instruction.

NORTHEAST WISCONSIN TECHNICAL COLLEGE - GREEN BAY, WI

ASSOCIATE DEGREE PROGRAM

Environmental Engineering Water and Wastewater Technology

UNIVERSITY-AFFILIATED PROGRAMS

UWM WATER EQUIPMENT AND POLICY CENTER

- Housed within the UWM School of Freshwater Science, the Center is funded by the National Science Foundation. It is a collaboration with Marquette University and local water related companies.
- Creates new products and processes in the water industry

UWM SCHOOL OF CONTINUING EDUCATION

- Water Technology Certificate – 7 courses
 - Coursework in water quality and management.
 - Participants are mainly professionals with water sector experience.

MARQUETTE LAW SCHOOL- WATER LAW AND POLICY INITIATIVE

- Focuses on the legal regulations surrounding water policies and issues.
- The Initiative has ongoing projects related to watershed issues, food-energy-water nexus, public policy and American drinking water, transboundary waters, energy and manufacturing partnerships.
- Invites low-income high school students to participate in workshops in water technology law and policy.

UNIVERSITY OF WISCONSIN-MADISON

- Professional Development for professionals in the water sector. Water-related professional development program in water distribution system and maintenance.

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ENDNOTES

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⁸ NAICS 54171: This industry comprises establishments primarily engaged in conducting research and experimental development in the physical, engineering, and life sciences, such as agriculture, electronics, environmental, biology, botany, biotechnology, computers, chemistry, food, fisheries, forests, geology, health, mathematics, medicine, oceanography, pharmacy, physics, veterinary, and other allied subjects.

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¹² Ibid.

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