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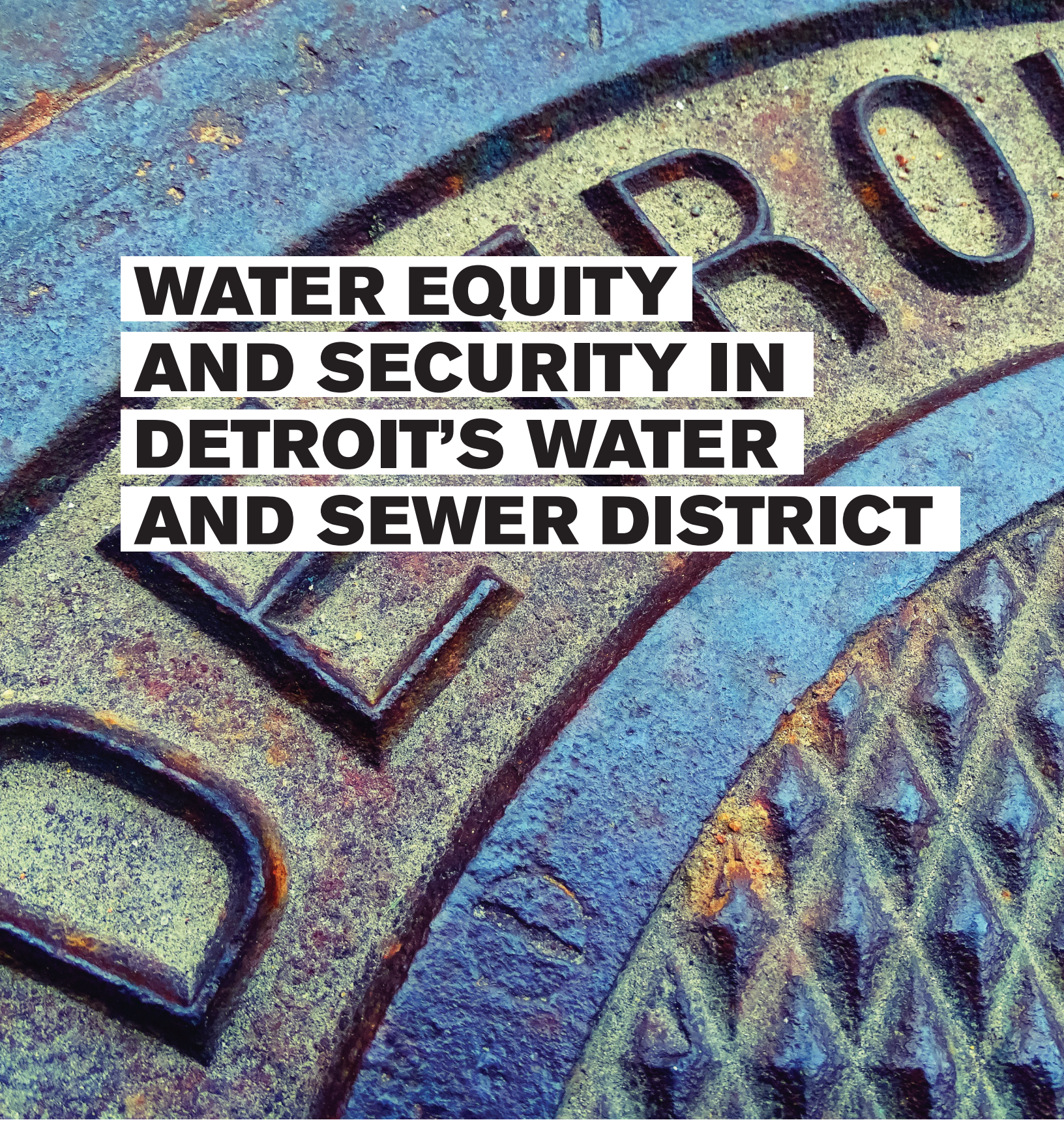

WATER EQUITY AND SECURITY IN DETROIT'S WATER AND SEWER DISTRICT

haas institute
FOR A FAIR AND INCLUSIVE SOCIETY

MOSES
Metropolitan Organizing Strategy Enabling Strength

PRAXIA
PARTNERS

This report is a joint publication of the Haas Institute for a Fair and Inclusive Society at UC Berkeley, MOSES, and Praxia Partners

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Executive Summary

Introduction

Ensuring access to drinking water and wastewater service is a nationwide policy challenge. Across the United States access is increasingly insecure for many people and places. In this report we comply with scholarship and legal precedent that defines access to include access to residential in-home service, quality service that serves environmental and personal health, and affordable service.

Water security is a term in this report used to describe the presence of structural, systemic, and institutional arrangements that ensure everyone has consistent access to drinking water and wastewater services. Water insecurity looks different in the humid east than in the arid west, different in the Midwest from the South, different between urban, suburban, or rural. However different water insecurity problems look at the local level, they are the result of similar institutional, systemic, and structural problems. This is a study of the what persistent water insecurity looks like in the service area of Detroit's drinking and wastewater system (DWSD) and specific places within that system, notably Detroit.

A 2017 Michigan State University study estimated that if water costs continue to increase at the same rate for the next five years, a third of households in the US may be unable to afford water costs.[1] This alarming figure highlights the scale of water insecurity due to barriers to affordable access. Detroit's regional system fits patterns of water and sewer insecurity across the country and creating water security is an effort that must also consider the operator and manager of the system—the Great Lakes Water Authority (GLWA).

Water and sewer systems in the US have to meet federal regulatory standards to maintain or improve environmental quality and public health. While the federal government has a uniquely vast capacity for funding local infrastructure.[2] It has provided far less than needed to supplement state and local government investments. Inadequate federal investment creates a pervasive problem for local system revenue. The costs of system repair and upgrade to meet regulatory standards is high. The Congressional Budget Office data records that federal investments in the nation's drinking and wastewater systems constituted between 5.7 and 4.0 percent of total annual spending since 2010. The rest falls to state and local governments.[3] The bulk of investment then trickles down to revenues from system users in the form of service rates or fees. To complicate the matter, many cities, particularly deindustrialized cities, have experienced economic trends that challenge the capacity for system revenue to cover costs. Some cities' systems are a century old. In the case of many systems, when the system grew into a regional system the most aged parts of the infrastructure are those serving the city's urban core. Even though the EPA has documented 228 water affordability programs across the country, we did not find note or reference to a plan that adequately addresses the local needs.[4] In Detroit, evidence of barriers to drinking and wastewater service are primarily described as affordability challenges although there are concerns about the water shutoffs' impact on drinking water quality vis a vis increasing water age—the amount of time water spends within the system infrastructure.[5]

In the context of global climate change, it is critically important that drinking water and wastewater systems are designed to be adaptable and resilient. Extreme and unpredictable weather conditions and higher temperatures affect the distribution of rainfall, snowmelt, and ground-

Communities across the US need solutions to what has been described as among the primary infrastructural challenge of the twenty-first century.

water, ushering in more frequent floods and droughts—patterns that should be anticipated and integrated in local water and sewer system planning and design. Balancing necessary improvements in the context of shrinking public resources is a common problem with dire impacts.

Communities across the US need solutions to what has been described as among the primary infrastructural challenge of the twenty-first century.[6]

The mission of the DWSD system is clear—as is GLWA's mission: It should meet the universal goal that everyone benefits from region-wide water security and improved environmental quality and public health. This universal goal of water security is not realized for everyone and every place in the service area and so the entire region is deprived of the environmental and public health benefits of widespread water security.

The national attention brought to Detroit and its water system is driven by the city's bankruptcy and the use of water shutoffs as a dysfunctional incentive for bill payment. The moving personal accounts of the effects of water shutoffs have mobilized compassion and the attention of policy makers to address affordability and rate setting. National attention is now directed at how GLWA operation and management of Detroit's water and sewer system will handle the challenges to providing water security and its salutary effects on public health and environmental quality.

Detroit is a focus in this report for two reasons. Firstly, even among other cities within GLWA service area, Detroit is uniquely positioned because of its ownership of the system and operation and its management of the system since 1836. The City of Detroit built out the infrastructure into suburban municipalities which allowed new municipalities to avoid great expense to establish and develop.

It's an ambitious task to design and align a set of targeted strategies that will enable everyone to enjoy water security and its contributions to public health and environmental quality. These strategies cannot be designed without a careful analysis of the unique relationships between Detroit, the system, GLWA, and the region.

It is with the interests of the entire service area that we analyze the potential of the regional and exceptionally valuable water and sewer utility and its impact on regional environmental quality and public health. The next phases of the project will more fully engage the regional aspects of the system. This will entail broader engagement and consultation with the system's municipal and county governments within the service area, as well as advocate and community groups that serve those communities. The project aspires to create structural and institutional coordination between Detroit, Detroiters, DWSD, and GLWA. As ambitious a goal as that is, we aspire to do more—to promote regional coordination and alignment to ensure water security for everyone in the region and maximize the system's ability to lift up regional economic and public health.

Secondly, Detroit is a focus of this report because it exemplifies another national trend in water and sewer insecurity. People and places most directly impacted by water and sewer insecurity are also those historically neglected by public institutions and left out of key decision-making processes. In the case of GLWA and DWSD—and "pockets of water poverty" across the country—this means poor Black Americans and other people of color, and places where data shows higher rates of poverty, unemployment, and disability.

Targeted universalism policy requires a detailed understanding of the problem—a process that is not trivial and requires scrutiny from every direction.[7] Accomplishing this initial broad base of participation is critical and not just because "community engagement" is best practice. It is critical because novel viable strategies cannot be created without understanding all of the complicated ways people—and the places they live—are experiencing water and sewer insecurity and their different relationships with relevant institutions. This report is a first step in synthesizing and analyzing these components of a targeted universal platform for water security in the DWSD system service area that lifts up public health and environmental quality.

Local governments and households across the GLWA service area and state and federal government are at a critical juncture. National leaders in community organizing have emerged from the area. They have provided emergency assistance to communities and defined and conducted areas of research into water insecurity. These people, organizations, and groups are instructive for people across the country.

Opportunities for national leadership exist in other domains and are needed by local residents

and many more. The incredibly valuable asset that the City of Detroit has built can become a powerful lever of economic growth—for the city and the region as a whole. They system's operation can be an example of how to ensure water security across the region and design practicable urgent adaptation to climate change. It can be an example of practical adaptation that also raises the level of public health and environmental quality. It can also provide a model of how to provide benefits to everyone and can be best and most fairly accomplished by designing strategies to help places and people who most urgently need relief from structural, systemic, and institutional barriers. The regional context of the DWSD system and its environmental and public health impacts are exceptionally well suited to see how "we all live downstream" and stand to benefit or be harmed by the way our neighbors fare.

This report outlines a number of technical findings and suggests targeted interventions that can begin steps to create water security. Resolving problems is not only a matter of technical correctness and sophistication. Resolutions must also address deeper social cleavages around race and poverty. Solving the problem of region-wide water security and its contribution to environmental quality and public health requires technical and social science.

Each section in this Executive Summary corresponds to a full chapter in the report expanding and elaborating on the topic. We encourage review of the full chapters, particularly if questions or concerns arise after reading this summary.

We first appraise the way the city is positioned within the GLWA through an analysis of the lease and services agreements between the DWSD and GLWA. This is an area of great concern to organizations and individuals we spoke with. It is also the core text encoding institutional relationships that set the rules of how decisions about water security, public health, and environmental quality will be made. Some details of these relationships we discuss respond to persistent questions that were raised and others raise the profile of well-known community concerns.

This analysis leads to the next section where we summarize seven recommendations, or opportunities, that can be pursued to remove structural barriers to region-wide water security and its environmental and public health benefits. These strategies target specific concerns raised by Detroiters, city leadership, and community organizations and advocacy groups. Many of them are the focus of current discussions, advocacy, or projects. The recommendations are raised in general terms and within these descriptions we identify areas of further inquiry that can further implementation correspond to information gaps that must close.

An additional chapter details the well-established work linking health outcomes to the accessibility to drinking and wastewater services, access to affordable, in-home, and high-quality service. We discuss the deleterious effects of water insecurity on both individual and community health. This discussion was warranted because of concerns related to systemic health effects of water shutoffs and its cascading effects within communities and an ongoing desire to develop research in this domain.

The final chapter provides historical context of the drinking and wastewater system. When groups discuss the need for structural changes, the implication is that structures can either be a force for marginalization or inclusion. In Detroit's regional area, and across the US, drinking and wastewater infrastructure can become a force for inclusion. At the moment, the system functions such that some places and groups of people experience greater water insecurity than others. Furthermore, the entire area is missing out on the potential for water security to improve public health and environmental quality. The full history of how local structures are artifacts of the national and local history of racial animus have been studied and documented in great detail and rigor. It is beyond the scope of this report to reflect the breadth and depth of that work. Ours is an effort to note specific moments in that history and overlay those moments with key moments in the evolution of the DWSD system.

Institutional Relationships: The Great Lakes Water Authority and the Detroit Water and Sewer District

The Great Lakes Water Authority (GLWA) operates and manages the Detroit Water and Sewer District system. The GLWA is a "public body corporate"[8] created in fall 2014. By the end of

2014, Detroit and Wayne, Oakland, and Macomb counties joined the Authority. The DWSD system was formally regionalized in June 2015 when a 40-year lease agreement was approved and GLWA took over operations and management of the system. Under the current arrangement, the authority leases the regional water system from Detroit. GLWA pays a $50 million per year lease payment, pays a $26.2 million credit to Detroit's revenue requirements as a "return on equity," and commits $4.5 million (or 0.5% of budgeted operating revenues) for a water assistance program.[9]

The terms of the institutional relationships between DWSD and GLWA are detailed in the lease and services agreements. Here we identify structural design flaws in these agreements that our research suggests are some root causes of many community concerns. There are other important documents that require further detailed analysis in future studies–for example GLWA's master bond ordinance.

The first chapter of the report focuses on how the agreements create structural barriers for water security in Detroit and throughout the system's service area. These barriers have to be addressed in order for the system–an exceptionally valuable asset–to create and build opportunities for the City of Detroit. This is a regional approach that responds to regional inequality but also is practical in considering economic development in the region.

Additionally, we find that some of the strategies designed to target Detroit will in effect also benefit a more diverse group of people and places. Creating water security in Detroit will improve water security in other municipalities and among their residential users. The presence of wide-spread water security implies that a number of critical conditions would also be intact. For example, improved fiscal health in local communities, quality infrastructure, adequately funded and well-designed water affordability programs, and quality management and operation structures. Furthermore–and most important to understand the universal regional benefit–wide spread water security provides improves environmental quality and public health throughout the region.

The universal and individually unique benefits of this public asset inspire this project. The potential of Detroit's system is also the potential of similar public water and sewer systems across the country. This is the basis for expanding our project's reach and participation in the coming phases of the work. This is also the basis for proceeding with designing a platform that meets the immediate and more urgent needs for some people and places in the service area–in the process improving the outcomes for people and places throughout the service area.

Water affordability

We first discuss water affordability throughout the system. This is because of the exceptionally urgent need to address water affordability issues in the city and the associated regime of water shutoffs. We make recommendations that can respond to this structural problem in both the short and long term. We primarily spoke with Detroit-based organizations and their primary reason to attend to affordability is due to the specter of shutoffs within the city. However, there are clear affordability problems throughout the service area. While we have further work to do in evaluating the details of affordability problems in other locations, the bulk of recommendations pertaining to affordability will provide relief to users throughout the service area.

The agreement contains provisions for a $4.5 million water assistance program. However, the program is demonstrably underfunded, making it impossible to effectively meet the needs on the system's service area. Even though all those eligible to enroll do not enroll, when the program began in March 2016, funds allocated to Detroiters for the year ran out by August.[10]

The solution is not to simply pour more money into the existing customer assistance program. It is important to note that the current affordability program merely provides assistance to customers whose bills are already overdue, rather than structuring rates to make them affordable in the first place. Affordability–rather than assistance–programs designed to align with the general principles of our recommendations will be more durable and do more to expand water security throughout the service area.

There is a need to update and expand upon the work of the 2005 affordably plan and determine the costs of comprehensive water affordability in the region today. We have begun a study that includes the full-service area. Additionally, the study compares the EPA metrics with proposed alternative metrics more suited for targeted place-based affordability standards.

Rate Setting

Designing rate structures is incredibly complex and limiting room to maneuver can limit options for novel designs that accomplish multiple objectives–including affordability. Rate setting is entangled with a proposition in the final report from the state's Flint Water Advisory Task Force. It was suggested that the crisis in Flint "prompt local and state re-investment in critical water infrastructure, while providing mechanisms to advance affordability and universal access to water services."[11]

The lease agreement contains terms that can be obstacles to fundamentally reevaluating pricing structures. Such reevaluation may be required for effective cost-recovery, as well as for guaranteeing water security, improving environmental quality, and increasing public health.[12] The current agreement could inhibit the development of a rate-setting structure that recovers costs while ensuring equity, efficiency, and sustainability.

For example, the agreement prohibits increasing rates by more than four percent per year for the 10 years of the 40-year lease agreement, except when necessary to meet legal obligations.[13] This is locked-in but this may not be adequate depending upon the future decisions and practices of GLWA. The four percent cap could present significant limitations to recovering costs and therefore a barrier to funding a water affordability program and improvements to Detroit's urban infrastructure. Consultants who recommended the 4 percent cap factored in funding for the customer assistance plan–but did not account for expanding that program or creating a robust affordability program.[14]

Rate increases can be difficult–even impossible– for some wholesale customers to meet without significant financial assistance. For example, a more affluent community with an increasing population and high employment rate would be able to better absorb and distribute a rate increase than a community struggling with a shrinking economy, stressed finances, and population decline. The design of a fair and adequate rate structure should be sensitive to differences among places and sensitive to different needs of wholesale customers.

As we propose in the recommendations section of this report, parties with expertise and experience in developing equitable rate setting strategies should conduct a rigorous and detailed assessment of the current rate structures and their impacts. Additionally, possible alternatives should be considered.

Annual Lease Payment

A lease payment should be based on the value of the leased asset and compensation for the risk its owner faces in such an arrangement. While this detail is not directly connected to appraising the value of DWSD's asset, popular objection to Detroit having to pay for part of the lease of their own asset drew our attention to analyzing structural features of the lease payment. The lease agreements categorize the lease payment as a "common-to-all" meaning that DWSD-R will contribute $13.6 million–out of the total $50 million–toward the lease payment in fiscal year 2018.[15]

We discuss three primary reasons that analyzing the methodology used to calculate the least payment and the valuation of DWSD's asset is warranted. Two of them relate to the fact that GLWA and DWSD are positioned to be national leaders on infrastructure being a site to build regional equity and development by promoting water security. The last relates to the prospect that the current lease amount of $50 million may not be fair.

Firstly, it is of national consequence. There is little publicly accessible methodology on valuing drinking and wastewater systems. When there has been cause for such a valuation, the process is usually conducted by consultant firms and detailed calculations and rationale are often not disclosed. This is of great concern given the growing practice of public systems entering into operation and management agreements and leases with public or private corporations. Either scenario is very different and warrants different valuation processes tailored for the context. However, each scenario does put great importance on ensuring the calculation derives a reasonable and fair amount. And, the valuation methodology should be open to public review and influence.

Secondly, leasing to a public corporation rather than a private corporation may be preferable if the only other option is purchase by a private corporation. Notably, though, there is a clear over-

all objection registered by Detroiters of any corporate control of DWSD–whether by private or public corporations. GLWA is in precisely this situation of a public corporation leasing what was formerly a publicly controlled asset. Therefore, such analysis and system valuation will be a significant contribution to water security in the DWSD service area but also to systems across the US facing similar decisions. Furthermore, ensuring the process is conducted in concert with participation by DWSD customers and other service area customers will set an exemplary model for systems across the country.

Finally, in the case of GLWA, we offer three "data points" that suggest that analysis of the determination of the lease payment and valuation of the system is warranted. None of these three points definitely shows that the lease payment is artificially low. However, each point does highlight the why we feel the lease payment does not reflect the value of the asset and the risk the lease–DWSD– assumes within the agreement. There is a need for a professional evaluation of the methodology used to calculate the lease payment and a valuation of the drinking water and wastewater systems.

One signal of the potential for this problem is raised by the substantial value of the system–ultimately the system's revenue–that enabled GLWA's successful bond offerings in 2016 and 2018. In August 2016 GLWA was able to issue $1,339,100,000–$1.34 billion–in bonds following the adoption of a master bond ordinance.[16] These bonds were comprised of $421.3 million in revenue refunding bonds for the sewerage disposal system and $917.8 million water supply system revenue and revenue refunding bonds. Months prior to their sale date, the 2016 bond series' credit ratings were upgraded by Moody's

> *"[r]eflect[ing] improved financial metrics resulting from revenue growth, rate restructuring to enhance collections, and ongoing implementation of operating efficiencies, …[and] the massive scale of water operations in southeast Michigan."*[17]

Again in 2018, GLWA was able to issue $413,060,000–$413.1 million–in system revenue and revenue refunding bonds.[18] Similarly, these bonds' credit ratings were upgraded by Moody's prior to their sale. The investors service explained that:

> *[t]he upgrade[s]…reflec[t] the continued trend of strong financial performance by an essential service enterprise whose customer base includes a substantial share of the state's population. The rating balances the sewer system's healthy debt service coverage and liquidity against high leverage. The rating also considers the large share of system-wide revenue generated by retail operations in the City of Detroit...*[19]

The rationale for the bond series' credit upgrades in 2016 and 2018 reflects some circumstances that would also have been applicable to DWSD had the operations and management not been leased to GLWA: for example, the fact that the system provides an "essential service" to a sizeable share of the Michigan's population. Other circumstances may have been met by DWSD has their debt been restructured with creditors: for example, operational improvements and improved liquidity and leverage ratios. Circumstances related to increased revenue collection in the city and rate restructuring is the basis of strong community resistance as these are understood to be a rationale for dramatic increases in water shutoffs beginning in 2013 but most pronounced in 2014 and thereafter.[20]

Another data point might suggest the lease payment does not appropriately reflect the value of the asset. We can find results of the valuation of water and sewer systems when it is purchased or acquired by a private corporation. We can then compare DWSD to such a privatized system. In 2017, Aquarion Water sold one of its systems to Eversource Energy for $880 million.[21] The DWSD system serves 6 times the number of people and the debt per capita–per utility system customer– is similar.[22] This comparison is not one that is nuanced to all the different features of both systems.

It is difficult to compare the value of one system to another and difficult to map the sale of a utility to an investor owned corporation. However, this does raise the need make sure the lease payment reflects the value of the system and is designed to promote water security among customers across the region. Such a valuation needs to also be tailored to the context of a public corporation being the lessor–which may further complicate this comparison.

Finally, the systems' audited 2014 Certified Financial Annual Reports value the net capital as-

sets of the water system at $2,011,642,990–$2 billion, and the net capital assets of the sewer system at $2,837,994,840--$2.8 billion.[23] The Governmental Accounting Standards Board accounting rules are primarily designed to design comparable reports of the overall financial condition of governments or government entities. The accounting rules for valuing the capital assets of water and sewer system capital is not necessarily well suited to calculating a systems value in the context of a lease agreement to a private or public corporation.[24] However, in the absence of established methodology or precedent, this does highlight the need to adequately analyze the methods used to calculate the lease payment amount and to properly appraise the value of the system in the context of leasing it to a public corporation.

The amount at which the DWSD system is valued and the process used to calculate the lease payment of that asset is a necessary component of GLWA's governance going forward. These studies will determine a well-informed position on whether the lease payment is fair and in the interests of system-wide water security–including service affordability, water quality, wastewater service adequacy, and improved environmental quality and public health.

Cost Allocations

Under the lease and shared services agreements, some costs of operating and improving the regional system are considered "common-to-all," meaning that DWSD-R and other wholesale customers contribute to them, while others are "Detroit-only."The ways costs are allocated within these classes tends to be unfairly burdensome for Detroit and neglects the city's unique relationship. These unfair cost allocation practices perpetuate regional inequities and endanger the sustainability of the portion of the infrastructure that is within the city's borders.

For example, as stated above, under the current arrangement, the $50 million/year lease payment is a common-to-all cost, meaning that when costs are divided, Detroit contributes $13.6 million to the lease payment for its own system.[25] Our conversations and research do not find documentation discussing the rationale for categorizing the lease payment as a common-to-all cost explained. This should be pursued and be available for public review and debate. This is the case even in light of the $26.2 million "return on equity" GLWA pays Detroit on an annual basis.[26]

On the other hand, substantial costs associated with the combined sewer system are allocated to Detroit. Due to the absence of necessary investment and improvement, a large portion of the water and sewerage infrastructure within municipal Detroit's boundaries, including that under the domain of DWSD-R, is left with a combined sewer system (CSS) in need of repair and upgrade.[27]

In a CSS system, wet weather events–melting snow or rain-can degrade water quality and may cause public health and environmental quality issues. A CSS system collects rainwater runoff, domestic sewage, and industrial wastewater into one pipe.[28] When the volume of wastewater exceeds the capacity of the system or the treatment plant, usually during wet weather events like heavy rainfall or snowmelt, combined sewer overflows (CSO) may result. This means that untreated or partially treated human and industrial waste, toxic materials, debris, and stormwater discharges directly into streams, rivers, and other water bodies.[29]

State EPA agencies, like Michigan's Department of Environmental Quality, are tasked to regulate and track CSO events and issue permits. Each permit sets specific conditions that the system must conform to such that the EPA's CSO Policy–a national framework that is designed to ensure CSO events will not violate Clean Water Act standards.[30] Despite this regulatory system, there is a nationwide problem with the capacity of CSS systems to make adequate upgrades to meet water quality standards. This is, in part, due to a lack of federal spending on drinking and wastewater infrastructure that could supplement state and local government spending.

Infrastructure to reduce CSO events–creating a separate sewer or building new infrastructure– can be too costly. Because local governments finance 98 percent of water and sewer infrastructure costs, financing capital intensive projects like this can be difficult. Combined sewer systems can no longer be built and cities with CSO systems often try to convert to sanitary sewers or reduce the likelihood of CSO events through green or grey infrastructure projects. Traditional remedies include filtering contaminated overflow or relieving pressure on the system by way of large retention basins. These initiatives can take the form of either

"grey" or "green" CSO management.[31] While green infrastructure projects are a promising strategy to reduce CSO events, cities under compliance schedules with the EPA can be 'locked into' traditional grey infrastructure projects and may have to seek approval to implement those projects.

Under the current agreement, Detroit covers 83 percent of the costs of several CSO facilities leased by the regional system, while the wholesale customers cover only 17 percent.[32] Additionally, Detroit is required to cover 83 percent of the costs of some "future green facilities," as well as grey facilities which are deemed to "primarily serve Detroit"—a distinction which is unclear considering that the systems are, literally, interconnected.[33]

This 83/17 split is rooted in the 1999 Rate Settlement Agreement, passed while DWSD was under federal court oversight as part of the effort to oblige the utility to comply with regulatory standards.[34] 83 percent of the construction costs for any CSO control system is covered by Detroit residents while suburban wholesale customers pay the remaining 17 percent—even if the CSO system exclusively serves non-Detroiters. The agreement enforces an exceptionally questionable cost structure for CSO management. It puts additional fiscal stress on DWSD-R and the city, which are already struggling to provide quality service and properly maintain urban infrastructure. There is also frustration in the community that the rationale of the 83/17 split is not clear—leaving the cost allocation to seem arbitrary from the perspective of community members. The city has begun charging high unmetered drainage fees to DWSD-R customers.

From our research, it almost certain that this is a direct consequence of this 83/17 split.[35] These drainage fees are for Detroit's residents, but also challenge the fiscal sustainability of important social institutions in the city, including faith-based institutions that are a foundation for community services and social bonding in Detroit.

Financing costly and vital updates to older infrastructure is not just a problem for the City of Detroit. Many municipalities served by the system are more affluent suburbs with greater financial resilience and these municipalities are those most likely to have newer separate sanitary sewers. However, there are many suburban municipalities that are struggling with development and aging infrastructure—including water and sewer infrastructure. These are the types of suburban areas that are also populated by more diverse people—meaning these suburbs counter the stereotype of affluent white suburbs. Nationally, these struggling and diverse suburbs are the fastest growing suburbs.

This is the pattern in the service area of the DWSD system—while the City of Detroit has experienced dramatic population decline, the regional area has not.

Mitigating the harm of CSO events is not only in the interest of the people living in the immediate area of the discharge into surface waters. The environmental principle "we are all downstream" is well suited to this problem. Ensuring surface water quality is a service provided not only to Detroiters or communities with combined sewers is a service provided to the entire service area—and many more. Maintaining water quality within the Great Lakes Water Basin contributes to the quality of 20 percent of the globe's fresh surface water. Water security and its impacts on environmental quality and public health are a perfect example of universal benefits.

There is also more area for research to ensure fair cost allocation within the agreements between DWSD and GLWA—agreements that are currently operating and those coming in the future. The allocation of other types of costs have yet to be determined and the precedent for making such allocations is to limit public debate and contestation. This allocation is important given that if Detroit is unable to meet its financial commitments, there are substantial negative consequences for Detroit. The city has already lost significant control of the system and the associated potential to benefit from investments in the system—but it is threatened with loosing even its remaining authority.

Governance Structure

GLWA has a six-member board, which includes: two positions appointed by the Detroit mayor, one appointed by the governor (who will soon be replaced by a representative from Flint, which returned to the regional system in 2017), and seats for each county in the service area—Wayne, Oakland, and Macomb counties.

Detroit has two of six positions on the GLWA board of directors. The system provides 125 suburban communities with water service and 77 communities with sewer service. These are represented by GLWA board representatives from their respective counties. One of the seats currently apportioned to the state of Michigan is marked for a representatative from Flint, MI. This arrangement signals an acknowledgement of the unique relationship Detroit has with GLWA—how DWSD-R is not similarly related to GLWA.

However, Detroit's authority is limited relative to its historic contributions to the region and its historic operation and system management since 1836. GLWA's institutional structure should benefit from expanding the role of Detroit within GLWA. This general principle could suggest any number of changes to GLWA and strategies may include, but should not be limited to, considering GLWA board structure. This is the rationale for our identification of a structural governance problem within the GLWA service and lease agreements—one that is clearly communicated in the work of and our conversations with many of Detroit's community-based organizations.

Detroit has vested interest in the operation and management of the system as owner of the asset. This is at the heart of many objections from organizations and the simple arrangement of seats on the board are not seen to adequately reflect the city's unique relationship with GLWA. In fact, the arrangement is seen as an expression of disrespect for the role of the city in building the system and enabling the creation of suburbs through expanding its infrastructure. It is seen to also express the popular discourse of recent decades that represents the city as incompetent and in need of outside leadership and direction.

A super majority is required for all major decisions, and Detroit only has two members appointed by the mayor. This is in contrast to the three representatives from the counties and one appointed by the governor, soon to be replaced by a representative from Flint.36 This governance structure diminishes Detroit's influence in making long-term decisions about the future of the system. To many community groups, particularly those suffering under the weight of unaffordable bills, the GLWA board structure echoes the disenfranchisement felt under emergency management. Notably, this design also presumes that the full diversity of water security problems within counties is adequately represented through the county-level representatives. It is reasonable that there is a reasonable limit to the number of seats on the GLWA board.

However, the limits of expecting few board representatives to adequately represent a wide diversity of needs suggests the need for GLWA to design additional structures for local influence in its governance structure. Additionally, it is possible that DWSD-R will be unable to meet its financial obligations under the GLWA agreement, especially given the lack of clarity in the way costs will be shared in the system. Should the city be unable to meet these obligations, current governance structures can create serious issues for Detroit. Firstly, DWSD-R can lose its ability to set rates, issue bills, or establish collection practices.[37] The city can also forego future lease payments if it withdraws from the Authority.[38] Finally, should conflict arise between GLWA and DWSD-R, dispute resolution occurs through an arbitration process that blocks access to courts.[39]

In identifying strategies that respond to the GLWA governance structure we must think more deeply than simply adding a seat to the board or giving another seat to the city. There is much more at stake. And, to simply make those changes does not respond to the way other suburban areas are very differently situated within GLWA. Having a county-level representative is a profound problem for representing the very different needs of places and people within that county.

The Creation of GLWA

The prospect of regionalizing the utility was previously raised in a number of venues before the city's bankruptcy process. For example, the state legislature introduced legislation to regionalize the system and negotiations of DWSD under the EPA suit also attempted to regionalize the system.

The Great Lakes Water Authority, created in 2014, leases the regional water and sewerage infrastructure from Detroit for $50 million per year for 40 years. Those funds are set aside in an account managed by GLWA to fund capital improvements on Detroit's urban water and sewerage systems. The authority also commits $4.5 million or .5 percent of based budgeted operating revenues for a water assistance program.[40] As a "return on equity," GLWA provides a $26.2

million credit to revenues Detroit is required to collect under the agreements.[41]

From our research, we found these technical details critically important. Equally important and meaningful were the social conditions of the regionalization process. A notable factor that has alienated many people and groups we spoke with was that negotiations occurred under the suspension of ordinary democratic process. Substantive decisions and negotiations took place under the period of the city's emergency management.

Under emergency management residents were effectively disenfranchised from democratic representation and contestation in formal governance. It is widely thought that the regionalization of the DWSD system would not have occurred if the regular process of public referendum were required. It has also been suggested that regionalizing the system in the absence of a referendum would be contrary to the state's constitution.

The alienation expressed in our conversations also had profound racial dimensions. This is evidenced by seeing the racial footprint of places where emergency management has been instituted within the state. Since 2009, nine Michigan cities were appointed emergency managers by the state–six of those cities constitute 49.8% of the state's African American population. Whether or not there was an intentional design to sever local control of local government for the majority of the state's African American population, there were clearly uneven racial impacts of the implementation of emergency management. The state law enabling emergency management is, in and of itself, an artifact of state government rejecting the democratic will of state residents. State legislation enabling emergency management, PA 4, was repealed in 2012 in a statewide referendum. A month after this repeal the legislature passed PA 436 which effectively replaced the repealed legislation. While multiple circumstances alienated Detroit residents from thedecision made in recent years, emergency management was at the root cause of most objections.

GLWA operates and manages 'parts' of the DWSD system within Detroit's municipal boundaries. DWSD-Retail (DSWD-R) continues to operate and manage the remaining 'parts' the system within its municipal borders. The 'parts' of the system are defined and itemized in the lease and services agreements and subsequent DWSD and GLWA documents. It is not entirely clear how tasks associated with management and operation of system components are parsed out, nor is the rationale of the division clear. Suburban customers remain wholesale customers, meaning that suburban municipalities purchase water and sewerage services from GLWA at a wholesale rate. DWSD-R is created to be another wholesale customer of GLWA although it is situated differently than other wholesale customers.

Recommendations

We identify and outline seven recommendations that address the barriers discussed in the previous section. In our conversations to this point, we find that some of these recommendations are new, some are already underway and are expanded upon here, and others are in discussion among different groups that may or may not already be coordinating. The recommendations are accompanied by preliminary analysis, and we outline and suggest points for further inquiry.

This report intends to illuminate meaningful and potentially powerful changes that directly respond to the most pressing community needs. To further this work in its future phases, we must broaden the cast of collaborators and consult with experts to rigorously explore and pursue the proposed strategies.

Recommendation 1: Moratorium on Residential Water Shutoffs and Redesign Decision Making on Water Shutoffs

We propose instituting an immediate moratorium on residential water shutoffs until such time adequate processes are established that allow individuals a form of due process in the course of a water shutoff. Processes should enable effective and easily navigable processes to challenge to shutoff orders and access financial support programs. The moratorium should also be in place until there is a clear sufficient process to distinguish

between accounts that are able or unable to pay. During of the period of that moratorium, it is essential for GLWA, DWSD, and other service providers to seriously consider the objections raised by the Detroit community and international agencies and implement long-term, dramatic changes to service disconnection practices.

There are many industries that rely on customer revenue to stay afloat; however, the inability to pay for services ought not result in an acute threat to health and safety. Any policies that pursue service disconnection to incentivize payment should be designed to apply only to situations in which there is an ability and unwillingness to pay. This will disqualify the vast majority of service disconnections.

An expanded and effective water affordability program and changes to current rate structures will reduce instances of inability to pay, thus curbing the need for residential water shutoffs. These possibilities are detailed in recommendations three and four.

Fair disconnection policies could be established by encouraging service providers to adjust their customer service policies or by implementing legislation that forbids water shutoffs where failure to pay is based on economic hardship.

Recommendation 2: Implement a Comprehensive Water Affordability Plan

For many people in the service area, drinking water and wastewater service rates are simply unaffordable. In order to safeguard environmental quality, public health, and water security we recommend designing and implementing a comprehensive income-based water affordability plan. This recommendation reflects a primary concern of Detroit leaders and community members.

In 2005, with the support of Detroit's robust activist community, affordable utilities expert Roger Colton designed an income-based water affordability plan for Detroit in response to increasing rates of shutoffs. The plan, known as the Water Affordability Program (WAP) was approved by the Detroit city council in 2006 but never implemented.

We recommend adopting a revised and expanded version of Colton's plan that includes customers across the entire GLWA service area. In the fall of 2015, Philadelphia became the first major city to adopt an income-based affordability program, and similar cities are following suit. By implementing a robust water affordability plan, GLWA, DWSD, and other wholesale customers will join the cast of cities implementing similar policies to ensure water security.

Further research should identify the precise needs across the service area and match these to program design features. It is possible that components of the original WAP are best suited to this effort. These included providing fixed credits to GLWA customers' bills. The fixed credit is calculated by determining (i) a burden-based payment (i.e. an affordable percentage of household income), (ii) the annual bill amount, and (iii) the fixed credit necessary to reduce annual bill to a burden-based payment.

The 2005 WAP plan required that water and sewerage rates not exceed between two to three percent of annual household income. As there is also a diverse and consistent call for basing affordability plans based on criteria other than household income, we recommend further inquiry into the most effective metrics for determining affordable burdens.

In 2016, the Senate Appropriations Committee directed EPA to contract with the National Academy of Public Administration (NAPA) to "conduct an independent study to create a definition of, and framework for, community affordability of clean water"[42] that encompassed both drinking water and wastewater. NAPA produced a comprehensive literature review, over 100 stakeholder interviews--including PA Financial Advisory Board, Council of Mayors, water industry groups, academics, consultants, governmental entities, and others–a stakeholder survey, and a roundtable discussion with stakeholders and experts.[43] Their 2017 report produced a set of findings and recommendations related to affordability concerns and improvements to EPA metrics, among other things.

> *… In discussions with NAPA about the above critiques, EPA noted that the RI was intended to assess overall system affordability rather than individual household affordability, that it desired a "common starting point" for negotiations between regulators and individual permittees, and that an adjustment to the metrics would increase*

staff workload by reopening negotiation around existing consent decrees (legal agreements between EPA and permittees regarding actions and timelines required to achieve compliance with CWA and SDWA regulations).[44]

There is a need to update and expand upon the work of the 2005 affordably plan and determine the costs of comprehensive water affordability in the region today. The above quote is taken from a report in publication that compares the EPA metric and two alternative metrics that enable more targeted place-based analysis of water affordability. This type of study is a prerequisite to designing an robust and adequate affordability plan.

Recommendation 3: Incorporate Basic Consumer Protection in GLWA Policies

This recommendation acknowledges that many systems already have consumer protections in place—many states require such programs. The term itself, "consumer protection" is misleading in that a public utility "consumer" is different than a "consumer" of hamburgers or electronic equipment—and this difference should be reflected in the design of protection policies. In many places— Detroit included—the failure of consumer protection programs in the context of drinking water and wastewater systems is inadequate.

For example, in Detroit's system there is an appeal process, but due to data systems in the DWSD we understand that many users were not provided notice or were provided notice but were unable to navigate the process for appealing the collection process or arranging existing financial support systems. The scale of the shutoffs in Detroit is larger than in other areas we found through our research.

In other places where shutoffs have taken place there are also consumer protection measures on the books. For example, in Baltimore there were 1,400 shutoffs in 2016 and 8,000 the year before. Some media reporting on the Baltimore shutoffs have described the effects being less severe than in Detroit, in part because the accounts with the largest balances were primary focus and this included some private corporate accounts. Additionally, it was reported that there was priority also given to collect balances in areas with lower poverty rates and it is presumed that this meant fewer people who could not pay were shutoff.

The process of shutoffs can be better designed. Other state utility organizations have protection for utilities—including water. Many allow for a delay, usually 30 days, in the case of medical events and this stay can be renewed. However, in the absence of doing a full survey of consumer prote tions from water shutoffs throughout US states there seems to be a pattern that focuses on age, ability, and health—and that these circumstances only offer temporary relief. It also seems very common to offer payment restructuring programs.

These orthodox consumer protection plans are not adequate to address the needs of a family who is unable to pay a water and sewer utility bill. Fundamentally, any consumer protection plan needs to be linked to and designed alongside with an adequate affordability plan. However, consumer protection can be part of that process and enable the system to distinguish between account holders who are able or unable to pay their bills—and who is or is not subject to a water shutoff.

Some components to a consumer protection plan were described in Colton's 2005 Water Affordability Plan (WAP). We propose adopting protections in the following areas:

1. **Late fees**: Late fees disproportionately impact low-income people and worsen financial stressors. Currently, DWSD-R charges a five percent late-fee for overdue accounts. As that five percent well exceeds the costs associated overdue accounts, we recommend lowering that percentage or eliminating late fees all together.
2. **Deferred payment plans for arrears:** Customers with seemingly "affordable" bills burden can still be left with unaffordable bills when they have past due bills. We recommend implementing renegotiable payment plans and allowing arrears to be paid in regular monthly installments.

Currently, DWSD-R and wholesale providers have their own customer service policies. To implement policy reforms region-wide, each service provider could adopt the policies, or GLWA could develop new policies which apply to all of its regional customers.

Recommendation 4: Implement Legislative Reforms

The universal goal is wide-spread water security– of access to affordable, high quality, and residential drinking and wastewater service and benefitting from its contributions to environmental quality and public health. This universal goal should animate legislation and regulatory standards.

Several states and municipalities have implemented protective water legislation, and we recommend further inquiry into potential legal and legislative strategies. Federal legislation that bears on the water security–access to drinking water and wastewater service–includes S.2015, the Water Affordability Act that would create low-income drinking and wastewater assistance pilot program.[45] This program is a targeted strategy as eligibility for the program is set by particular geography, income, and enrollment in other assistance programs. This bill was introduced in June 2018.

At the end of October, America's Water Infrastructure Act of 2018 was signed into law.[46] This type of legislation requires re-authorization every two years and makes modest increases in investments in drinking water. Terrain of debate on this bill pertains to provision that enable greater participation of private corporations in the work of public infrastructure. For example, there is an interest to remove a cap on private activity bonds and other terms of the legislation that could impact regulation of infrastructure that runs through waterways which has been an interest of the energy sector.

The National Coalition for Legislation on Affordable Water (NCLAWater) advocates for a variety of measures at the state and federal levels.[47] Those efforts include legal measures to ensure access to water, fair water billing and rates, water quality, and citizen oversight and transparency. NCLA Water's Michigan statewide legislative package, which offers a sample of a viable legislative model, includes the following:

Access to Water

HB 4291 Michigan Access and Affordable Water Act. Creates the "Accessible and Affordable Water Act," which would require that all state departments and agencies employ all reasonable means to adopt policies to ensure that water is affordable and accessible as long as those policies do not affect eligibility for federal funds.

HB 4360 Water Access. Requires access points for safe drinking water be available in places where residents are not supplied municipal water hook-ups.

Water Billing and Rates

HB 4394 Affordability. Addresses water rate structures that unduly burden low-income residents by amending the Social Welfare Act to create a residential water affordability program within DHHS in order to ensure that water bills are based on household income.

HB 4389 and HB4390 Decriminalization. Decriminalizes the act of re-connecting water service from a five-year felony to a civil infraction or misdemeanor.

Water Quality

HB 4124 Program for Schools and Child Day Care. Establishes water testing and interventions in schools and child daycare centers, as well as mechanism for repairing and replacing sources of lead contamination.

HB 4120; HB 4372, 4378, 4379 Water Quality Testing. Requires water quality testing at regular intervals in schools, colleges, universities, nonpublic schools and hospitals.

Citizen Oversight and Transparency

HB 4201 and HB 4214 MDEQ Citizen Oversight Commissions. Restores a gubernatorial-appointed citizen oversight commission on water quality.

HB 4375 Water Ombudsman. Establishes a Water Ombudsman to advocate for residents throughout the state on water-related issues.

Recommendation 5: Evaluate the Fairness of GLWA's Annual Lease Payment

We recommend conducting a comprehensive appraisal of the regional water and sewerage system, and given that value, recalculating the annual lease payment.

This issue is at the center of the inequity of the currently-in-place agreements between the City of Detroit and GLWA. In order to ensure the distribution of affordable high-quality water and establish an equitable relationship between the city and the region, the annual lease payment must reflect the value of the system as assessed through proper review.

Though information about how the lease payment was calculated is not readily available, it appears that the value of the Detroit Water and Sewerage Department and its infrastructure was underestimated. At minimum DWSD-R should not need to contribute $13.6 million to the lease payment of a portion of its own asset.[48]

The lease payment ought to be recalculated following comprehensive appraisal. Given the sensitivity and centrality of this matter, it is imperative information about those negotiations be publicly available. Local systems in a growing number of places in the US are entering into operation and management contracts, leases, and other types of arrangements with public and private investor owned corporations. Assessing the lease payment amount and decisions that were involved is an opportunity to provide leadership at the national level. Systems across the country are facing similar difficulties and complexities in setting the terms of arrangements they enter. This is both a problem for policy makers to gauge their expectations and for community members to impact and influence decisions.

Recommendation 6: Rework the Terms of the GLWA Service Agreement

The existing framework of the agreements between the City of Detroit and GLWA creates unnecessary structural burdens for the City of Detroit to exercise its unique role as owner of the system. Additionally, its position within the GLWA governance structure is similarly limited to other municipalities in the service area. We recommend changing some aspects of the current agreements in order to build towards water security for everyone and every place in the service area.

We discuss five concerns to address:

- Depending on the results of analysis of the process that calculated GLWA's annual lease payment and the valuation of the system there may be need to adjust the lease payment accordingly.
- The allocation of costs between DWSD-R and GLWA can contribute to Detroit's unaffordability problem and other regional areas similarly disadvantaged.
- Contain provisions can impede the establishment of fair and sustainable rate-setting structures.
- Institute a flawed governance structure that diminishes Detroit's agency as a steward and owner of the system and diminishes the role of other retail customers to have their unique concerns adequately represented.
- Terms of the agreement were based on funding an inadequate customer assistance program and there was no consideration of designing terms to build a robust affordability program.

In addition to researching and possibly adjusting the annual lease payment we recommend reframing the Detroit/GLWA agreements by:

- Establishing a more equitable cost-sharing model that takes regional inequities into account. This will likely involve making expenses associated with the combined sewer overflows (CSO) common-to-all and not requiring Detroit to contribute to the lease payment. Current rate structures should be reappraised based upon a more thorough analysis of water affordability throughout the region
- Reconsidering current rate-setting structures in order to develop a system designed to balance cost-recovery, conservation, affordability, and economic development while also preserving water security throughout the service area. This may involve abandoning the four

percent rate cap. Crucially, any rate increase that exceeds the four percent cap must be accompanied by a robust affordability plan,

- Reworking the GLWA governance structure to ensure that Detroit and other places in the region have fair representation in decision making bodies. Addressing this concern can extend beyond simply adding seats to the board. Rather, deep analysis should be conducted into best practices and alternative structures that can adhere unique community concerns to influence in decision making. Additionally, legal resources and protections should be created such that Detroit or other wholesale customers have access to proper legal remedy if there are disputes or failures to meet obligations or a decision is made to withdraw from the authority.
- Creating structures to fund an affordability plan.
- Reworking any terms of the agreements should not be conducted in the spirit of decisions during bankruptcy processes that alienated the GLWA from those receiving its service.49 The very best practices and even new processes that provide meaningful influence by community groups should drive decisions. Detroit and other areas facing water insecurity ought to be fairly represented, expert opinions should be taken into consideration, and information about the renegotiation process ought to be made readily available to the public and express a commitment to transparency and community accountability. It is likely that achieving comprehensive water equity in Detroit will require the agreement to be renegotiated more than once. We recommend that fair, periodic negotiation be a central aspect of the of the relationship between the City of Detroit and GLWA.

Recommendation 7: Implement Green Infrastructure Initiatives

Addressing the problem of systemwide water insecurity in isolation is a disservice to the effort to design a system that provides region-wide environmental quality, public health, and water security. Water insecurity, as we have suggested earlier, is a result of many entangled social, economic, and environmental issues. These issues include, but are not limited to, aging urban infrastructure, historical imbalances of power, austerity and systemic divestment, and stressed municipal finances.

In response to these interconnected challenges, we recommend enacting a broad green infrastructure initiative in Detroit. Green infrastructure offers a dynamic, multidimensional solution to Detroit's interrelated problems.

Green infrastructure involves natural and engineered environmental upgrades that promote water reuse and infiltration into the natural aquifer. Green infrastructure offers an opportunity to relieve pressure on Detroit's aging water and sanitation infrastructure while also facilitating economic growth and sustainable urban development. While traditional grey infrastructure improvements are necessary, GI projects can provide resilience to the effects of climate change and reduce the demands on the scale of grey infrastructure needs. Additionally, investing in drinking water and wastewater systems have positive and significant impacts on state and local economies. Green infrastructure has an array of potential social, environmental, and financial benefits for Detroit and the region. These multidimensional benefits, which comprise a "Triple Bottom Line" framework, have been well-documented in other cities.[50]

Based on a 2016 assessment by the American Society of Civil Engineers, this study estimates that the US needs to invest an additional $82 billion per year in water infrastructure at all levels of government over the next 10 years to meet projected capital needs. If the estimated investment gap were closed, it would result in over $220 billion in total annual economic activity to the country. These investments would generate and sustain approximately 1.3 million jobs over the 10-year period.[51]

A study should be commissioned that applies this analysis to the economic effects of investment in southeast Michigan. A design for a study of this type is underway and meets industry standards for rigor and quality.

Michigan's Department of Evironmental Quality has developed and implemented several extensive green infrastructure projects in the city and the region in recent years.[52] The initiatives we propose here complement green infrastructure projects underway in Detroit. These existing

Two Paths for Detroit

The first column is what it will be like in 10 years if we continue to make the choice not to act, the second column is what it will be like in 10 years if we make the choice to implement the recommended changes

Continued Disinvestment

- Continued human right to water crisis
- Water and sewerage fees steeply increase
- DWSD forced to continue paying fines for violating EPA laws, meaning higher water rates
- More breaches in system, leading to more wasted water and higher unmetered water loss fees
- Poor water quality, including lead contamination
- Another 200,000 shutoffs
- Undermines plans for economic development and neighborhood reinvestment, compromising property values, school system, and other public services like police and fire protection
- Depopulation

Meaningful Reinvestment

- No more shutoffs
- Affordable water and increased revenue for DWSD
- Green Infrastructure investment creates 15,000 living wage jobs and spurs small business growth
- Improved air and water quality, including cleaner rivers and lakes
- Restoration of tree canopy
- Increased property values and tax base
- Detroit recognized for its resourcefulness, ingenuity, and persevearance
- Southeast Michigan earns a national reputation as leader in sustainable water quality and access, setting the standard for infrastructure redevelopment

initiatives set precedent for the potential of green strategies.

What we suggest here is a significant increase in scale of these programs and also principles that should be integrated into current efforts underway.

Green infrastructure can also reduce costs associated with the combined sewer system by lessening the quantity of impervious surfaces, and thus reducing the amount of water entering the system. This diversion of runoff results in savings in labor, chemical, and energy costs, as well as costs associated with preventing combined sewer overflows.

Detroit offers an ideal setting for an ambitious green infrastructure initiative for four reaons.

1. Green infrastructure requires a large amount of low-cost land, which Detroit has in abundance.

2. Green infrastructure offers a lowest cost, highest reward strategy for dealing with the city's aging infrastructure.
3. Green infrastructure creates jobs in response to issues of sufficient employment and living wages in Detroit.
4. Detroit has a rich community of local leaders with knowledge of the capacity and needs of neighborhoods.

The elements of our proposed green infrastructure initiative include the following:

- An initial capital source sufficient to fund a larger array of green infrastructure installations on properties throughout the City of Detroit.
- A strategy for identifying the most beneficial areas for reduction in peak combined sewer overflow in order to make the greatest economic and environmental impact.
- A strategy for assembling land for green infrastructure installations, primarily among the many parcels already assembled in the land bank.
- The development of several engineering prototypes for green infrastructure designed for permitting and priced for financing and contracting.
- The cultivation of a cohort of local, minority-owned small business enterprises equipped and trained to perform contracts for green infrastructure installation.
- The establishment of a small business association (SBA) or micro-lending loan program to provide working capital and equipment financing for small contractors who can efficiently and economically execute contracts for green infrastructure.
- The establishment of a protocol for measuring economic and environmental benefits of each type of green infrastructure installation and translating these economies into aggregated savings to the DWSD-R and GLWA for purpose of reinvestment.
- The development of a strategy for tax increment financing or other long-term investment strategies for the purpose of monetizing cash flows for additional capital investments in green infrastructure.

The Costs of Water Insecurity

The starting place for this project is a focus on Detroit. A primary feature of water insecurity in Detroit is a profound problem with access to affordable drinking and wastewater services. The expression of this access barrier is water shutoffs that have been implemented throughout historically, but dramatically increased in and since 2014. The implementation of water shutoffs in Detroit took place regardless of whether or not someone was able to pay, and collections seem to have been targeted at residential accounts rather than commercial accounts that have higher arrears.

The profound harm to an individual's physical and mental health is reflected in volumes of personal accounts that have been shared. Additionally, because of the geographic patterns of households who find drinking water and wastewater service unaffordable, there are clear effects at the neighborhood level.

We include this section because of the extreme and unique harms that arise from losing residential access to water service. In our conversations with community members it was clear that the defense of water shutoffs was felt to be disconnected from empathy and understanding of this harm—and therefore those defending the practice are viewed as disinterested in providing relief to people who experience shutoffs. Additionally, there is clear disregard for appreciation of the direct regional impacts of large scale water shutoffs and water unaffordability. We review here research that details the deleterious impacts of water insecurity—in particular the inaccessibility of affordable drinking and wastewater services.

There is near-consensus among those whose water has been shutoff and people who advocate and provide emergency services to them—people "touched" by water shutoffs—that water shutoffs are a crisis. However, among people who rationalize and argue there is a need for residential water shutoffs there is a sense that shutoffs are routine ordinary practice and that incentivizing bill collection is not a crisis—that the crisis is that system revenues have been too low in recent decades.

Consistent and secure access to clean water that runs in your home is taken for granted by many until there's a plumbing leak. It's common for homeowners to know—or learn quickly—where the shutoff valve is for their home's sink or toilet in the event of a water leak. The relatively minor inconv nience of the disconnection of a single fixture is, for many people, the only experience of not having the water access one would like to have. For pe ple advantaged in this way, decisions of whether and how long to wash vegetables and fruits are not considered a decision—it's just a routine task. Decisions of whether to steam or fry potatoes is governed by the preference of those you're coo ing for. If there's a scraped knee or a finger cut it is washed with soap and water: migraines or ankle sprains get ice and fevers are cooled with chilled water. One can use the toilet whenever they need, wash their hands after, and waste can be quickly ushered out of the home through sewer lines. These basics are not basic for people without running clean water in their home. It is not controversial to characterize the large number of water shutoffs as a crisis.

When adults or children are facing these challenges in their day-to-day lives they realize that it's not normal and that a vast majority of people do not face these struggles. These are the material conditions of being *othered* and structurally marginalized. The relief of getting access to water and sewer systems can be a force for structural belonging and inclusion. Our previous recommendations can get us there.

Detroit's water shutoffs have been widespread and have raised the visibility of water affordability problems across the country. In Detroit, at least 100,000 households have had water shut off since 2014.[53] While the annual number of shutoffs has decreased since 2014, in March 2018, the *Detroit Free Press* reported that at least 17,000 households were at risk for shutoffs.[54] Data suggests that in Detroit, as in other places across the country experiencing water shutoffs—there is not a reticence to pay, but rather the problem is being unable to pay. Records obtained by Bridge Magazine show that the number of residential shutoffs dropped from 33,000 in 2014 to 23,000 in 2016 and increased again to 27,552 in 2016.[55] Critics have noted the way in which shutoff practices have targeted residential rather than commercial account-holders, though arrears owed by commercial customers far exceed that of residential customers.[56]

Because water affordability is a growing problem across the US, water utilities use shutoffs as an incentive for utility customers to bring their bills up-to-date. Shutoffs are not unique to Detroit, but the number of shutoffs in the city is remarkably high and many of the strategies implementing shutoffs are particularly harmful for household residents. In 2016, Baltimore shutoff water to 1,400 accounts and 8,000 the year before. They enforce shutoffs if a bill falls behind by $250 for two billing periods.[57] In Baltimore, unlike Detroit, household residences were not always the primary focus on shutoffs and utility customers with remarkably high past-due amounts were primary targets and these were larger corporate accounts. Additionally, in Baltimore there was a focus on collections from areas outside of the urban core where poverty rates were lower. Water shutoffs cannot be defended as an incentive system for collection from households who are unable to pay. This matter was not adequately addressed in Baltimore. However, differences between implementation strategies are meaningful. In our conversations the practice of shutoffs for people willing but not able to pay was a fundamental problem.

In addition, the conversations explained that the execution of shutoffs was deeply problematic and existing avenues to appeal or delay shutoffs were practically unnavigable for people.

Across the US, there are similar problems with the use of shutoffs to increase system revenue from people who cannot pay and a pattern of lacking mechanisms to appeal or suspend a shutoff. In the course of our research we did not find any appeal process that effectively prevented a shutoff in the case of an inability to pay—although we did find allowance for establishing an income-based repayments plans. However, these repayment plans do not resolve the problems that arose in the course of our conversations. We noted accounts of many repayment plans that were still not affordable for households and the water was shutoff after the first failed installment plan.

In May 2017, 40,000 Philadelphia households were eligible for water service disconnections.[58] Their process provides two notices instructing the household to set up a payment plan or else their water will be cut off. The main pipe to the house would be turned off and a lock installed on the meter box.[59] The work of the shutoff is done by a crew that will usually identify those with thousands of dollars owed.[60] They visit and do the shutoff at that loca-

tion and then turn off other accounts in arrears in nearby locations, without discretion of the amount owed.[61] This is thought to be a more efficient strategy and a crew can do 3,000 shutoffs with this method.[62] In Seattle shutoffs are triggered at $300 past due and 52 days; Phoenix is triggered at $75 and 30 days; Denver shutoffs are triggered at $125 and 50 days. Some states establish water utility consumer protections that delay a shutoff in the case of sick children, seniors, or medical conditions.[63]

In many ways across the US there is a gap between standards set by international human rights law and the function of fundamental resources to levers of opportunity. For example housing, education, or food. Despite these persistent gaps it is useful to document these gaps in the aspiration to meet universal goals outlined therein. In 2014, following an upsurge in shutoffs during Detroit's bankruptcy negotiations, Catarina de Albuquerque, the United Nations Special Rapporteur on the human right to water and sanitation, and Leilani Farha, the Special Rapporteur on the right to adequate housing, visited Detroit. Albuquerque explained that "it is contrary to human rights to disconnect water from people who simply do not have the means to pay their bills."[64] In the visits to states across the US, the UN Special Rapporteurs have connected water insecurity to poverty and the right to clean water, sanitation and housing.[65]

Water shutoffs are a collections system universally designed to incentivize users to pay bills. Water and sewer utilities in the US are considered "natural monopolies" and rate setting is typically dominated by studies that measure the willingness of users to pay (WTP) for water. This is mismatched to the empirical reality of entrenched poverty and inadequate federal, state, and local funding for system operation, management, and upgrade. These studies have also shown that lower income households have an elastic relationship to water rates—meaning that if there are any changes in the rates these are the households most likely to use less. It is a perverse system design to make the assumption that all users can pay and accommodate this reality by explaining universal rate-setting designs that produce "inelastic" relationships with low-income users—rather than making accessibility to affordable water possible.

This section of the report details the wide-ranging negative outcomes produced by using water shutoffs as a bill collection practice. Resorting to shutoffs is directly rooted in the historical challenges faced by service providers in the regional and issues with the current Detroit/GLWA agreement, described in Sections I and II, respectively. Not only are shutoffs ineffective in recovering revenue, but they also endanger peoples' livelihood in a myriad of ways. The burdens caused by water shutoffs are disproportionately endured by low-income people and people of color.

The Health Costs of Shutoffs

Water shutoffs can threaten public health and exacerbate or deepen disparities in health outcomes. Studies overwhelmingly confirm the links between water scarcity and a variety of health issues.[66] The link between living without access to drinking water and wastewater services and vulnerability to a number of diseases and sicknesses is well-documented and studied with consistent findings in places across the globe.

A primary risk associated with water scarcity is dehydration. It can have lasting effects on individuals' health and intensify other health problems. Moreover, poor hygiene resulting from lack of water access can spread and create a variety of health problems, such as skin diseases and gastrointestinal issues, as handwashing is the first line of defense against several communicable diseases. Lacking water in the home can also negatively impact nutrition, as the preparation of healthier foods is particularly dependent upon water.

There is little scholarly study of the effects of water shutoffs and public health in the context of circumstances like those in Detroit. An abstract of an unreleased study by the Henry Ford Health System's Global Health Initiative and Division of Infectious Disease offers a preliminary analysis of the effects of shutoffs on public health in Detroit. The study examined 37,441 cases of water-related illnesses at Henry Ford Hospital between January 2015 and February 2016. Researchers found that patients with water-related illnesses were 1.48 times more likely to live on a block that had experienced water shutoffs.[67] The study was criticized due to its failure to document causation and the geographic scale of its analysis. Lacking the full text, it is difficult to appraise the methodology, however the findings are consistent given what we know about the consequences of lacking access to water and sewer services. Furthermore, questions re-

garding the study's focus on correlation—not causation—and the geographic scale are unlikely to prove a solid ground for contesting the study's findings. As presented in the abstract, finding causation and geocoding and aggregating patient diagnoses at the census tract level are standard features of scholarly study in the field.

There are also a variety of mental health issues associated with water poverty, and water deprivation can exacerbate existing mental health problems as well.[68] For example, irregular bathing and sanitation can create lasting feelings of shame and negatively affect people's sense of self-worth.

In these ways, among others, the suspension of residential drinking water and wastewater services creates lasting mental and physical stress for individuals that has measurable effects on the body. The "toxic stress" associated with the cascading effects of shutoffs must be considered when appraising the health costs of water deprivation.

A variety of studies have discussed the way in which toxic stress contributes to disparate health outcomes for people—in particular poor people and people of color.[69] The day-to-day stressors of living as a person who is considered "other" and deprived of resources and opportunities have demonstrable physiological effects. This chronic stress may be related to experiencing micro-aggressions, persistent unemployment, residential segregation, and subpar educational options.

While studies have not explicitly examined the relationship between toxic stress and water scarcity, the connection is plausible. This is especially considering the way in which water access is a precondition for realization of other positive out-comes associated with toxic stress. For example, maintaining family cohesion, housing, healthy food, and health.

Not only are marginalized groups disproportionately exposed to health risks, but they also often have limited access to health care. These social determinants of health—that is, increased exposure to risk and limited access to care—combine to perpetuate disparate outcomes.[70]

The wide-ranging health consequences of water deprivation endangers the well-being of individuals, families, and entire communities. Water access is a precondition of human health, and depriving people of it constitutes a violation of basic human rights.

The Social Costs of Shutoffs

Water shutoffs also compound social problems caused by the systemic marginalization of communities. We the People of Detroit's Community Research Collective has documented the ways past due amounts on delinquent water bills are rolled over to liens on homes. This lien can then combine with any other liens and therefore accelerate the process of home foreclosure.[71] Foreclosures have a number of negative outcomes for households and communities at large. Additionally, Child Protective Services (CPS) considers homes without access to running water to be unfit environments for children, water shutoffs can break up families.[72] Whether or not the child is actually removed from the house, living with the possibility of separation creates psychic harm and contributes to toxic stress.

If the problem is the ability to pay—not the willingness to pay—then the fundamental problem is located in pricing structures and processes within the DWSD and GLWA. Under the current GLWA agreement, DWSD-R customers bear the burden of costs associated with the combined system by paying $750 per square acre of impervious surface in monthly "drainage fees."73 One symptom of this structural design flaw is that high fees actively threaten the fiscal sustainability of Detroit churches and other important social institutions in the city.

Churches are especially burdened by drainage fees given the large quantity of impervious surfaces they maintain and occupy—including the size of the church itself, parking lots large enough to accommodate whole congregations, satellite community buildings, and even vacant properties churches have acquired for neighborhood improvement projects. Detroiters feel that these fees are arbitrary, particularly in the context of alternative reasonable approaches to determining drainage costs.

Drainage fees and water shutoffs in Detroit offer a particularly glaring example of how problems surrounding public infrastructure can actively disrupt communities. Shutoffs across the US pose acute threats to human health and play a critical role in accelerating cascading effects that erode historically marginalized communities, threatening the well-being of neighborhoods,

families, and community spaces.

The Long History of Detroit's Water and Sewerage District

Studies have found that people who experience affordability barriers problems to water and sewer access are also areas where there are higher populations of people in poverty, disabled, people of color, and higher enrollments in public service programs.[74] These "pockets of water poverty" are consistently characterized in this way and the GLWA service area is no exception.[75] Areas of unaffordability throughout the GLWA service area are marked by these patterns, including Detroit.[76]

Race, physical ability, and socioeconomic status correlate with affordability access barriers to water and sewer service security. These are also groups that are underrepresented in institutions that determine rate structures and other procedures for utilities. These are also groups that are on the lower side of disparities—including disparities in political power. These circumstances can create conditions for utilities to function with ostensibly neutral and objective processes that are universal and "color-blind" with the intention to not treat everyone the same. These universal policies often, in execution, perpetuate disparities and end up providing greater outcomes to the groups that are already better-served by dominant institutions. If GLWA and DWSD pursues universal policy to treat municipal retail customers and system users with the same brush, it will neglect important differences and fail to respond adequately and fairly to the different ways some places and groups of people relate to their water and sewer services. In an EPA study of 795 utilities, 228 offered some form of affordability plan—28 percent of the sample.[77]

By examining the history of water and sewerage services in Detroit, we can begin to understand the way in which historical factors created structural problems for the regional utility that disproportionately impacts othered groups—and in Detroit history demonstrates these are largely poorer lower-wealth Black and African American people. These factors include the racial dynamics of labor unions and within industrial firms, racially disparate application of federal financial support for home mortgages and opportunities to move outside of areas of the region and city with richer opportunity networks. Accordingly, inequity is baked into the way the way the system functions today.

Our account of the history of the system contributes to an explanation of how water and sewer systems were designed alongside and during profound periods of hostile and explicit racial animus. While this animus may not animate and drive current policy the institutional design and structural design reflects deeply racialized outcomes. To re-engineer these systems to promote inclusion there needs to be deliberate effort to understand the dynamics of the creation of DWSD. While the details in this section are necessarily unique to Detroit, the general principles are not. Many of the details unique to Detroit are the result of waves of policy and development that shaped places—and water systems—throughout the US There is a script for this past and there is a script to arrest the historical momentum inherited from a troubled history.

The history of Detroit's water system begins in 1836, when the city purchased the Water Works. For the next century, a booming, industrializing Detroit thrived, growing and expanding into region surrounding the city. The Detroit Water and Sewerage Department (DWSD) system and infrastructure grew along with it, serving as the backbone for regional expansion.

Suburbanization in the southeast Michigan region skyrocketed in the latter half of the twentieth century, largely in response to urban economic decline and growing racial tensions. Suburbanization in southeast Michigan offers a prime illustration of the migration of white people from urban centers to more racially homogenous suburban regions—a trend that was deepened through federal and local government policies that incentivized different groups to move or stay in place.

Before suburban areas could be created and established, the DWSD would have to extend the system infrastructure to those places. In this way Detroit "subsidized" the suburbs. This was brought up as another example of why Detroiters today are further alienated from GLWA's control of the formerly Detroit asset. The city enabled the development of suburbs by building the system—but during the bankruptcy process the city was deemed incapable of operating

the resource and, therefore, benefiting from the incredibly valuable asset. Between 1955 and 1973, 51 municipalities were added to Detroit's water system.[78] While jobs moved to the suburbs, in the city, population numbers plummeted, the job market shrank, and poverty and segregation grew. Since development does not occur where infrastructure is unavailable, the very existence of the suburbs depended on Detroit.

Today, the regional water system serves 3.8 million people—over one third of Michigan's population. Over 80 percent of people served by the system live outside of Detroit.[79]

In 1977, Detroit was sued by the EPA for failing to meet the newly amended Clean Water Act.[80] While many public systems found themselves struggling to meet newly imposed federal regulations, Detroit's case was unusual in that the process to create a mutually agreeable compliance schedule between EPA and DWSD was protracted over 37 years, during which DWSD was "overseen" by a federal judge. While this time proceeded, some Detroiters explained that they felt this process distanced the influence of community members from the operation and function of the DWSD even though the process was one designed to ensure water quality and public health outcomes.

Another court decision that Detroiter's have described as unfair and arbitrary was the "1999 Rate Settlement Agreement," which obliges Detroit to pay for 83 percent of the costs associated with several combined sewer overflow facilities, leaving the suburbs responsible for only 17 percent.[81] As detailed in Section II of this report, this unfair arrangement has resulted in considerable expenses for Detroit and is still in place today. This agreement was part of the 37-year court-mediated process. This agreement is not felt to have served the interests of Detroiters and the DWSD relationship with suburban retail clients. It is characterized by many Detroiters to be an arbitrary division of responsibility and an unjustified separation of components of a system that services Detroit and suburban users.[82]

During the latter period of EPA oversight, the DWSD continued to accumulate debts to manage and operate the system. Some of this debt financed the needs to meet environmental standards. However, some of the debt instruments were exceptionally and unnecessarily risky—carrying fees and costs that were not associated with traditional bonds. In order to shift to more secure bonds DWSD took out 'refinancing bonds' as a form of 'refinancing.' By 2012, 40 percent of DWSD revenue was going toward debt service. However, this is not to say that these management decisions ruined and degraded the value of the DWSD system.

With more than 2,700 miles of transmission and distribution mains and 3,000 miles of sewage collection pipes, the DWSD system is one of the city's most valuable assets.

There is an emphasis on Detroit working to better its regional area, but also to provide national leadership in effectively and innovatively tackling the task of building water security and access.

Conclusion

The layers of social, political, and environmental issues that have contributed to the inequitable distribution of power and resources in southeast Michigan demand a multidimensional response. It is our intention that by offering a preliminary explanation of those issues, we can highlight a path forward for Detroit that is socially, economically, and environmentally sustainable.

It is important to note that the solautions offered here are preliminary, and we hope that this report will lay the groundwork for further efforts to realize water security and the benefits it provides to environmental quality and public health. In crafting and implementing multidimensional solutions to Detroit's problems, community support and input is crucial. As we expand the base of participation in this project to expand and diversity, this report has openings for a range of parties and interest groups to collaborate to develop strategies that foster lasting benefits throughout the service area.

The report offers solutions that are tailored for Detroit but also responsive to nationwide patterns of expanding water insecurity. With this design there is an emphasis on Detroit working to better its regional area, but also to provide national leadership in effectively and innovatively tacking the task of building water security and access.

The problems discussed in this report are not insoluble, and inaction is not an option. Choosing not to respond to the pressing inequities at hand only passively enables the continuation of today's system, which, if left unchecked, will likely worsen existing problems: increasing water and sewerage bills, contaminated water, and failing infrastructure accessibility, and

correspondingly, poverty and insecurity.

We envision a different path forward for Detroit and the region—one where vital resources are fairly distributed, where the region's residents can enjoy a dignified life in health communities, and where lasting economic and social equality is fostered and nurtured.

SECTION I

INSTITUTIONAL RELATIONSHIPS: THE GREAT LAKES WATER AUTHORITY AND THE DETROIT WATER AND SEWERAGE DEPARTMENT

Institutional Relationships: The Great Lakes Water Authority And The Detroit Water And Sewerage Department

THE DETROIT WATER SYSTEM reached a point of crisis in the period leading up to the bankruptcy, but the issues which produced that crisis have a long history. The restructuring of city's finances and assets during the bankruptcy proceedings could have offered an equitable path forward– one that allowed for the fair distribution of power and resources in the region. However, the current arrangement perpetuates, rather than amends, these deep-rooted, historical inequities governing the distribution of water in Detroit.

During the bankruptcy negotiations, Detroit's emergency management, under the leadership of Kevyn Orr, eventually decided that DWSD would be regionalized into a regional water authority. This section discusses the details of that deal, showing that by failing to ensure water affordability and infrastructure improvements, as well as unfairly allocating system costs to Detroit, the current agreement codifies historical inequities.

Under the new regional system, the City of Detroit has a service agreement and two lease agreements (one for water services and one for sewerage services) with the Great Lakes Water Authority (GLWA), a public corporation created in the fall of 2014 under a US Bankruptcy Court order.[1] GLWA is a quasi-governmental entity and therefore does not require direct supervision by locally elected officials.

The creation of the GLWA and the service and lease agreements were politically expedient solutions that were folded into the city's bankruptcy proceedings. Examining the agreements that resulted from these negotiations reveals significant weaknesses that prevent the entire region from realizing the equitable and sustainable system it needs.

In this section, we first discuss the context of folding the DWSD into the city's bankruptcy proceedings, the primary antecedent of which is the creation of the GLWA and, in turn, the city's service and lease agreements. Second, we identify five key structural flaws in the GLWA service and lease agreements. We argue that the current agreement perpetuates, rather than amends, the historical inequities governing the distribution of vital resources in Detroit.

DWSD and the Detroit Bankruptcy Negotiations

It has been argued that DWSD should not have been included in the bankruptcy proceedings in the first place. Bankruptcy law governing municipal bankruptcy, unlike corporate bankruptcy, does not involve the liquidation of municipal assets to settle debts. Rather, in the context of municipal bankruptcy, the scope of negotiations is limited to annual revenue and expenses.

DWSD's debt was included in the calculation of Detroit's total municipal debt, even though DWSD served a region much greater than the city of Detroit. Detroit was only a fraction of the water department's service area, but its debt was attributed to Detroit alone. In his 2013 analysis of the calculation of Detroit's municipal debt, Wallace Turbeville calls attention to the:

> *Additional $5.8 billion is debt [that is] owed from the Water and Sewerage Department, which serves in excess of three million people all across southeastern Michigan (roughly 40 percent of the state's population). The debt is payable from the fees charged for that service rather than from city resources. This is debt of an enterprise that reaches far beyond the city and is not a direct obligation of the city's budget. Thus, asserting that the total bond amount is a liability of the city is not appropriate.*[2]

Despite arguments like this one, DWSD was included in negotiations, and what should have been one of Detroit's greatest assets became one of its biggest liabilities.

When the city was under state-imposed Emergency Management, several of the city's assets and

Image from the film I Do My Dying. Coutesy of Kate Levy, available online at detroitmindsdying.org

real estate—which could have laid the foundation of future economic development and growth—were considered properties whose value could be used in creditor settlements. For example, Detroit's waste collection and public lighting systems were both privatized.[3]

Another example is the city's settlement with Syncora—one of the city's bond insurers—whereby the firm was granted development rights to just under 12 acres of east riverfront land, where it plans to develop 2.2 million square feet of mixed-use space.[4] In total, Syncora claimed a $333 million debt from Detroit, which was settled with $44.8 million in new debt, development rights to riverfront land, a long-term lease to operate the Detroit-Windsor Tunnel, a long-term lease of Grand Circus Park parking garage, and development rights to the former Detroit Police Department headquarters 250,000 square foot building.[5] Another bond insurer, Financial Guaranty Insurance Corporation, was granted development rights to the Joe Lewis Arena, an area of about nine acres, where the firm plans to build a hotel.[6]

The selling-off of municipal assets during the Detroit bankruptcy negotiations speaks to the way in which municipal fiscal distress can be beneficial to the private sector, and to private sector developers in particular.

The Detroit Water and Sewerage Department constituted one of the city's most valuable assets, and its fate was up for negotiation during the bankruptcy proceedings. One possibility was to privatize the utility. Another was to regionalize the system, creating a new regional authority. This was not a new idea—there had been efforts to transfer the asset to a regional authority for some time.

One such attempt occurred in the state legislature in 2010, when State Representative Kurt Heise campaigned to put DWSD into regional management and operation, introducing House Bill 4112 in January 2011.[7] Rep. Heise introduced an equivalent bill, House Bill 4009,[8] in January 2013. Neither of these legislative attempts to transfer DWSD to a regional entity gathered enough interest or support to move forward.

There was another attempt at regionalization included in the EPA case proceedings. On March 27, 2013, the US District Court Judge Sean F. Cox issued the court opinion and order ending the protracted 1977 lawsuit between EPA and DWSD.[9] Cox had dismissed the city's earlier request to dismiss the suit and ordered a team of

administrators and officials to meet and create a plan that would enable DWSD to meet the environmental regulatory standards of the Clean Water Act. This group came to be known as the "Root Cause Committee" and met between September 2011 and March 2013.[10] In March 2013, the Root Cause Committee submitted a final plan proposing a new operational model for DWSD that centered on the creation of a regional authority to operate and manage DWSD.[11]

In the case's closing proceedings in March 2013, Cox found the Root Cause Committee's submissions adequate to end the suit, deeming the 2011 administrative consent order a "sufficient mechanism to ensure sustained, compliance" with federal environmental regulations.[12] However, on the matter of creating a regional water authority, the judge ordered that the court lacked the authority to transfer DWSD assets to a regional authority given its limited role in enabling DWSD to meet federal compliance. The court's opinion explained,

> *Even if this Court had the authority to order what is now being proposed, the Court would not do so for multiple reasons. Arguably, if the Court were to order or approve the transfer of one of the City of Detroit's largest assets, at this juncture, that could potentially force the City into bankruptcy or have other highly undesirable consequences. If the City of Detroit and/or its regional customer communities wish to pursue the creation of a regional authority, they may do so through the political/legislative process.*[13]

However, during the bankruptcy negotiations—which began just weeks later—the possibility of regionalization re-emerged. The prospect of transferring valuable water and sewerage utilities to quasi-governmental authorities or private entities is a national trend—one that follows an even longer practice internationally. In 2011, for example, Pontiac, Michigan signed a service agreement which transferred management of their water system to United Water, a subsidiary of the global water firm Suez.[14] Similar institutional restructuring of public water and sewerage systems has occurred in many places, including Montana, Indiana, Arizona, and Kentucky.[15]

Generating revenue for local governments by transferring ownership of water and sewerage infrastructure can be appealing for local governments—but it is equally, if not more, appealing for the entities who benefit from control of the asset. Nationally, the private sector value of structures associated with water supply, sewage, waste disposal, public highways, and streets are incredibly high.

At the time of Detroit's filing for bankruptcy, DWSD constituted one of the city's most valuable assets. With Detroit and the DWSD in crisis, on April 7, 2014 Emergency Manager Kevyn Orr put out a Request for Information for private contractors interested in managing the system.[16] While Orr was receiving bids for privatizing the system (leasing or selling), he was also negotiating with suburban representatives about regionalizing DWSD under a new regional authority.

Terms of the Lease and Services Agreements

Ten months into bankruptcy negotiations, a plan to transfer DWSD to a regional authority—the newly created Great Lakes Water Authority—was approved by the court. Leasing a system is one option for transferring ownership to quasi-governmental entities, as the prospect of an annual lease payment can be appealing to local governments struggling with local revenue crises.

Under the current agreement, GLWA leases Detroit's suburban infrastructure for $50 million per year for 40 years.[17] The agreement, finalized in 2015, requires that Detroit continue to manage and maintain its municipal water system under a new, limited entity: DWSD Retail (DWSD-R).

The lease payment—the $50 million annual payment, $13.5 million of which comes from Detroit, as the payment is considered a "common-to-all" cost—is held in a fund belonging to the Authority. That fund is used exclusively to maintain Detroit's water and sewerage infrastructure, to pay debt services associate with those improvements, or to contribute to the common-to-all improvements in the system.

Suburban customers—not users who live in suburbs, but the suburbs themselves—are "wholesale customers" of GLWA, rather than being wholesale customers of DWSD as was the case under the previous arrangement. Suburban municipalities purchase water and sewerage services at a wholesale rate and sell it to suburban residents with a retail markup. Just as DWSD used to do, GLWA sells water to suburban municipalities at a price that strictly covers the cost-of-service. The suburbs then add a retail price when selling to residents to cover their own costs. Each suburb sets its own markup and keeps its own revenue.

GLWA also assumed responsibility for DWSD's bonded indebtedness and committed to putting $42.9 million dollars towards DWSD pensions over the next eight years, as well as committing to an additional $26 million annual payment as an annual return on equity in recognition of the city's ownership of the system.[18]

Image from the film I Do My Dying. Coutesy of Kate Levy, available online at detroitmindsdying.org

The Agreement also created a GLWA board, which, in 2015, included six members: two appointed by the Detroit mayor, one each by Wayne, Oakland, and Maycomb counties, and one by the Governor. In November 2017, Flint rejoined GLWA and the city's agreement with GLWA states that the governor's appointee for the board will resign and the governor will appoint a Flint resident to the seat.[19] Any major decision–including the appointment of the authority's general manager; approval of rates, fees, and charges; issuance of debt; approval of budget; and adoption of procurement policies–requires supermajority approval.

GLWA operates and manages suburban water and sewer lines and as well common-to-all assets within Detroit, like the wastewater treatment plants and some CSO basins.[20] These costs are shared among all the regional municipal customers and Detroit– more about how cost are shared with in the agreement is detailed below.

The GLWA lease agreement also allocated $4.5 million in 2014-15 (and 0.5 percent of base budgeted operating revenues in years thereafter) to fund a Water Residential Assistance Program (WRAP). WRAP is intended to provide assistance to indigent customers throughout the region, and again, is described in more detail below.

The terms of the service agreement and two lease agreements were decided behind closed doors and without meaningful and sufficient consultation with Detroiters or their elected officials. As a result, the process has received substantial criticism, with critics citing the tension between emergency management decision making, community accountability, and democratic participation.

An analysis of the terms of the agreements reveals that the creation of the Great Lakes Water Authority (GLWA) and the resulting lease and service agreements are clearly weighted against the interests of Detroit. Instead of an ownership and governance structure that clearly delineates responsibility and authority, the void of representative democratic practice created during the bankruptcy and emergency management permitted a complex and inequitable transaction structure that has incredibly important, long-term impacts on the city of Detroit.

Points of Concern

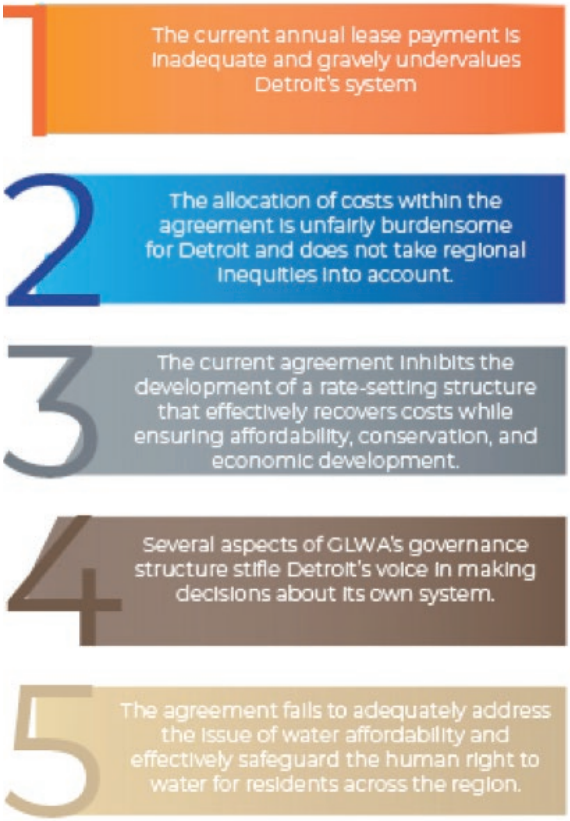
The DWSD/GLWA agreement poses serious threats to the environmental, social, physical, and economic well-being of Detroit and of Detroit's residents. The following discussion outlines the principal ways in which in this agreement puts the city at a financial disadvantage and threatens Detroiter's access to safe and affordable water and sewerage services.

Primary concerns with the terms set by the lease agreement fall into five categories:

1. The agreements are not based on an adequate valuation of the DWSD system, and correspondingly, the annual lease payment is inadequate.
2. The allocation of costs within the agreements is unfairly burdensome for Detroit and does not take regional inequities into account
3. The current agreement inhibits the development of a rate-setting structure that effectively recovers costs while ensuring equity, efficiency, and sustainability.
4. Several aspects of GLWA's governance structure stifle Detroit's voice in making decisions about its own system and make it difficult for Detroit to rework the terms agreement should conflict arise.
5. The agreement fails to adequately address the issue of water affordability and effectively safeguard the human right to water for residents across the region.

FIGURE 1

THE FLAWED GLWA AGREEMENT



Lease payment

During the GLWA negotiations, Detroit's water and sewerage infrastructure was not properly appraised, and the resulting lease payment is arbitrarily and detrimentally low. While the exact value of the system will not be determined until it is officially appraised, it is apparent that the $50 million annual lease payment is insufficient.

Importantly, the $50 million annual lease payment is a cost shared by all wholesale customers–including DWSD-R. In FY 2018, Detroit will contribute $13.5 million to the $50 million lease, leaving the suburbs to cover only $36 million.[21]

The vast inadequacy of a $36 million lease payment is especially clear when considering the value of similar systems. The 2017 sale of Aquarian Water to Eversource Energy offers a helpful example. The $1.7 billion sale combined Connecticut's largest water and energy companies, and Eversource paid $880 million is cash for Aquarian's system, also assuming $795 million in Aquarian's debt.[22]

Detroit's regional system is much larger than Aquarian's, which serves 625,000 people.[23] Detroit's system serves 6.25 times as many people: about 3,900,000. As of 2016, the debt carried on the Detroit system was much larger, $5,548,324,503.00.[24] However, that debt breaks down to $1,450.00 per user, as compared to $1,272.00 per user in the Connecticut utility. So, in other words, when adjusted for system size, the debt burden is quite similar.

In the Connecticut example, $880,000,000 was paid to the Owner representing the market value over the indebtedness, that's $1,480.00 per user. Applying that same market analysis to Detroit gives a market comparable value of $5,385,600,000.00 over the indebtedness. That is over $5 billion in equity that was not reflected in the GLWA transaction

As we describe in the "Recommendations" section of this report, imputing a reasonable lease rate of interest to the rental structure, Detroit should be

paid four percent annual interest on the value of the asset, or $215.4 million per year. That is 5.8 times what it is currently being paid.

The fact that negotiations led to a lease and not an outright sale of the infrastructure allowed the lease payment to be set at so low a cost. While a sale would have required a comprehensive assessment of the asset's value, negotiating a lease payment did not. The circumstances of the creation of the regional water authority—namely, that Detroit was in the midst of a municipal bankruptcy and under emergency management—gave rise to a transaction that would not have occurred under normal circumstances and is, correspondingly, blatantly inequitable.

This issue is at the center of the inequities with the agreement. In order for DWSD to be able to supply affordable, high quality water to all its customers, the annual lease payment must reflect the value of the system as it is assessed through proper review. This is the fundamental issue with the agreement as it stands today, and until it is addressed, a truly just and sustainable water system in Southeast Michigan cannot exist.

Cost allocations

Additionally, the allocation of costs within the agreement is unfairly burdensome for Detroit and does not take regional inequities into account. Under the lease agreement, some costs of operating and improving the regional system are considered "common-to-all," meaning that DWSD-R and wholesale customers contribute to them, while others are "Detroit-only" or "customer specific." Under the currently system, the ways costs are allocated within these classes is inequitable to Detroit and endangers the sustainability of its water and sewerage infrastructure.

For example, under the current arrangement, the $50 million/year lease payment is a common-to-all, meaning that Detroit contributes $13.6 million to the lease payment on its own system. The proposed Water Residential Affordability Program (WRAP) is also a common-to-all cost.

On the other hand, substantial costs associated with the combined sewage system are largely left to Detroit.

The enormous expense of the combined sewage system is rooted in with the way in which sustained historical neglect of necessary capital improvements to Detroit's infrastructure has left the city with an antiquated combined sewer system (CSS). In a combined sewer system, sewage, greywater, and stormwater all mix within the same system and are all transported to the same wastewater treatment plants. This type of sewerage system is no longer built, and converting a combined sewer into a separate sanitary sewer—in which stormwater is separated from sewage and greywater treatment—is exceptionally expensive. This is one of the reasons why over 800 communities in the United States continue to depend upon combined sewerage systems.[25]

In the regions, 3,800 miles of sewer are in Detroit and 8,770 miles in suburban areas. Of the 8,770 miles of suburban sewer, only 970 miles are combined sewer systems, while the vast majority of Detroit's sewer is combined sewer.[26]

The primary issue with CSS is environmental risk of combined sewage overflows (CSO) and the substantial costs of preventing those overflows. During wet weather, the sewerage system takes in an increased volume of stormwater, in addition to greywater and sewage. This additional intake of stormwater can make the volume of water exceed the system's capacity. In these cases, there is a risk for the sewers to overflow, and for the overflow—containing sewage and industrial waste—to be discharged directly into freshwater. These overflows present acute environmental and public health threats, and municipalities with combined sewer systems are required by the EPA to take protective measures to avoid CSOs—or else incur heavy financial penalties. These preventative initiatives can take the form of either "grey" or "green" CSO management.[27]

The measures required by the EPA are incredibly costly, and under the current agreement, those costs are inequitably allocated to Detroit. The current agreement requires that Detroit covers 83 percent of the costs associated with several of the grey CSOs leased by the regional system, while the wholesale customers cover only 17 percent.[28] There is one exception– The Belle Isle CSO Retention Basin– which is paid for by Detroit exclusively. This 83/17 split is rooted in the unfair and non-transparent "1999 Rate Settlement Agreement," implemented while DWSD was under federal oversight.[29]

Additionally, Detroit is required to cover 83 percent of the costs of future grey CSO management facilities which are deemed to "primarily serve Detroit"– a distinction which is unclear considering that the systems are, literally, interconnected.[30] In addition to covering 83 percent of the costs with existing grey CSO control facilities and perhaps that of new facilities, Detroit is also left to cover 83 percent of the expenses associated with the construction of new green CSO control systems.[31] The new facilities are hugely expensive, with those initiatives currently planning costing over $50 million in capital investment over the next four years.32 Those costs will likely increase over the course of the lease, given increased pressure on

the system due to climate change, as well as continued deterioration of Detroit's system.

Leaving Detroit responsible for 83 percent of CSO costs is inequitable for a variety of reasons. The logic behind the 83/17 split is likely rooted in the fact that most of the combined sewage system is in Detroit; however, though Detroit does contain the majority of the combined sewage system, the system is a regional responsibility.

One reason for this is that Detroit acts as the backbone of the region, housing highways, universities, hospitals, and governmental buildings that are used by people throughout Southeast Michigan. Much of the drainage entering the system– and contributing to CSOs– is related to the large impervious services required for those amenities. The costs pertaining to other entities that serve the region but are located in Detroit, such as the wastewater treatment plants are common-to-all; this ought to be the case for CSO costs as well.

Additionally, the fact that Detroit has an antiquated system such is because of the sustained historical neglect of Detroit's system, which is a product of the way in which Detroit enabled suburban growth, described in Section I. Thus, the costs associated with maintaining the city's aging infrastructure are not the responsibility of the Detroit alone.

The consequences of the inequitable allocation of costs under the current agreement are detrimental to the well-being of Detroit's system and the fiscal well-being of Detroit. To cover the costs of CSO management, the city is forced to charge high unmetered drainage fees to DWSD-R customers. Currently, DWSD-R customers pay a monthly fee of $750 per impervious acre.[33] These drainage fees are not only burdensome for Detroiters, but as described in Section III, actively threaten the livelihood of community spaces; the existence of many Detroit churches, for example, is endangered due to their inability to afford the fees.[34]

Under the current agreement, costs–particularly the lease payment and CSO costs–are allocated in unfair ways, which does not take into account the ways that historic divestment and austerity has created lasting expenses associated with Detroit's crumbling infrastructure. The sharing of costs under the GLWA agreement could have provided a vehicle to amending the region's unfair history, but rather, given the current structures for sharing costs, perpetuates it.

Rate structure

Pricing policies are a key component in determining utility provider's cash flow, and what is factored into the calibration of rates plays a key role in determining equity. However, the current GLWA/DWSD agreement inhibits the development of a rate-setting structure that effectively recovers costs, while ensuring equity, efficiency, and sustainability.[35]

Notably, GLWA inherited DWSD's historic rate-setting structure. As evidenced by the DWSD's massive debt and use of shutoffs in its final years, that rate-setting structure failed to effectively recover costs and ensure the human right to water. With the creation of the GLWA, those rate-setting structures were not reconsidered.

Through the lease agreement, GLWA has ultimate authority to establish rates for both Retail and Wholesale customers.36 However, DWSD-R assumes this responsibility, along with billing and collections as detailed in the services agreement, but is ultimately subject to GLWA's approval.37 Notably, DWSD-R will be subject to the same rate increases as other wholesale customers; customers with greater or similar economic conditions than Detroit.[38] On the other hand, there are suburban wholesale customers that could reasonably sustain a rate increase, especially if there was in effective affordability plan in place to serve the needs of low-income people in those jurisdictions. After all, GLWA's base water rates, inherited from DWSD, are low as compared to similar places.

Importantly, the agreement contains obstacles to fundamentally reconsidering GLWA's rate-setting structure, which would be required for effective cost-recovery, as well as for guaranteeing affordability, conversation, and economic development.

The four percent cap on rate increases under the current agreement is one of these. The current agreement sets a rate increase cap of four percent for the first 10 years of the 40-year lease agreement.[39] Depending upon the future decisions and practices of the GLWA, the four percent cap could present significant limitations recovering costs, and in particular, for funding a water affordability program and improvements on Detroit's urban infrastructure.

Note that the percent cap on rate increases has a notable exception. The rate increase can exceed four percent if the increase is required to meet legal obligations GLWA and DWSD-R.[40] Costs associated with meeting the terms of the long-term compliance schedule between DWSD and EPA are quite high–perhaps as high as $1 billion.[41] Given the likelihood of increased regulatory issues with the regional water infrastructure, it is probable that rates will likely increase beyond four percent, which may pose threats for affordability in low-income communities.

At the same time, the four percent cap may also hamper the ability to fund large-scale improvements on Detroit's urban infrastructure: the most antiquated in the region. Because GLWA and

DWSD-R plans together to address capital needs of their shared system, a four percent cap on other wholesale customers can limit the amounts available to meet the needs. Lacking funds for large-scale improvements is particularly burdensome for Detroit, as their urban infrastructure is in most need of improvement. Failing to improve Detroit's infrastructure not only further marginalizes the city, but also compromises the sustainability of the entire regional system.

Additionally, the four percent rate cap is based upon an insufficient valuation of the true costs of water affordability. Notably, the cap factors in the costs associated with the currently-in-place Water Residential Assistance Program (WRAP).[42] As is empirically evident in Detroit, water poverty persists despite the WRAP program. Not only is the WRAP plan inadequate to meet the needs of Detroiters, it's inadequate to meet the needs of struggling customers across the region. The costs for an effective program well exceed the figure used to determine the asserted adequacy of the four percent rate cap. This point is discussed particularly at the latter part of this section, as well as Recommendation 5 in this report.

GLWA rate-setting structure ought to be reconfigured to include the full costs of necessary improvements to the infrastructure that needs it most as well as a robust affordability plan. After all, the core purpose of the utility is to deliver palpable water to all customers in the service area and discharging and treat sewage from customers in service area, while also meeting legal obligations and assuring the fulfillment of the human right to water. Figuring these elements into the cost-of-service model, and relatedly, rate-setting structures, may result in increases above or below four percent, which may vary based on resources available from wholesale customers. Of course, any increase in water rates must be accompanied by a robust water affordability plan.

Governance

Several aspects of GLWA's governance structure stifle Detroit's voice in making decisions about its own system.

One issue is that the structure of the GLWA board limits the power of Detroit in making decisions about its own system. As previously mentioned, the board includes two members appointed by the Detroit mayor, one member each by Wayne, Oakland, and Maycomb counties, one appointed by the Governor who will resign and be replaced by a Flint resident.[43] A supermajority is required for all major decisions, including the appointment of the authority's manager; approval of rates, fees, and charges; issuance of debt; approval of annual operating budgets; and approval of capital improvement plans.[44]

It could be argued that Detroit has "more" influence on the board relative to other whole sale customers based upon two seats designated for mayoral appointments. However, with only six seats and five votes required to approve influential actions, the degree of the city's influence on board decisions is moderated. As these non-Detroit parties' interests are more closely aligned with each other and much less inclined to address the historic inequities represented by the existing infrastructure system, Detroit's influence in the GLWA is greatly diminished.

To underscore the severity of the imbalance of the GLWA board, one only has to look at the September 20, 2017 draft of the GLWA "One Water" partnership agreement.[45] The partnership appears to create a second governance structure comprised of 84 named municipalities, the Great Lakes Water Authority, the city of Detroit, the Michigan Department of Environmental Quality, the Southeast Michigan Council of Governments, and consultants representing any of those members.

The responsibilities of the partnership closely parallel those of GLWA board. Among the common goals of the partnership is a commitment to work toward consensus on each issue. Depending on how "most of the membership" is defined, this is remarkable. A majority vote—whether super or simple majority strengthens more homogeneous suburban interests with the representation of smaller concerns relevant to the city of Detroit and Flint. This parallel governance structure further dilutes the voice of DWSD, Detroit, and Flint which comprise only a tiny fraction of the parties at the table. The regional authority has over eighty voices behind it, while only a few representatives speak to the needs of Detroiters.

This echoes the long history of Detroit being marginalized in their influence of decisions about a system designed, maintained, and expanded by the city. The board structure, as well as extra-board organizations such as the One Water Partnership, stifle Detroit's influence in an environment that has already devalued their asset and investment.

The limitation of Detroit's voice in the GLWA board and extra-board organizations echoes the trend of limitations on democratic representation during the bankruptcy process. In fact, although the city's bankruptcy plan was approved by the federal court, the city's autonomy over its own finances has yet to be returned to the city three years after its bankruptcy process. The Michigan State Treasury's Financial Review Commission must approve city budgets and contracts.[46] Al-

though the city's subjection to this Commission could come to a conclusion as early as March or April 2018, the agency that the mayor could exercise or the agency that could be exercised by city representatives on GLWA board is understandably limited. Currently, these are very official inhibitions placed on city agency, and even after the official inhibitions are dissolved, it's feasible to imagine a persistent trail of policies left in the wake of the Commission's suppression of Detroit's democratic voice.

Another issue with the agreement's governance structure pertains to the consequences of Detroit either failing to meet the terms of the agreement or opting to withdraw from the authority. It is very possible that Detroit will be unable to meet its obligations under the GLWA agreement, especially given the lack of clarity in the way costs with be shared in the system. This is in part due to the way in which within the lease and services agreements, the GLWA possess important power—but it does not lease the entire infrastructure system within the geographic boundaries of the city. Rather, the documents outline what has become an entirely artificial division between what "parts" of the infrastructure are Detroit's and which parts are GLWA—from the size of pipes to vehicles and office space.

Also described in these documents are the complexities of how this distinction will be managed. Detroit's parts and GLWA's parts are associated with different costs and different upgrade projects. However, there is little detail on how these responsibilities will be distributed between Detroit and GLWA. CSO costs are a notable exception. And, more importantly, there is little specification on how decisions regarding these plans will be made. It appears that a central point of making these distinctions will come through DWSD-R's obligation to submit a budget and capital improvement plan to GLWA every year.[47] The documents contemplate the need for sharing and coordinating efforts to share obligations to what is, in effect, a single system. However, it seems that concretized decisions on how to share these duties will be run through GLWA board decision-making, a mechanism wherein Detroit's voice is severely limited.

The artificial division of what is a single system can create significant difficulties for DWSD-R to meet its obligations under its services agreement with GLWA. For example, if GLWA increases rates then DWSD-R along with other customers will have new revenue requirements to meet. For DWSD-R there are these increased revenue requirements, but also there is the variety of unknown additional costs for management of its own local system—a system that is the same as that of the GLWA despite however detailed the agreements' lists of specific assets are. One issue, for example, is the lack of transparency about the ways that costs associated with capital improvement plans or long-term compliance schedules will be shared.

Barriers to Detroit meeting its obligations under the lease are compounded by the city's poor credit ratings, and correspondingly, inflated costs for debt service. Additionally, the utility has substantial challenges in recovering revenues, given the high proportion of low-income people in the DWSD-R service area.

The terms of the agreement are incredibly unfavorable for Detroit should the city fail to meet the terms of the agreement. DWSD-R can lose its ability to set rates, issue bills, or establish collection practices, and instead GLWA could take over those duties.[48] Additionally, should conflict arise between GLWA and DWSD-R, dispute resolution occurs through an arbitration process that blocks access to courts.[49] And if the city opts to withdraw from the Authority, Detroit can forego future lease payments.[50] As the agreement states, that any such withdrawal will not terminate this Lease or affect the Assignment and Transfer, or affect the Revenues collected by the Authority."[51]

Ultimately, the agreement limits Detroit's agency, which is a serious concern considering how unfavorable the agreement is for the city. Leases ought to reflect clear and fair contractual agreements. In the case of the GLWA/DWSD agreement, the agreements more closely resemble an unfair sale. In fact, as states in the agreement, "Notwithstanding the foregoing, this Lease shall constitute a bill of sale from the City to the Authority pursuant to which the city conveys all of its right, title and interest in and to the personal property that is part of the leased water facilities."[52]

DWSD is not like other GLWA wholesale customers and the governance structure and the relationship between the city and the GLWA should reflect that. Not only did the city own and create the asset, the city was also the regional hub for economic and social development; the agreement's governance structure ought to reflect that.

Affordability programs

The current water affordability plan in Detroit is the Water Residential Assistance Program (WRAP), which provides funds to subsidize repayment on overdue accounts.[53] Under WRAP, which began operating in Detroit in March 2016, DWSD customers at or below 150 percent of the federal poverty line are eligible to receive a $25 monthly bill credit and have their debt frozen for 12 months. Customers who successfully make monthly payments for one year are then eligible

for a $700 credit towards their debts. Additionally, customers exceeding 120 percent of average household water consumption can receive a free home water conservation audit and, based on the audit, may receive up to $1,000 for repairs. Customers must have a delinquent bill or shutoff status to be eligible.

DWSD did not appear to anticipate the assistance program's weaknesses. DWSD director Gary Brown insisted that WRAP is "a very robust, comprehensive program that addresses all of the issues I've seen in the past that causes people to fall out of a plan." However, by August 2016, just five months into the assistance plan's implementation, program funds ran dry, and customers who sought assistance were turned away.[54] In 2017, out of 18,749 completed pre-applications, only 6,402 households were enrolled.[55]

Activists and experts in affordable utilities point out that the plan is markedly inadequate and fails to address the root issues of water affordability and prevent shutoffs. It is important to note that WRAP is an assistance rather than affordability plan; it offers a short-term, insufficient solution for residents whose bills are simply unaffordable.

As described by Lynna Kaucheck, a senior organizer for Food & Water Watch, "These assistance programs are not helpful for people who have real, long-term affordability problems… These programs are going to continue to fail because it's not really addressing the problem."[56] The sheer degree of shutoffs following the implementation of the plan also speaks to its inability to address the issue of water unaffordability. People want to pay their bills, and they want to have access to water, and a true affordability plan would make this possible.

In 2005, Roger Colton worked with Michigan Welfare Rights Organization (MWRO) and DWSD to design a Water Affordability Plan (WAP).[57] Colton's WAP proposed a rate structure based on DWSD users' income (we propose a regional version of this plan in Section IV of this report). Income-based plans address the root causes of unaffordability and ensure that water and sewerage rates do not exceed an affordable burden. The plan also recommended abolishing late payment fees and educating residents about water conservation.

Economist and utility services expert Roger Colton has explained that the issue of water affordability affects everyone, not only those who are unable to pay:

> *Providing water affordability assistance is critically important from everyone's perspective. From the customer's perspective, having affordable water often is the primary factor that determines such fundamental issues as whether someone can stay in their home or retain custody of their children. From the water provider's perspective, it makes little sense to issue bills that people cannot afford to pay. In such circumstances billed revenue does not translate into collected revenue. The water provider ends up spending more and more money in a less and less successful effort to collect its bills. From a community's perspective, unaffordable water service drives up health care costs (borne by everyone), impedes childhood education (thus continuing the cycle of poverty), destabilizes neighborhoods, and makes communities less competitive to businesses seeking places to locate. From an environmental perspective, unaffordable water service frequently (if not generally) prevents local governments from investing in the infrastructure improvements to meet clean water objectives. As can be seen, unaffordable water is not simply a poverty issue. It is a health care issue, a housing issue, an education issue, a business development issue, an environmental issue. Any reasonable local official must recognize that unaffordable water service is a problem that must be addressed and resolved.*[58]

Additionally, as Colton's 2005 Water Affordability Program (WAP) states:

> *In the energy arena, ample research has found that many low-income customers pay their home energy bills at significant personal sacrifice to themselves and the members of their households. Low-income consumers may forego buying medicine, food, insurance, and dental care. Low-income consumers have been reported to heat their homes with "alternative fuels" including used tires, newspapers, clothing and furniture in order to pay for their heating bill. Low-income consumers have been reported to pawn their possessions, abandon their homes for days or weeks at a time, and reduce their heating to unsafe levels in order to pay their heating bills. These consumers are no less "payment troubled" than their counterparts who simply do not pay their bills. The same results would arise with water bills. In sum, payment troubles are a manifestation of the affordability problem. They are not the problem itself.*[59]

Residents are not choosing to fall behind on payments or to go without water. Bills are simply unfeasible for low-income Detroit residents to pay.

WRAP's failure to address the underlying issue of water affordability creates a system that is perpetually in crisis. The creation of the GLWA thus failed to address the crucial issues of water affordability in Detroit by providing an underfunded regional assistance, rather than affordability, program. Detroit lost its most valuable asset and failed to secure affordable water for its residents.

Conclusion

The current GLWA lease and services agreements with DWSD and other related agreements with DWSD that preceded the GLWA contains multiple areas for concern. The cluster of agreements have legally installed structural constraints on GLWA and DWSD. The design process and deliberation on terms have not been adequately transparent or created in a context of public debate and influence. The features are of great consequence for DWSD because of the consequences of failure to meet any of its obligations. Desgins for DWSD's obligations are problematic and can be argued to be difficult for DWSD to meet. Some people have discussed the documents design to "set Detroit up for failure." In identifying key structural design flaws in this section, we are able to locate structural barriers for DWSD and its customers to maintain even a modicum of local control and benefit from the regional asset.

For example, the cost sharing and rate structure do not allow for many probable scenarios that DWSD could experience For example, the terms also are not designed to account for a robust affordability program that addresses long-term revenue challenges for Detroit residents that are unable—not unwilling—to pay. The problem of the system providing water access, environmental quality, and public health throughout the region is a profound problem and inhibits the mission of DWSD—but also inhibits the mission of the GLWA. These structural features between DWSD and GLWA are also relevant for other retail customers in the regional service area. More prosperous and other struggling retail customers should also inspect and critically appraise their agreements with GLWA. Some have suggested that the design of GLWA is to consolidate its unilateral control of the regional system.

At this stage of analysis, the intention of GLWA is not clear. However, structural flaws and severe consequences of retail customers to meet GLWA service agreements should be rigorously reviewed and the decision making around these agreements should be made available for such review.

It is likely that the lease payment is based upon a deflated value of the DWSD system. It is not at all clear that the amount of the lease payment was tied to a consideration of the value of the system. This is an area for concern since the lease payment constitute an important part of DWDS's capacity to meet its obligations under the agreement. The lease payment is also an important part of other retail customers to structure their rate structure and fulfill their missions to ensure high-quality drinking water and adequate wastewater services and ensure their system's contribution to regional environmental quality and public health.

Second, the way in which costs are allocated within the lease agreement is not clear. In this lack of clarity and transparency there is limited room for analysis. However, the separation is seen to be arbitrary and unfair by institutions and residents throughout Detroit. Designing a separation of operation, management, and maintenance tasks across the regional system and the portion of the system within Detroit is exceptionally complex and the rationale of this separation is unclear. This is particularly evident in the way in which the lease payment is common-to-all, while costs pertaining to CSO management are not.

Thirdly, the agreement contains provisions which inhibit the development of a rate and pricing structure that ensures equity, sustainability, and efficiency. Rates may need to increase by more than four percent (the limitation imposed by the GLWA/DWSD agreements) to provide for these areas. Again, in this case, the rationale of the 4 percent cap is not clear.

Fourth, the governance structure of the GLWA board limits the influence of Detroit and ability to influence decisions about its own system. Flaws within the governance of GLWA are also of consequence to other smaller financially struggling cities within the region.

SECTION II

RECOMMENDATIONS

Recommendations

DETROIT HAS THE POTENTIAL to become a national leader in the primary infrastructure challenge of the 21st century: securing economic and physical access to clean and safe water and sanitation services. Water insecurity is experienced across the country—the pervasiveness of the problem indicates a systematic failure. Water access includes service that is affordable, physically accessible, quality and safe drinking water, and wastewater services that promotes environmental quality and public health. These are challenge through the country and within the GLWA service area.

The previous section presented a structural analysis of challenges that face DWSD and GLWA and identified specific areas of concern. Here we detail the start of strategies that could address those systemic design flaws and can promote improved water access in Detroit and throughout the GLWA service area.

There is a vast array of strategies and solutions that could be implemented to advance water access. There are strategies that enjoy strong or weaker political will. Strategies have to be designed, aligned and implemented such that a balance is struck between pragmatism and larger scale structural change. An additional factor that should ultimately determine which strategies to implement and their design should be ensuring that reaching water access is also advancing the broader need for social equity.

Some of the following recommendations will have far-reaching immediate benefits for people lacking basic access to in-home clean water and sanitation, while others will have benefits in the long-term, laying the groundwork for the development of resilient systems, protected against economic and climactic risks. No singular strategy can respond to Detroit's complex problems, and even these six constitute a preliminary list, offering a catalyst for further development, study, and participation.

These recommendations support solutions crafted by local experts, including community leaders, activists, and academics. They have been an incredibly valuable resource that has too often been neglected in the creation of actionable policies. Correspondingly, meaningful relationships with community stakeholders should be integrated into the development and implementation of these strategies.

Moratorium on Residential Water Shutoffs and Redesign Decision Making Regarding Water Shutoffs

Rationale

We propose instituting an immediate moratorium on residential water shutoffs until such time adequate processes are established that ensure a shutoff is not implemented when a person is unable to pay. The moratorium should also be in place until there is a clear sufficient process to distinguish between accounts that are able or unable to pay. As part of this strategy and generally there needs to be a form of due process in the course of a water shutoff. Processes should enable effective and easily navigable processes to challenge to shutoff orders and access financial support programs. This strategy will be greatly eased with the recommendation of designing a robust and effective water affordability program which is immediately follows here. During of the period of that moratorium, it is essential for GLWA, DWSD, and other service providers to seriously consider the objections raised by the Detroit community and international agencies and implement long-term, dramatic changes to service disconnection practices. Any policies that pursue service disconnection to incentivize payment should be designed to apply only to situations in which there is an ability and unwillingness to pay. This will disqualify the vast majority of service disconnections.

Implementation

A prohibition on shutoffs in the situation of inability to pay can be implemented by either reframing GL-

WA's customer service policies. Alternatively, this protection can be realized by implementing state or national legislative reforms that forbid water shutoffs when the inability to pay is documented.

Implementing an effective affordability plan and certain customer protections–described later in this Section–should eliminate the need for punitive collection practices in the first place. However, in light of the massive impact of shutoffs on residents in Detroit, it is important to decisively and permanently eliminate shutoffs until more well-designed consumer protection measures are in place.

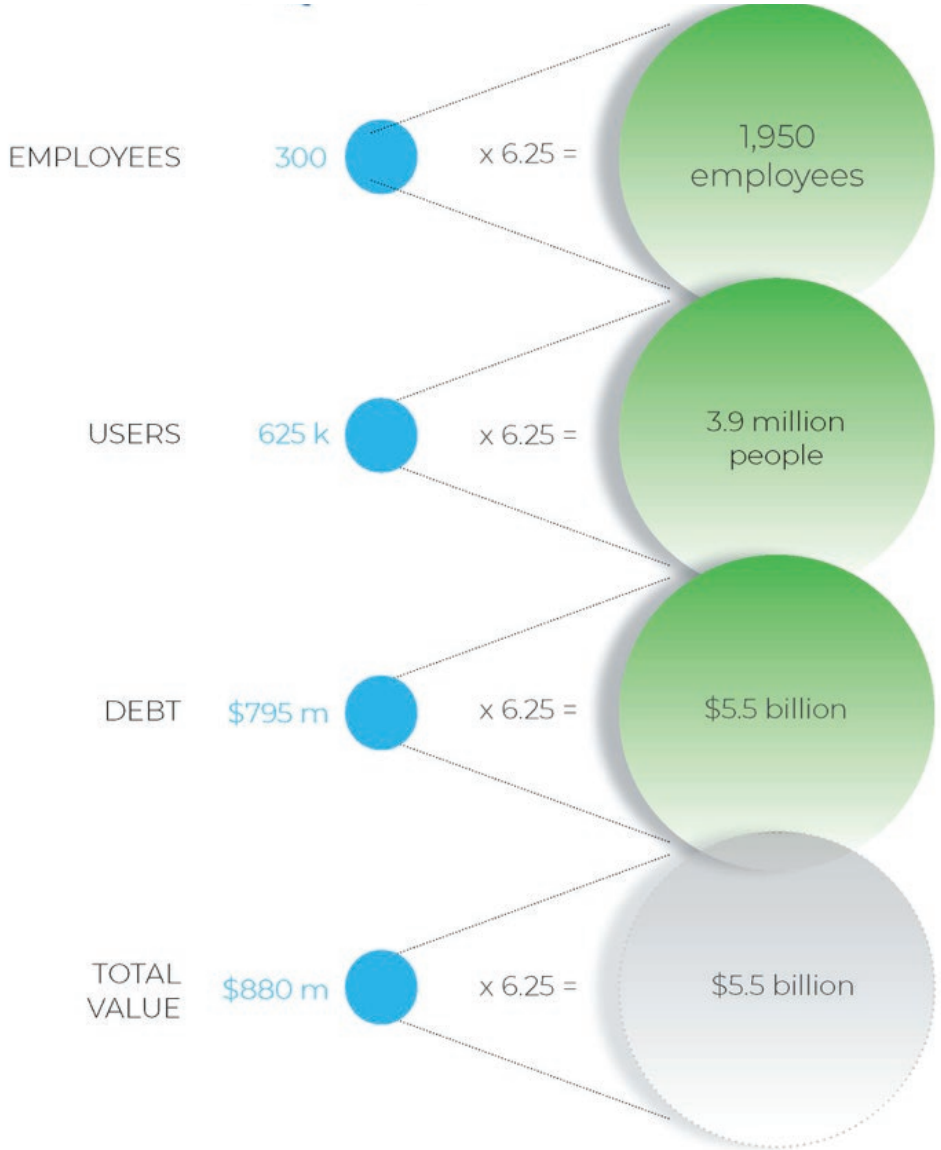
Appraise the Annual Lease Payment

Rationale

It is possible that the $50 million/year annual lease payment and other payments made to Detroit and DWSD-R do not adequately reflect the value of the system GLWA operates and manages. The payment is considered a common-to-all cost, Detroit contributes to the lease on its own system. In fiscal year 2018, Detroit will contribute $13.6 million to the lease on its own system.[60] It is not entirely clear if Detroit's $13.6 million is intended to cover services and operations to GLWA.

FIGURE 2

THE FINANCIAL IMPLICATIONS OF CALCULATING ACTUAL MARKET VALUE OF THE REGIONAL WATER & SEWER INFRASTRUCTURE



Implementation

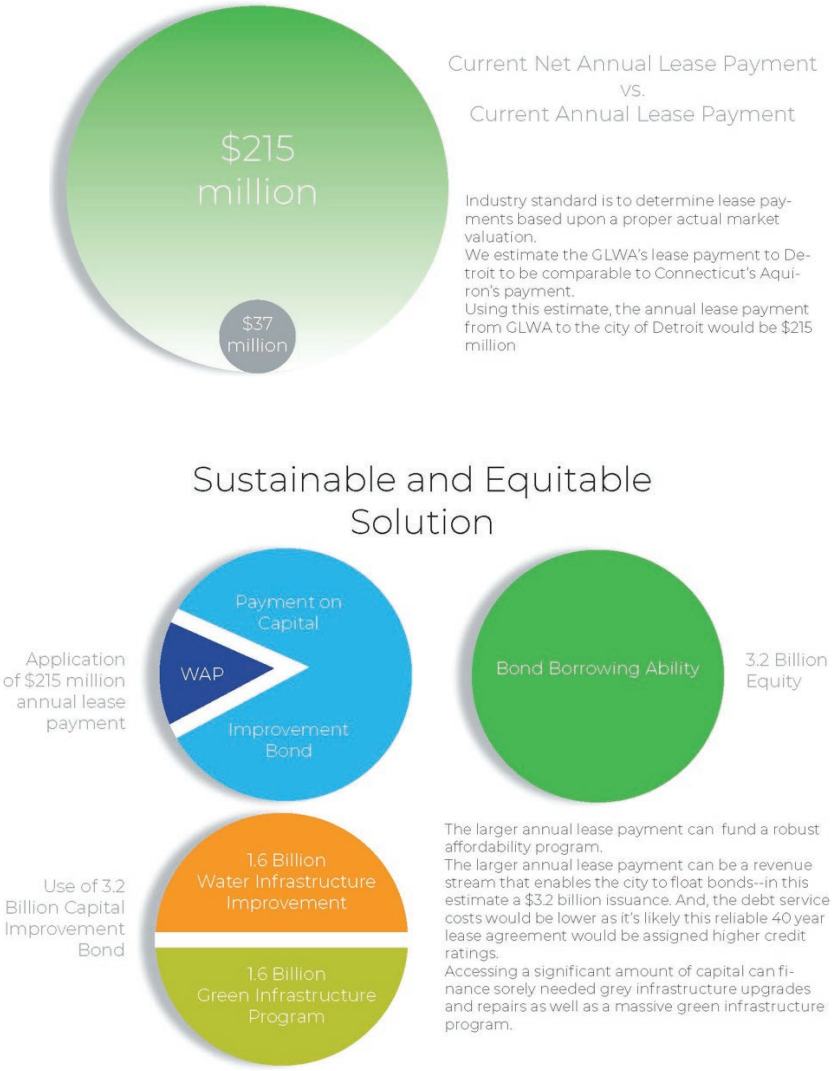
We recommend that rationale and calculation of the GLWA lease payment be made available for public review. Additionally, a comprehensive appraisal of the regional system may be warranted to assess the degree to which the lease payment adequately reflects the value of the asset.

This is a non-trivial part of our recommendations—enabling public disclosure of the rationale and basis of calculation of the lease payment is necessary. The circumstances of the DWSD system and its relationships to GLWA, and GLWA itself, are not those of a transaction between a public system and an investor owned utility. This complicates a process of valuation. Additionally, the process of valuation of water and sewer systems is exceptionally complicated and techniques of valuation of drinking and wastewater systems is not well researched or publicly available. Not only would a valuation need to be done, but the valuation process itself would need to be carefully considered and be made transparent and subjected to a period of public comment and expert review.

This does not require abandoning the agreement. Rather, the agreement can be reworked with an eye aimed at achieving lasting regional equity. Any renegotiation process of the lease payment or other provisions in the lease and services agreements ought to be transparent, fair and balanced, evidence-based, and periodic.

FIGURE 3

SETTING AN ACCURATE LEASE PAYMENT BASED ON FAIR MARKET VALUE; AND A SUSTAINABLE AND EQUITABLE SOLUTION



Consider Legislative Reforms

Rationale

Plans for a more equitable and sustainable water and sewerage system rests on the firm conviction that every person has the right to safe, affordable, and accessible water. This tenant should be reflected in law. In 2012, California became the first state to legislatively recognize the human right to water by requiring that every person has the right to "safe, clean, affordable, and accessible water" for consumption and sanitation.[61]

Current legislation does not adequately protect the fundamental human right to water. Effective legislation would safeguard those rights. In order to ensure durable and widespread access to drinking and wastewater services, there is a need for policy that safeguards access to clean, affordable water and clean surface water. These general principles and aspirations are reflected in different ways in the following examples.

While most of these recommendations would be implemented on a state or local level in Michigan and throughout the GLWA service area, these suggestions provide a model for national legislation, as well as initiatives that can be applied in other states and local communities across the country.

Access to safe and affordable water and wastewater services is a problem that has multiple structural elements and no one piece of legislation can accomplish all that is needed. The samples below

reflect a partial menu of strategies and targets.

Components

Important work has been done on this front, and we recommend further inquiry into the feasibility and development of potential legal and legislative strategies.

The National Coalition for Legislation on Affordable Water (NCLAWater) is current advocating for a variety of measures at the state and federal levels.[62] Founded in Detroit, the coalition is comprised of local, state, and national organizations advocating for legislation that guarantees "comprehensive access to safe, affordable drinking water and sanitation – the human rights to water and sanitation." They require that water be accessible, safe, and affordable.

Those efforts include legal protections for access to water, water billing and rates, water quality, and citizen oversight and transparency. NCLAWater's Michigan statewide legislative package includes the following examples.

Examples of Legislation

The following bills could work in different ways to advance the realization of water access by explicitly stating that right, requiring transparency from service providers, ensuring affordability, and implementing consumer protections. [63]

Access to Water

HB 4291 Michigan Access and Affordable Water Act
Creates the "Accessible and Affordable Water Act," which would require that all state departments and agencies employ all reasonable means to adopt certain policies to ensure that water is affordable and accessible as long as those policies do not affect eligibility for federal funds.

HB 4360 Water Access
Requires access points for safe drinking water be available in places where residents are not supplied municipal water hook-ups.

Water Billing and Rates

HB 4393 Shut-Off Protections
Institutes shut-off protections by creating categories of individuals protected from shut-offs (seniors, families with young children, pregnant women and people with disabilities) and providing for clearer notices about potential shut-offs.

HB 4392 Regulation of Water Rates by MPSC
Grants the Michigan Public Service Commission the power and jurisdiction to regulate rates, fares, fees and charges of any water or sewer authority in the state. According to a Legislative Service Bureau research memo from 2015, water utilities fall under the purview of 45 other state public service commissions.

HB 4394 Affordability
Addresses the water rate structure that unduly burdens low-income residents by amending the Social Welfare Act to create a residential water affordability program within DHHS in order to ensure that water bills are based on household income.

NATIONAL COALITION FOR LEGISLATION ON AFFORDABLE WATER GUIDING PRINCIPLES

NCLAWater was created to adopt federal and state legislation establishing affordable water and sanitation services, ensuring that every person has access to safe, affordable water and sanitation. No person shall be denied access to basic water and sanitation services based on ability to pay, race, age, or gender. All state and local criminal law provisions that criminalize lack of access to safe affordable water and sanitation are a violation of constitutional due process and equal access guarantees. Drinking water and sanitation services and facilities must be accessible at home, in schools, clinics, low income and elderly housing, and to homeless persons; Safe drinking water must be free from microbes, parasites, chemical substances, heavy metals and radiological hazards that constitute a threat to a person's health. Sanitation facilities must ensure the health and physical security of the person. [Affordable water] [m]means that every person can pay for drinking water and sanitation without sacrificing another basic, essential human need – such as food, health care, housing, transportation, education, and emergency communications. No person shall be denied access to basic water and sanitation services based on ability to pay, age, disability, gender, or race. Drinking water and sanitation must not comprise more than 2.5-4% of monthly income for low-income persons.

HB 4389 and HB4390 Decriminalization
Decriminalizes the act of re-connecting water service (because of a shut-off due to inability to pay) from a five-year felony to a civil infraction for a first or second offense and a misdemeanor for the third offense.

HB 4388 Water Meters
Requires that a provider shall not make water or sewerage service to a residential customer contingent on the installation of an advanced meter or use of an advanced meter function.

HB 4712 Billing
Allows some customers, who have not received a water bill by ten days after the end of the billing period, to no longer be responsible for paying that bill if he or she contacted the department in writing twice and the department did not respond within 30 days.

Water Quality

House Bill 4125 Lead and Copper Action Level
Establishes criteria for the action level or engagement of state departments as it relates to the Lead and Copper Rule.

HB 4124 Program for Schools and Child Day Care
Establishes water testing and interventions for schools and child day care centers, as well as repair and replacement of sources of lead contamination.

HB 4120; HB 4372, 4378, 4379 Water Quality Testing
Requires water quality testing at regular intervals for schools, colleges, universities, nonpublic schools and hospitals.

HB 4206 Pre-Flushing
Stipulates that the DEQ and all water authorities must be compliant with EPA guidelines and mandates that procedurally no entity, including the DEQ, will be permitted to use pre-flushing as a water sample collecting method.

HB 4179 Loans to Local Government
Allows the Drinking Water Revolving Fund to give out low-interest loans to local governments to replace lead service lines.

HB 4175 Drinking Water Loan Fund
Creates the Drinking Water Emergency Loan Fund, which would allow for the owner or operator of a public water supply to apply for emergency funding for remedial purposes if it is found there is a threat of contamination to its drinking water.

HB 4339 Lead-Free Pipes/Fittings
Updates the definition of what constitutes "lead free" for purposes of pipes and pipe fittings. This legislation brings the definition in line with the Federal Safe Drinking Water Act language. Currently, the statute allows for pipes and pipe fittings to contain up to 8 percent lead. This bill reduces that amount to 0.25 percent.

Citizen Oversight and Transparency

HB 4201 and HB 4214 MDEQ Citizen Oversight Commissions
Restores a gubernatorial-appointed citizen oversight commission on water quality.

HB 4375 Water Ombudsman
Establishes a Water Ombudsman to advocate for residents throughout the state concerning water-related issues.

HB 2121 Rate Transparency
Increases transparency by requiring water providers to submit an annual report to DHHS regarding water rates and how they were determined, along with information about shut-offs in the previous year.

Revise Terms of Relevant Agreements

Rationale

The existing GLWA lease and services agreement—and other decisions regarding cost allocation—may reflect an undervaluation of the asset that is leased to GLWA. Furthermore, the structure of cost allocations between GLWA and DWSD seems to place uneven obligations—placing what is possibly an unfair burden on DWSD. Because the cost allocations were designed without public review and open consideration many groups feel that the distributions are arbitrary and unfair. We recommend responding to those inequities by a thorough review of the rationale in designing the cost allocation structure and reconfiguring any agreements in light of the results of such a review. In lieu of the ability to conduct assessment of documents, an appraisal of the system could further be used to determine to some extent whether the cost allocations are warranted.

As detailed in this report, the current GLWA lease agreement could unfairly burden Detroit. It is well known that many Detroit residents and institutions feel they have been left out of decision making regarding the creation of GLWA and, for a longer time, decision making regarding DWSD. Given the recent crises in water access and longer-standing problems with water and environmental quality it is

clear that despite intention, the people of Detroit have not been primary beneficiaries of high-quality drinking and wastewater services. Some of the recommendations here are necessary inquiries that will enable greater coordination between residents and local institutions and the institutions that govern the provision of drinking and wastewater services that have significant impacts on public health and environmental quality–for everyone in the GLWA service area.

- May reflect an undervaluation of the system or other errors in calculating the lease payments or cost allocations
- May allocate costs in ways that unfairly burdensome for Detroit.
- Limits the capacity of decision making in rate-setting structure–a primary means to balance what are frequently competing demands of rate setting structures including economic development, equity, efficiency, and sustainability.
- GLWA governance structure limits the ability for Detroit to exercise influence in decisions about the regional system that it owns. Additionally, the GLWA governance structure limits the representation of other retail, residential, and commercial customers that face barriers to water access including access to clean water, affordable water, and wastewater services that promote environmental and public health
- Fails to address the crucial issue of water affordability and provide durable solutions to water access

While the perception that the regional water authority and the negotiation of its governing agreements were problematic, these recommendations do not require discarding the current agreements entirely. Instead, there are ways to maintain the current fundamental structure while improving upon selected areas.

Establishing a more equitable cost-sharing model

We recommend reframing the way costs are shared in the agreement to make the agreement more transparent, fair, and equitable. The particular ways in which the sharing of costs should be reconfigured is grounds for further inquiry, but will likely involve making CSO costs common-to-all and not requiring Detroit to contribute to the lease payment on its own system. Other cost-sharing practices should be reframed along these lines, realizing that the agreement offers a mechanism for actively amending historical inequity in the region, ensuring the sustainability of local infrastructure, and ensuring the human right to water.

FOR FURTHER INQUIRY

In order to effectively advocate and realize state and federal legislative change, funds allocated for the development of a large scale organizing campaign is required. Such a campaign would involve the merging of philanthropic, advocacy, policy, and grassroots groups. The organizing structure of the Atlantic Philanthropy's Affordable Care Act Implementation Fund and the foundation's coordination of activities offers an example of a viable model.

Reframing Rate-Setting Structures

The way in which rates are calibrated in utility services is key to the equitable distribution of water and other resources. The current lease agreement, however, contains provisions that inhibits the development of a rate-setting structure that ensures equity, efficiency, and sustainability.[64]

GLWA inherited DWSD's historic rate-setting structure. As evidenced by the DWSD's massive debt and use of shutoffs in its final years, that rate-setting structure failed to effectively recover costs and ensure access to drink and wastewater services. With the creation of the GLWA, rate-setting structures remain inadequate to ensure water security throughout the GLWA service area.

We recommend appraising and studying alternative rate structures tailored to correct for any unfair terms in the cost-of-service model–including costs of affordability and substantial improvement to Detroit's into water rates. This may dictate water rate increases above the four percent cap–a cap which is currently posited in the agreement), and those increases may vary for different wholesale customers. Importantly, any increase in rates must be accompanied by a robust affordability plan which comprehensively meets the addresses the needs of low-income customers. Rate structure changes should also be represented of the way in which affluent communities may be more able to absorb rate increases than low-income and financially stressed ones.

The particulars of this renewed rate structure present grounds for further inquiry. We recommend conducting extensive research into the development of a new, equity-focused rate-setting structure in Detroit.

Reworking the GLWA Governance Structure

There are three primary ways we recommend reworking the GLWA's governance structures.

The first concerns the GLWA board. There are currently six members on the GLWA board: two appointed by Detroit mayor, one from each suburban county (Wayne, Oakland, Macomb), and 1 appointment by the governor, soon to be replaced from a representative from Flint. A super majority is required for major decisions about the system. In order to ensure the equitable representation of Detroit in decision-making about the regional system, we recommend increasing the number of representatives from Detroit.

Second, we recommend renegotiating and refining the terms of what should happen should Detroit fail to meet its obligations under the agreement. As discussed in this report, if the terms of the agreement are kept in place–including a rate increase cap, cost sharing, and calculations that are not based on adequate affordability plans–it is possible that Detroit will be unable to meet its financial obligations. Should Detroit fall short of its obligations under the agreements, the city can lose its rights to set rates, issue bills, and establish collection processes, also forgoing future lease payments should the city withdraw. Finally, if conflicts arise, disputes can only be settled through arbitration processes which block access to courts.

We recommend reworking those terms of the agreements to ensure fair and equitable conflict resolutions. Detroit ought to have recourse to legal resources should conflict arise, and should maintain its right to make decisions about the delivery of water sources to Detroit residents. Determining what those terms would look like constitutes grounds for further inquiry by way or fair and democratic processes.

Creating Structures to Fund an Affordability Plan

One of the fundamental issues with the current DWSD/GLWA arrangement is that it fails to comprehensively address the issue of water affordability. Water affordability ought to play a key role in the terms of the agreement. We recommend reframing the agreement to include a comprehensive income-based affordability plan, described in the proceeding Recommendation.

Implementation

We have defined some problems with the current agrements, but this does not mean it is necessary to abandon the agreements in full. Rather, the agreements ought to be reframed by way of a fair renegotiation process; provisions for doing so are outlined in the agreement. Specifically, the agreement calls for periodic review of rate-setting and cost-sharing practices.[65] Those periodic reviews can provide a mechanism for substantially reworking the terms of the agreement.

In order to ensure the establishment of a fair and equitable solution, it is necessary that the renegotiation process be:

- **Transparent:** Key decisions that have been made in creating the current structure of GLWA and DWDS need to be made available for public review and analysis. Going forward, the process to make key decisions should be made available for public review and analysis. The decision making process should allow for
- **Fair and Balanced:** Specifically, it is important the voice of Detroit and its residents and other groups within the GLWA service area are fairly represented when reworking the terms of the agreement.
- **Evidence Based:** There are many aspects of the agreement which merit further inquiry. The system ought to be comprehensively reappraised and cost-allocation practices reconsidered. It is crucial that experts be consulted throughout the review process, and that the reframed agreement be not only fair, but evidence-based.
- **Periodic:** Considering the multidimensional nature of the problems with the current agreement, reframing the agreement just once will be unlikely to achieve comprehensive water equity. The process ought to be iterative, with progressive changes and incremental progress throughout the duration of the lease, with an eye aimed at fair and workable solutions.

Implement a Comprehensive Water Affordability Plan

Rationale

We recommend implementing a comprehensive income-based water affordability plan. The principles of a plan were outlined by the Water Affordability Program (WAP) designed by Roger Colton and presented to the Detroit City Council in 2005.[66] The Colton plan has been endorsed by many in Detroit including Detroit-based water and welfare activist groups.[67]

It is necessary to implement a comprehensive affordability plan in order to safeguard access to affordable and clean water for all customers in the GLWA service area. The current assistance-based affordability plan currently in place is underfunded.

Background on Affordability

The affordability or unaffordability of home utility bills, whether for energy or for water and sewerage services, is most often measured by the percentage of household income spent on the bills.

Notably, there is variability in the affordability thresholds. The EPA deems water affordable if the average cost of water and wastewater bills constitutes less than 4.5 percent of annual pre-tax median household income: 2 percent for wastewater (and CSO controls), and 2.5 percent for potable water.68 Colton's plan sets the affordable burden on a sliding scale of 2-3 percent, depending on household income.[69]

In order to ensure that water rates are below the affordable burden, the "EPA continues to encourage communities to consider and adopt rate structures that ensure that lower income households continue to be able to afford vital wastewater services."[70]

Instituting a comprehensive water affordability plan is in the best interests of all customers in the district. As Colton's 2005 plan discusses, "while the unaffordability of water/sewer service certainly poses a social problem, it manifests itself as a business problem as well."[71] This is because unaffordability contributes to higher instances of unpaid bills. If bills were less burdensome, customers would be more likely to pay them, thus avoiding increased costs associated with collections, arrears, and uncollectible accounts.

The Philadelphia Model

In the fall of 2015, Philadelphia became the first major city to adopt an income-based affordability program. Philadelphia's "Income Based Water Affordability Program" (IWRAP) was voted in unanimously by the City Council and began operations July 1, 2017.[72] IWRAP is designed to ensures that monthly bills are affordable by capping bills at a percentage of the household-income. Philadelphia's plan is newly implemented. The design principles of the Philadelphia plan can be a basis for plans in other cities and provides valuable precedent.

Key Components

To companion a robust affordability program, we propose a rate structure for GLWA that reduces water and sewage bills to an affordable percentage of income. Determining the affordable burden for customers throughout the regions, either by way of a fixed percentage of medium household, a sliding percentage based on poverty level, or by way of another measure constitutes grounds for further inquiry. Determining an affordable burden would require comprehensive information about average water bill costs and annual income.

Once affordable burdens are determined, an affordability plan could provide affordability assistance by providing fixed credits to GLWA customer's bills. As in Colton's 2005 plan, fixed credits can be calculated by determining (i) the amount of a burden-based payment (for example, 4.5 percent of household income), (ii) the annual bill amount, and (iii) the fixed credit necessary to reduce annual bill to burden-based payment.

There are substantive advantages to this approach. One administrative advantage is that the program works within a fixed operating budget because maximum program coverage is determined in advance– in contrast to existing assistance programs, where many bills go unpaid. Additionally, there is a conservation incentive for the customer, as under the fixed credit model, the credit is provided regardless of the actual bill. If consumption increases, the household pays for that increase.

Implementation

Colton's 2005 Expert Report proposing the Program details an estimated program budget and proposes a cost recovery mechanism. By calculating the affordable burden for customers at various brackets of the federal poverty level and assuming that 40 percent of eligible customers would participate in the program, Colton estimated that total cost of providing fixed credits to low-income customers was $9,371,427.00.[73]

We recommend further inquiry in order to determine the cost of implementation of an affordability program throughout the GLWA service area; the figures from the 2005 proposal need to be updated to account for demographic changes and regional implementation.[74]

Additional Proposed Program Components

In addition to detailing an income-based affordability plan based on fixed credits, the program proposed by Colton in 2005 contained two additional components: for "arrearage management" and "water conservation." More recently, Colton authored a water affordability plan for the city of Baltimore, which included an additional crisis intervention component.[75]

These components are viable additions to the water affordability package and we recommend considering including them in the implementation of this plan in the GLWA service area. While the details of these additional programs have not been worked out in this report, they deserve further inquiry at the time of implementing the affordability plan.

Arrearage Management

By participating in the affordability program, an arrearage management program can enable customers to earn credits to reduce pre-program arrears to a manageable level over an extended period of time. This is important because an affordable monthly payment, as made possible by the above proposal, can still lead to an unaffordable total payment considering past payment obligations and late fees. Under the 2005 plan, residents would pay back some of their arrears over two-year period, by contributing 0.5 percent of annual income and remaining in the affordability program. A similar model could be adopted now.

Water Conservation Component

High water usage in low-income households is often due to leaks and faulty infrastructure. A water conservation component in an affordability scheme would allow investments in water conservation to supplement the rate affordability scheme. These investments would go towards the distribution of water conversation kits to residents below 50 percent of the Federal Poverty Level. These kits would include water-saving fixtures, such as low-flow shower heads and faucet aerators, as well as tools for measuring faucet flow and leak rates.

Crisis Intervention Component

Low-income households often lack cash assets to allow them to handle unexpected expenses or loss of income. This is in part due to the high proportion of low-income people who work for an hourly wage and lack paid leave, meaning that unexpected medical or family care needs can result in an abrupt loss of income. These circumstances should not lead to an acute threat to human health and well-being. It is possible for the affordability scheme to include funds set aside a fund to provide crisis intervention assistance to customers on an as-needed basis.

A comprehensive water affordability plan will not only be beneficial in terms of ensuring the human right to water, but will also help create a more robust and sustainable GLWA business model.

- "Going forward" bad debt savings: as some of the ongoing bills for current consumption would (without WAP) result in uncollected funds by GLWA/DWSD-R, and responsibly, the accumulation of bad debt. Addressing the inability to pay by way of an affordability plan would result in reduction in bad debt and general cost savings.
- Reduction in working capital associated with arrears: high, unaffordable water substantially increases quantity of accounts in arrears, which results in additional costs in account management and collections. A water affordability plan would result in substantial savings in these areas.

Funding the Program

It was proposed that the 2005 Water Affordability Program be funded by a "meter charge" of $1.00 per month from residential customers, and $20.00 per month from commercial customers, $275 for industrial customers, and $80 for schools, municipal buildings, and housing projects.[76]

In order to calculate the possibility of implementing a similar scheme for the proposed regional affordability plan, updated numbers on quantities of customers in the various classes listed above is required.[77] We recommend further inquiry into the possibility of funding the affordability plan with meterage charges.

Another funding option is to incorporate affordability into the cost-of-service model. Currently, the cost of service for customers is determined by considering costs associated with Operations and Management (O&M) and Capital Improvement Programs (CIP).[78] GLWA calculates rates for retail and wholesale customers by determining the costs associated with these two areas (O&M and CIP) and the average consumption and numbers of customers. Delivery of affordable water could be assumed in calculating the costs of Operations and Management, in which case an affordability plan could be a part of the cost-of-service model.

Legal Issues

Some have objected to implementing an income-based water affordability plan in Detroit on the grounds that it violates Article 9, Section §31 of the Michigan Constitution, commonly known as the Headlee Amendment.[79] The amendment postulates that new taxes require voter approval.

Headlee is relevant for the case of an income-based affordability plan given the way that local governments have occasionally disguised new taxes as fees. The objection holds that the meterage fees– a proposed mechanism for funding the affordability plan– constitute a tax imposed on GLWA customers. In claiming this, critics often appeal to the 1998 *Bolt vs. City of Lansing* case.[80] The Bolt case yielded that a stormwater service charge imposed in the city of Lansing, MI constituted a tax that requires voter approval.

For a variety of reasons, this objection is flawed. An income-based affordability plan funded by meterage fees does not require the implementation of taxes and thus does not require a voter approval.

The inapplicability of Headlee and the *Bolt* case to an income-based affordability plan is outlined in a June 2017 Memorandum produced by the ALCU

of Michigan.[81] The Memorandum appeals to the way in which the criteria for a fee constituting a tax–as enumerated in the *Bolt* case–do not apply to the issue of water affordability.

The key issue in *Bolt* was whether a stormwater service fee on all Lansing property owners was a service charge or tax. The court held that the stormwater fees constituted a tax because:

- they did not serve a regulatory purpose.
- they were not proportionate to the necessary costs of service.
- paying the charges was involuntary.

As the Memorandum enumerates, these criteria do not apply in the case of a water affordability plan funded by meterage fees.

The court determined that because the fees were generating revenue and did benefit the public at large instead of individual customers, that they did not have a regulatory purpose. In the case of WAP, the money collected does not generate revenue– it does not flow into the general budgets of the city or the utility, but is used specifically to fund the affordability plan.

Moreover, as the ACLU analysis described, "key to appreciating the true nature of charges associated with an affordability plan is the fact that the benefits are not limited to low income customers."[82] These benefits, described previously in this section, include the ways in which the plan enables a higher proportion of residents to be paying customers, thus relieving pressure on the utility associated with unpaid accounts and arrears.

Additionally, in the case of water affordability, unlike the stormwater charges, the costs of the fees do not exceed the cost of the service. Although more data and analysis is needed in order precisely to determine the updated costs of the plan, and corresponding meterage fees, the fees charged to fund the program are intended to simply cover program costs: the expected costs of providing income based credits, the administration of the program, and the costs of additional program (i.e. arrearage assistance, water conversation, crisis management, etc.) The fees are thus not disproportionate.

Finally, the meterage fees associated with water affordability are voluntary, while in the Bolt case, there were mandatory– that is, all Lansing residents were required to pay the fee, while in the case of GLWA water affordability, only people who choose to have a water account has to pay the fee. It is incorrect to associate a tax with a voluntary service.

Claiming that the affordability plan violates the Headlee amendment is misplaced considering the key features of a tax, as opposed to a fee. These attributes of a tax i.e. not serving a regulatory purpose, disproportionality, and involuntariness–were enumerated in the Bolt case and do not apply to the case of implementing a regional affordability plan.

Incorporate Basic Consumer Protections into GLWA Policies

Rationale

Many of the relevant problems with drinking and waste water security in Detroit and the GLWA service area are rooted in the lack of basic consumer protections in service providers' policies. In order to curb the inequitable treatment of water customers in the future, we recommend incorporating basic consumer protections into GLWA policies.[83]

Components

Colton's Water Affordability Program, commissioned by DWSD in 2005, proposed implementing a series of basic customer protections pertaining to DWSD's collection practices. His recommendations pertained specifically to the imposition of late fees, issuance of notices of the disconnection of service, and the negotiation of deferred payment plans for arrears.

In line with Colton's proposal and the needs of the region's water customers, and in conjunction with the Water Affordability Plan outlined previously, we recommend implementing consumer protections in those three areas.

Late Fees[84]

DWSD-R imposes a monthly late fee of five percent for accounts that are overdue.[85] Similar fees are imposed by wholesale service providers. Late fees disproportionately affect low-income customers. Given that water is simply unaffordable for many low-income households, late fees add additional cost burdens to those who are unable to cover water costs in the first place. In addition, this additional cost burden does not even provide a substantial incentive to pay bills.

As Colton notes, the primary cost of late fees is to compensate for the additional costs associated with overdue accounts. They should not generate additional cash flow or be used for overhead and admin. These include the costs of collections–i.e. postage, phone calls, and required personnel–as well as "carrying charges," or the costs of the interest on any funds DWSD borrows to cover losses.

Five percent late fee charges well exceed these costs.[86] Additionally, collection practices do not begin the moment an account becomes overdue, while late fees are immediately and automatically

in place. In this way, late fees often do not correspond with any cost-bearing collection practices.

As Colton remarks, "what the non-cost-based late fee really does is to generate a stream of revenue by charging low-income customers more than it costs to serve them."[87] Given the excessive cost of late fees, we recommend either eliminating late fees altogether or reducing them to the actual costs of nonpayment.

Shutoff Notices

We recommend developing customer protections regarding water shutoffs.[88] This recommendation is a companion with the recommendation to suspend the practice of water shutoffs until the process can distinguish between the ability to pay and unwillingness to pay. Going forward, shutoffs should only be issued when there is a clear demonstrated ability to pay.

Notices must not be issued when there is no intent to terminate service. This has occurred in the past, perhaps because service providers did not have the resources to carry out the shutoffs, or because there was no intent originally.

A time limit must be established for shutoff notices. More specifically, if service is not disconnected within 15 days, the notice ought to be void. This is significant considering the formidable effects shutoffs have on households and the need to plan for them accordingly. This is not possible when a threat of a shutoff exists but is not executed in a predictable, timely fashion.

DWSD should not distribute two consecutive notices of disconnection. Shutoff notices should outline the steps the customer can take in order to avoid termination of services. By sending repeated notices, service providers negate the original purpose of notices in this regard.

Deferred Payment Plans for Arrears

DWSD and many other service providers currently have mechanisms for negotiating Payment Plan Agreements (PPAs) for customers with accounts in arrears, outlined in DWSD's "Interim Collection Rules and Procedures," for example. That document describes the way in which DWSD can terminate service for customers who fail to comply with the terms of the PPA and that DWSD is not required to negotiate a second plan. Note that the details of such an arrangement differ for various wholesale providers, who each conceive and implement their own policies. In adherence to Colton's 2005 WAP, we recommend reframing service providers' arrearage management procedures in the following ways:

- Renegotiable payment plans: If a customer's financial circumstances change during the period negotiated by the PPA, service providers should be required, if the customer requests it, to renegotiate the terms of the plan.
- Encourage reinstatement: If a customer defaults on a PPA, their status can be reinstated (and not under the threat of service termination) if they pay the past-due balance.
- Monthly installments: Arrears should be paid in regular monthly installments, and terms should be extended to ensure that monthly installment payments do not exceed a one-month average bill.

Implement Green Infrastructure Initiatives

Rationale

Green infrastructure can offer a multi-dimensional solution to many of Detroit's interrelated problems. The potential benefits of green infrastructure are far-reaching, and Detroit is well-suited to become a leader in sustainable urban development.

Note that green infrastructure does not supplant the need for the need of substantial improvements to the city's traditional "grey" infrastructure. On the other hand, cost savings from the implementation of a green infrastructure initiative can help to fund substantial future capital improvements.

This section considers the specific features that make Detroit a site for green infrastructure projects. There should be additional study and inquiry to identify opportunities throughout GLWA service area.

What is Green Infrastructure?

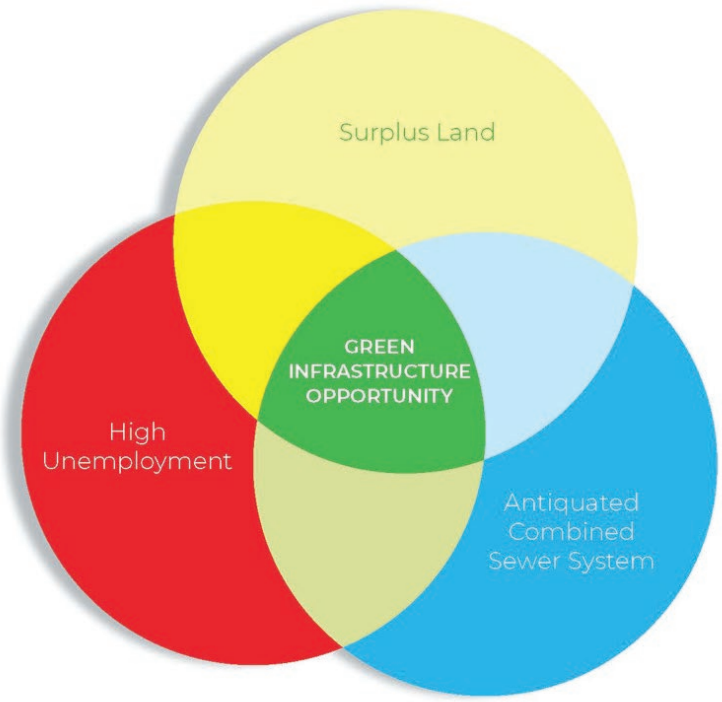
Green infrastructure includes both natural and engineered environmental upgrades that promote water reuse and infiltration into the natural aquifer and prevents combined sewer overflows, which can be harmful to the environment and cause health hazards. A list of green infrastructure installations by type and purpose produced by the US Environmental Protection Agency, these green infrastructure types and analyses are detailed to promote green infrastructure investment nationally.[89]

Green infrastructure diverts stormwater away from the sewer system, offering a simple and cost-effective solution to upgrading the entire regional system. The primary method for doing so involves transforming impervious surfaces.

Impervious surfaces are man-made structures that prevent infiltration of water into the ground. In the built environment, impervious structures include parking lots, sidewalks, and building roofs. In De-

FIGURE 4

GREEN INFRASTRUCTURE OPPORTUNITY



troit, rainwater, melted snow, and other forms of runoff drain from these surfaces into the combined sewer, where the runoff is then treated alongside other kinds of waste.

The natural environment–planted gardens, wooded lots, areas of surface water or low-lying land–are pervious surfaces that permit stormwater to replenish the natural aquifer and do not burden the common sewer system. Green infrastructure reduces the number of impervious surfaces and redirects stormwater that flows off of impervious surfaces to properly prepared green surfaces that can accept the water.

Stormwater that does not enter the combined sewer system does not require transportation to a sewage treatment plant or the labor and chemicals needed to clean it, and it does not need to be transported back in the water service line system. The savings in labor, chemicals, and energy for waste management systems and devices pays dividends on a permanent basis for every green infrastructure installation in which the city invests.

Detroit: An Ideal Setting

There are currently a variety of green infrastructure projects underway in Detroit and the region. Since 2011, after identifying peak overflow areas, DWSD has led initiatives to plant trees, "green" vacant properties, and disconnect downspouts, among other efforts.[90] In 2014, the Michigan Council of Governments (SEMCOG) published the Green Infrastructure Vision for Southeast Michigan, which details the way in which implementing green infrastructure practices will have a variety of positive outcomes. Since, DWSD has invested substantially in the development of green infrastructure initiatives.[91] The green infrastructure program proposed in this report complements existing initiatives in proposing larger scale implementation focused on socially conscious infrastructure development.

Detroit has many well-documented challenges to its reemergence as a prosperous and thriving city. Yet some of these challenges become assets in a bold and resourceful green infrastructure strategy. Four of these challenges-turned-assets include:

The city of Detroit and DWSD have a long history of disinvestment in existing infrastructure. This failure to invest has reached an acute stage with litigation fines penalties associated with their outdated combined sewer system, along with increasingly dire health concerns requiring imme-

diate action. Though the implementation of green infrastructure initiatives certainly does not curb the need for substantial improvements to the city's grey infrastructure, green infrastructure represents the lowest cost, highest reward strategy for reinvestment in the aging infrastructure.

The city of Detroit has an unemployment rate of at least eight percent, and many of the job opportunities pay less than a living wage.[92] The available workforce within Detroit neighborhoods is much higher than the national average. Green infrastructure creates jobs that are distributed throughout neighborhoods, pay a living wage, and can help workers earn skills for future employment.

The combination of population loss, business closure, and business relocation has resulted in an enormous quantity of unused land throughout Detroit that is available for repurposing. The coveted properties in the Midtown area have been assembled by large, wealthy developers with the aid of the city and state, while much of the surplus land is unused, available at very low cost, and in dire need of reinvestment. Vacant land is the vehicle for green infrastructure reinvestment, and its low cost has a dramatically positive impact on the feasibility of installing and obtaining investment return on green infrastructure.

Detroit's nonprofit and grassroots infrastructure is strong and shows a clear commitment to the revitalization of the city. Their knowledge of the capacity and needs of each neighborhood ought to be incorporated into prototypes and programs that are tailored to Detroit's unique potential.

Michigan's Department of Environmental Quality has developed and implemented several extensive green infrastructure projects in the city and the region in recent years;[93] the initiatives we propose here complement green infrastructure projects underway in Detroit. These existing initiatives set precedent for the potential of green strategies. What we suggest here is a significant increase in scale of these programs and also principles that should be integrated into current efforts underway.

Green infrastructure can also reduce costs associated with the combined sewer system by lessening the quantity of impervious surfaces, and thus reducing the amount of water entering the system. This diversion of runoff results in savings in labor, chemical, and energy costs, as well as costs associated with preventing combined sewer overflows.

Benefits for Community Sustainability and Wellness

Green infrastructure protects public health as well as the health of the water and sewer system. Installations are designed to permanently divert stormwater from entering the combined sewer system or to reduce the flow of water into the combined sewer system, preventing peak flows from breaching the system, through which pollutants to enter streams and rivers. Green infrastructure can work effectively throughout the region to solve the drainage overflow problem, protect the local environment, satisfy EPA mandates, and reduce DWSD operation costs.

Moreover, direct and indirect public health benefits of natural space include:[94]

- Providing space for exercise and respite
- Mitigating urban pollution
- Generating stronger immune systems [through parasympathetic stimulation]
- Improving the health of pregnant women and infants[95]
- Strengthening social ties by providing space for community and family gatherings
- Offering space for children to play and for parents to forge stronger social ties
- Alleviating stresses on social services by boosting public health
- Filtering and redirecting stormwater runoff

Fiscal Benefits

Green surfaces are economically valuable because they improve the efficiency and effectiveness of stormwater management. Establishing a green and sustainable system for the DWSD and the customers it serves could save billions over the next 25 years.[96]

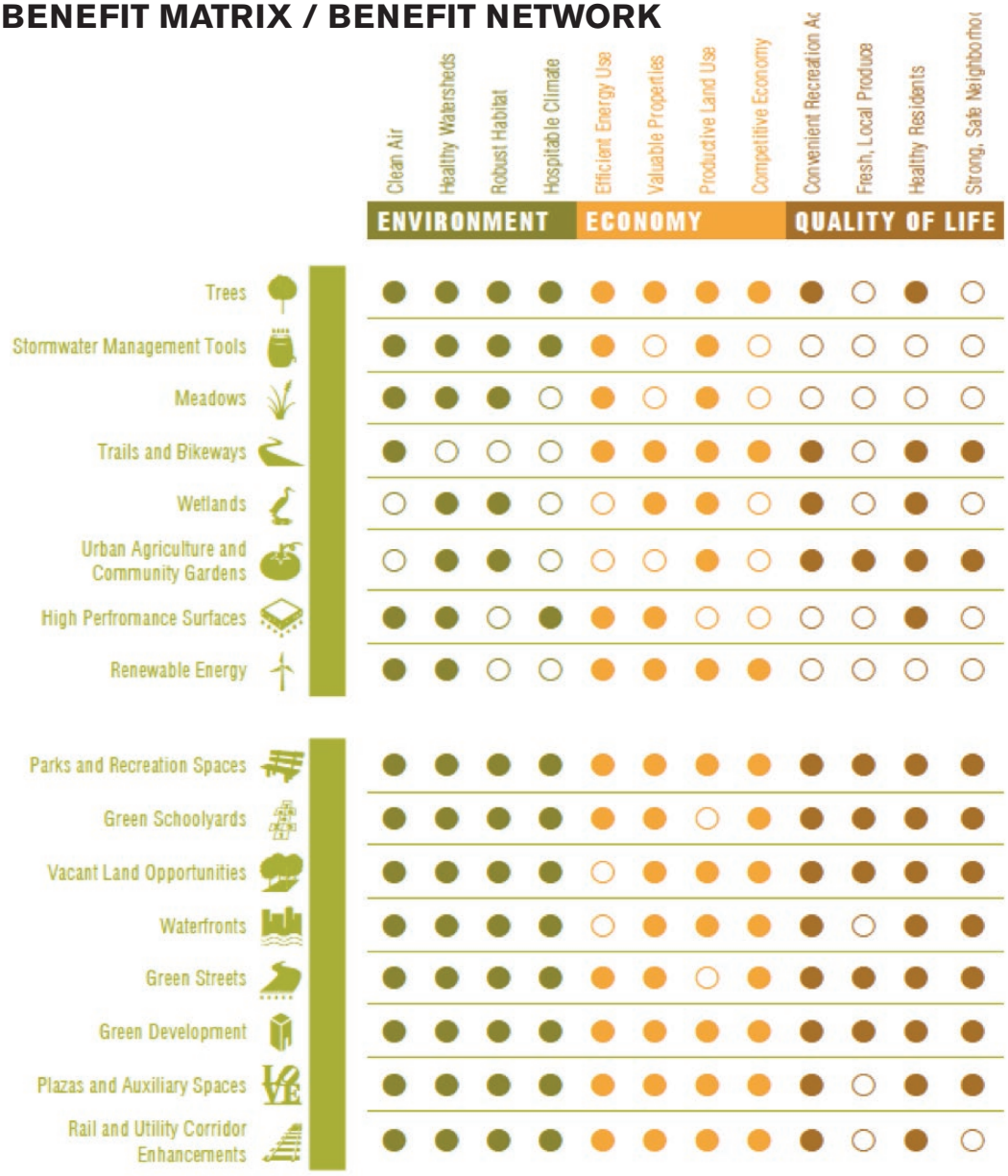
There are a variety of types of cost savings associated with green infrastructure. By relieving pressure on the existing, antiquated water and sewage system, implementing green infrastructure curbs the need for substantial capital improvements to grey infrastructure.

Relatedly, by reducing flow into the system, and thus the volume sent to wastewater treatment plants, there are additional savings in energy, labor, and treatment costs. Reduction in flow to the system also helps to circumvent combined sewage overflows (CSO), thus avoiding fees and fines associated with CSOs and environmental breaches.

Green infrastructure plans in Philadelphia and New York City offer examples of how innovative green infrastructure initiatives can yield substantial fiscal benefits. In Philadelphia, a comprehensive green infrastructure approaches estimated to cost just $1.2 billion over the next 25 years, compared to over $6 billion for "gray" infrastructure, a term used for the concrete tunnels created to move water.[97] Similarly, in New York, "every fully vegetated acre of green infrastructure would provide

FIGURE 5

BENEFIT MATRIX / BENEFIT NETWORK



total annual benefits of $8.52 in reduced energy demand, $166 in reduced CO2 emissions, $1,044 in improved air quality, and $4,725 in increased property value."[98] Even after the initial investment, green infrastructure continues to pay dividends for decades.

Moreover, green surfaces also offer important economic value in making neighborhoods more attractive for residents and investors. Innovations include aesthetically pleasing improvements to neighborhoods, planting tree lawns, growing low maintenance plantings and swales, urban gardening, building and maintaining wet detention (ponds) and dry detention, (low-lying excavated land) that is been planted with prairie grass.

Additional fiscal benefits of green infrastructure include higher employment, improvement in the tax base that supports schools and infrastructure, and a more equitable economic balance within the city of Detroit and the surrounding region.

Green infrastructure can curb the costs of storm water overflow. It is not only better for the envi-

ronment and better for neighborhoods, it also directly mitigates fiscal strain on the water department and on customers.

The current gray infrastructure is ineffective and expensive to maintain, but it also accrues additional expenses in fines from the EPA for violating Clean Water Act regulations.[99] As described in Section II and in Recommendation 7 in this section, the costs associated with combined sewage overflows, which are inequitably shouldered by Detroit, dramatically increase costs for individual households, small businesses, and community organizations. Green infrastructure offers a solution for reducing storm water's burden on the system, and correspondingly, the burden of drainage fees on DWSD customers.

Aligning with Community Support

A green infrastructure initiative supports the interests of the local community. In March 2017, for example, hundreds of local ministers of churches serving the city of Detroit and the surrounding communities wrote a letter to the mayor of Detroit requesting his advocacy on a number of measures to address the inequities presented by the current system.[100] Among them was a request that the mayor advocate a bold and ambitious green infrastructure plan for the city of Detroit.

In a public meeting in May 2017, Mayor Duggan took the first step toward directing public attention to the value of green infrastructure. In the public presentation, he provided a commitment of $5 million per annum to address green infrastructure. Funding for this comes from the annual GLWA lease payment.

Components

The elements of a green infrastructure program that creates a virtuous cycle for the Detroit community include:

- An initial capital source sufficient to fund a large array of green infrastructure installations on properties throughout the city of Detroit.
- A strategy for identifying the most beneficial areas to support the reduction in peak combined sewer overflow which have the greatest economic and environmental impact on the water and sewerage service area and on the city.
- A strategy for assembling land for green infrastructure installations primarily among the 72,173 parcels already assembled in the land bank.[101]
- Development of several engineering prototypes for green infrastructure installation that can be designed for permitting and priced for financing and contracting.
- Cultivation of a corps of local, minority-owned small business enterprises equipped and trained to perform contracts for green infrastructure installation.
- Establishment of a small business association (SBA) or micro-lending loan program to provide working capital and equipment financing for small contractors who can efficiently and economically execute contracts for green infrastructure.
- Establishment of a protocol for measuring economic and environmental benefits from each type of green infrastructure installation and translating these economies into aggregated savings to the DWSD and GLWA for purpose of reinvestment.
- Development of a strategy for tax increment financing or other long-term investment capture vehicles for the purpose of monetizing cash flows for additional capital investments in green infrastructure.

Initial Capital Source

The GLWA/DWSD Lease Agreements, both for water and sewer call for a 40-year stream of payments to both DWSD and directly to the city of Detroit. The lease payment is held in a fund belonging to the Authority. That fund can be used to maintain Detroit's water and sewerage infrastructure, to pay debt services associate with those improvements, or to contribute to the common-to-all improvements in the system. 102 We propose that a portion of this lease payment be pledged in order to sell bonds for large-scale capital improvements.

Identifying Peak Overflow

Processing stormwater runoff as sanitary waste is an expensive and inefficient practice. As previously mentioned, rainwater from the combined sewer overflow can result in substantial damage to the environment, and controlling those overflows is also incredibly costly. Green infrastructure offers an avenue for curbing increased pressure on the system during peak runoff, which would have a positive economic impact while also highest mitigating environmental concerns.

The EPA has documented many of the areas where peak flows result combined sewer overflow.[103] We recommend additional inquiry in these areas; focusing resources on high impact areas pays the highest early dividends to the utility and to the city at large.

Assembling Land

Green infrastructure requires a great deal of avail-

POINTS FOR FURTHER INQUIRY

This report is preliminary in nature, and seeks to lay the groundwork for further inquiry into water equity issues in Detroit. It is crucial that further inquiry is not only empirically sound, but also take the voices of Detroit community members and the history of regional inequity into account. We have identified several areas for further inquiry in this report. Some notable areas include:

Continued research into the effects of water scarcity on community health and well-being: This report identified several of the negative implications of water shutoffs in Detroit, but further inquiry into these issues is crucial. Additional analysis ought to delve deeper into the way in water deprivation impacts community health, happiness, social mobility, safety, and cohesion, among other areas. There are a variety of organizations doing great work in this area, notably the People's Water Board Community Research Collective.[150]

Detailed, forward-looking analysis of the current GLWA agreement: There are several problems with the current DWSD/GLWA agreement, many of which inequitably burden Detroit. As discussed in Section II, some of these problems are the insufficient lease payment, current rate-setting and cost-sharing structures. There is also much work to be done regarding the development and implementation of an income-based water affordability plan, including determining affordable burdens and program costs, developing cost recovery mechanisms, and creating structures for program sustainability. Transparent and fair inquiry into these problems, among other, and the development of workable and sustainable solutions is crucial.

Development of a large scale organizing campaign:

Additional development of the green infrastructure initiative: We have presented some of the primary elements of a robust green infrastructure program in Detroit, but further inquiry in a variety of areas is required. These include the development of a comprehensive financial model for funding the program, engineering prototypes, determining ideal locations for implementation green infrastructure projects, and developing strategies for measuring long-term impact, among others.

Working towards the development and implementation of protective water legislation: The human right to water ought to be protected under the law at the local, watershed, state, and national levels. Further development of workable legislation and advocacy towards those ends is required.

Continued community engagement and education: It is crucial that citizens voices are heard and taken serious through the development and implementation of measured aimed at achieving water equity in Detroit. Educating community members about the issues at hand and possible solutions is a crucial element of ensuring community participation. Further dissemination of the issues discussed here, though a variety of mechanisms, is imperative.

able land, and Detroit has more than enough: in 2017, there were 72,173 publicly owned parcels in Detroit.[104] Land assembly to support critical green infrastructure installations is especially feasible given the enormous inventory of land parcels under the control of the land bank.

Green infrastructure is a productive use of already vacant land, and policies for using vacant properties owned by the land bank should reflect that. An administrative rule that sequesters land transfers of high-impact areas for green infrastructure intervention and prioritizes the delivery of land in conjunction with such green infrastructure development would be efficient and effective in accelerating the process of developing green infrastructure in Detroit.

Engineering Prototypes

The US EPA has developed best practices for green infrastructure development and has outlined appropriate designs.[105] Adapting this research to the city of Detroit could be done by local civil engineers who develop a series of easily replicable engineering prototypes. These prototypes would be preapproved by the city of Detroit for permitting, studied by aspiring small contractors, carefully estimated and priced with published figures, and implemented in various scales to match the volume of stormwater flow at each location. Systematizing these engineering solutions will make it possible to post real-time results on investment, to strategize priorities, and to encourage participation at individual properties.[106]

FIGURE 6

FAIR REINVESTMENT MODEL

Prototypes ought to be structured for rapid development and subsequent cash infusions for small businesses. This "quick payday" structure is key for supporting fledgling and growing businesses. Wages earned from these activities will likely be reinvested in neighborhoods, because, as a percentage of income, low-income populations are much more likely to spend money in their communities than the wealthy.[107]

Cultivating Small, Local, and Minority-owned Businesses

A critical component in building a truly virtuous cycle for green infrastructure is to create an equitable business infrastructure. Some challenges for small minority owned business include:

- Business certification
- Best practices in performance
- Best practices in record and bookkeeping

The engineering prototypes can be coupled with comprehensive support and guidance for aspiring small contractors. Webinars, open forums, and capacity-building seminars can be utilized to teach a corps of small contractors to build capacity and living wage jobs throughout the community. Supporting the growth of contractors also creates more local jobs and decreases the likelihood that jobs are outsourced.

Capacity-Building for Local Businesses

A serious impediment to small, minority-owned business development is lack of capital. We recommend enabling these businesses to drive the implementation of green infrastructure by creating an environment of safe and prudent business lending.

The US Small Business Association's insurance and micro-lending programs are examples of ex-

cellent precedent for structures that provide for the credit and banking needs in communities.

We recommend reproducing that structure by way of a prototype phase of green infrastructure development structured for capacity-building, quick turnaround (and subsequent cash flow for growing businesses), and fair loans. These resources are most likely to be reinvested in local businesses and the local economy, an essential element of the virtuous cycle.

The importance of establishing a local contractor network cannot be overstated, as these dollars stay in the community, circulate among other businesses, and produce payroll for other employment. National studies show that these dollars circulate at least five times through the local community amplifying the impact of local contracting.[108] The small-scale of these individual contracts permit rapid completion, shortened billing cycles, and encourage a more robust growth in hiring and supporting labor.

Protocol for Measuring Benefits

Green Infrastructure presents a broad range of economic and social benefits to the community and to each of the participants in the process. These benefits submit to a triple bottom line (TBL) analysis: green infrastructure has multidimensional benefits and is environmentally, economically, and social sustainable.

Economic benefits include an economic return on investment by the utility, broader economic benefit to the community, including an increased tax base, and relatedly, additional funds for community health, education, and development. The local and state government benefits from the increased employment and the lifting from poverty of a green workforce. Green infrastructure also yields extensive public health benefits, resulting in reduced cost to the hospital and emergency care, for example.

It is crucial that the multidimensional benefits be subject to extensive measurement and research, so as to contribute public knowledge about the benefits of the strategies and help govern future implementation.

Analysis of the impact of Low Impact Development (LID) green infrastructure initiatives in Philadelphia offers viable precedent for a comprehensive triple bottom line analysis. Features assessed in the August 2009 triple bottom line analysis include recreation; increased community aesthetics (and relatedly, higher property values; heat stress reduction; water quality and aquatic ecosystems improvement; wetland creation and enhancement; poverty reduction from local green jobs; energy savings and carbon footprint reduction; air quality improvement; construction and maintenance-related disruption.

The assessment found that "LID-based green infrastructure approaches provide a wide array of important and environmental benefit to the communities, and that those benefits are not generally provided by the more traditional alternatives."[109] We recommend implemented comparable assessment and analysis mechanisms in Detroit.

Development of Structures that Ensure Long-Term Investment

In order to sustain the long-term growth and development of the proposed green infrastructure program, it is crucial to develop mechanisms that ensure the fiscal sustainability of the program over time. Opportunely, the City of Detroit thrives on attracting investment within its borders and, with those funds, reestablishing viable neighborhoods within the region. The extremely low entry cost for housing in the makes the city a viable cite for securing funds for economic development.

Infrastructure is part and partial to economically and environmentally sustainable development. In order to secure funding for the infrastructure imitative proposed here, we recommend a multi-stage plan:

- Monetize the cash flow available under the existing GLWA lease agreement, which will likely result in over $100,000,000 in bond proceeds for green infrastructure.
- Renegotiate the GLWA/DWSD lease agreement achieve an equitable rental payment for the system, thereby greatly increasing the bond generating capacity of DWSD and making it possible to increase its total green infrastructure investment to over $1 billion.
- Select surplus land in high impact areas for CSO abatement and, green infrastructure development coupled with community/economic development.
- Establish broad tax increment financing districts which includes the built environment in the area surrounding green infrastructure project and the acquisition of vacant land adjacent to or near green infrastructure projects
- With the improved environmental performance of the green infrastructure investment and the improved aesthetic quality of the surrounding neighborhood based upon these investments, encourage new housing and commercial development that is compatible with the existing uses and users of the neighborhood.
- Monitor increased property value and tax revenue achieved in these districts and, when pre-

dictable growth occurs, monetize this periodic increase in tax increment revenue to issue new supplemental bonds used to provide green infrastructure in contiguous neighborhoods.

- Repeat the tax increment financing mapping, designation, and tracking of property values in conjunction with the new green infrastructure investment.
- Again, once increased revenue is realized from new investment, captured that in a new bond issue which would be used to make a later stage green infrastructure investment.

Our recommendation is that tools such as dedicating the non-school portion of increased property tax revenues– a feature common to Midtown or commercial business District development– can be repurposed for use in multiple neighborhoods as a means of upgrading those neighborhoods and upon success of the first investments, successive additional neighborhoods/sites for green infrastructure implementation.

Conclusion

The layers of social, political, and environmental issues that have contributed to the inequitable distribution of water in Detroit require a multidimensional response. It is our intention that by offering the basis of a solution, we can highlight the possibility of path forward for Detroit that is socially, economically, and environmentally sustainable.

Our recommendations include,

- Suspending the use of water service shutoffs until processes can distinguish between the willingness to pay apart from those unable to pay
- Analyzing the calculation of the annual lease payment of the regional system and appraising the value of the asset
- Researching, designing, advocating, and implementing legislation that can promote access to drinking water and wastewater
- Reworking the terms of the GLWA/DWSD lease agreement
- Design and implement a comprehensive income-based water affordability plan
- Incorporating basic consumer protections into GLWA and DWSD-R customer policies
- Initiating a robust green infrastructure program

In crafting and implementing multidimensional solutions to Detroit's problems, community support and input is crucial. Community-led initiatives and knowledge from activists on the ground are integral resources to effectively improving the existing system.

SECTION III

WATER INSECURITY IN DETROIT: THE COSTS OF THE CRISIS

Water Insecurity in Detroit: The Costs of the Crisis

WATER, AND SPECIFICALLY clean water, is central to a wide range of essential activities. It is needed to drink, cook, flush and clean toilets, and clean bodies, clothes, food and homes. If water is not accessible, affordable, and safe, human health and well-being are severely endangered.

At least 100,000 Detroit families have had their water shut off since 2014.[110] While the annual number of shutoffs has decreased since then, in March 2018, the Detroit Free Press reported that at least 17,000 households were at risk for shutoffs.[111] This news follows the Detroit City Council's approval of a $7.8 million contract to Homrich Wrecking for conducting water shutoffs.[112] Records obtained by Bridge Magazine show that residential shutoffs dropped from 33,000 in 2014 to 23,000 in 2015, but increased again to 27,552 in 2016.[113]

"Why tear up property and seam it and everything? You're making things worse. They city is already going down. You say the bank owns the water company and you're going after the residents. The bank already made all these houses in foreclosure…and people come and take whatever they offer, so now here we have to water company doing the same thing. That's so wrong."

Rosalyn Walker, from *Detroit Minds Dying*

Image from the film I Do My Dying. Coutesy of Kate Levy, available online at detroitmindsdying.org

Water crises across the US have attracted growing national and international audiences. Pontiac, Flint, and Detroit, Michigan, in particular, have received a great amount of attention as a result of the rich grassroots activist responses to threats to water access.

In October 2014, following a summer of widespread water shutoffs in Detroit, the city gained international attention when two United Nations Special Rapporteurs: Catarina de Albuquerque, the UN Special Rapporteur on the human right to water and sanitation, and Leilani Farha, the Special Rapporteur on the right to adequate housing, visited the city. Albuquerque, appalled by the scale of shutoffs, claimed in a press conference that "it is contrary to human rights to disconnect water from people who simply do not have the means to pay their bills."[114] She continued: "In practice, people have no means to prove the errors and hence the bills are impossible to challenge… the indignity suffered by people whose water was disconnected is unacceptable."[115]

Notably, Albuquerque made an earlier tour of the US to assess the status of the human right to quality drinking water and sanitation. This tour included visits to Alabama, Alaska, Michigan, Puerto Rico, and West Virginia.[116] Each of these places experiences unique challenges in ensuring affordability while also financing the maintenance of systems that can sustain the distribution of clean, safe water. Underscoring the connections between water quality and affordability, Albuquerque was accompanied by the UN Special Rapporteur on extreme poverty and human rights. The trip included a visit to water and sanitation systems in rural Alabama, where the absence of adequate service has created public health problems thought to have been eradicated in developed countries.

"It is contrary to human rights to disconnect water from people who simply do not have the means to pay their bills… In practice, people have no means to prove the errors and hence the bills are impossible to challenge… the indignity suffered by people whose water was disconnected is unacceptable."

Catarina de Albuquerque, United Nations Special Rapporteur on the Human Right to Water

PLACES FACING WATER AND SEWERAGE PROBLEMS: A PARTIAL LIST

- Cities in Alabama, especially rural Alabama, Alaska, Michigan, Puerto Rico, and West Virginia
- Boston and Falmouth Massachusetts, Sacramento, Redding, Pennsylvania, the Winnemen Winto tribe, New Orleans, Seville, and other communities in California's San Joaquin Valley, and Edmonston, Maryland.
- Flint and Detroit, Michigan, Baltimore, Maryland, East Cleveland, Ohio, Newburgh, New Jersey, Los Angeles and many rural and urban cities in Arizona, North Carolina, Kentucky, Mississippi and Alabama are contending with rising rates that limit economic access and associated problems with water quality.

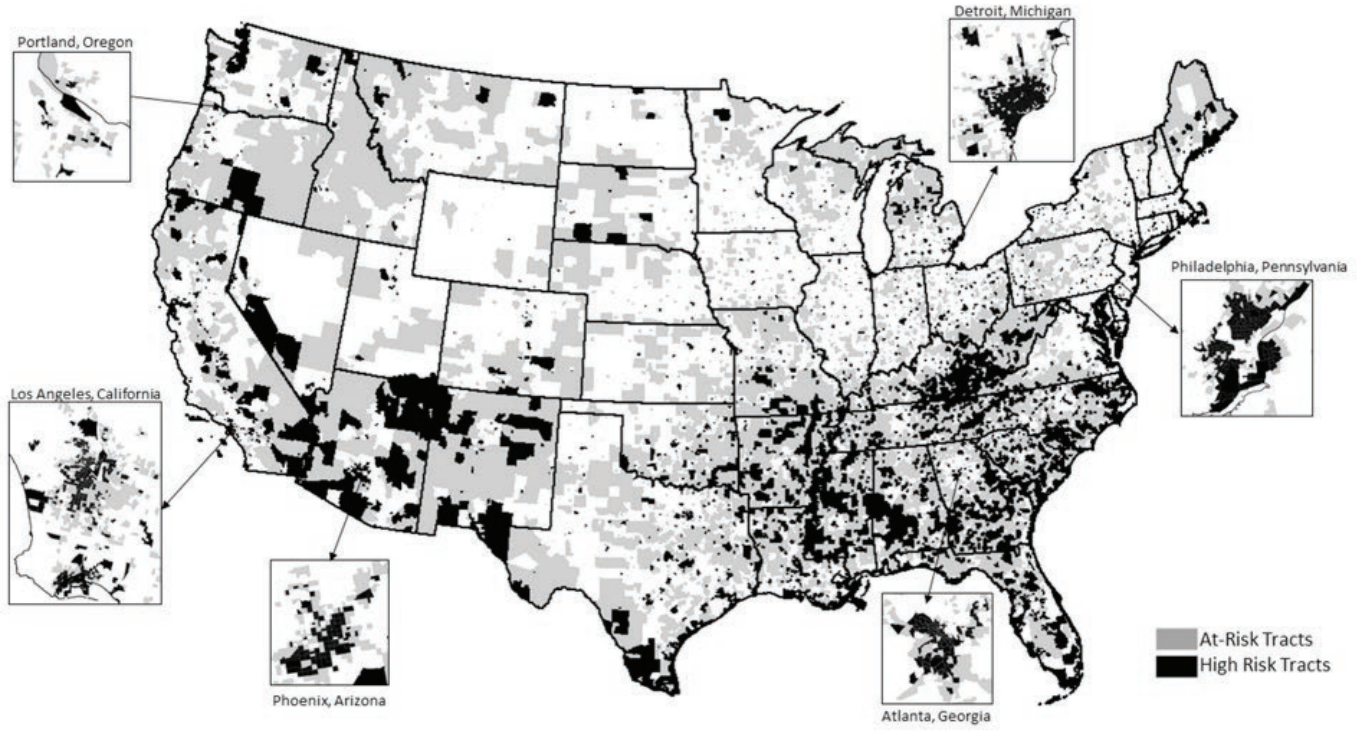
Water affordability is a nationwide problem. The US EPA sets an affordability standard of 4.5 percent for combined water and wastewater services.[117] A recent University of Michigan study found that using this standard, 11.9 percent of US households have unaffordable water bills.[118] Given the projected increases in costs of water and wastewater services in the next five years, the authors estimated that figure could reasonably rise to 35.5 percent.[119] Many of the studies of water access in the US focused on affordability have noted that improving aging infrastructure is crucial for effective interventions. However, an estimated $1 trillion needed to upgrade the country's water and sanitation systems, without which issues surrounding water poverty will worsen.[120]

By delving into the causes and implications of the water crisis in Detroit, we can begin to understand the wide-ranging, detrimental effects of water inequity. This endeavor, we hope, will set the stage for cultivating preventative strategies for and responses to impending water crisis nationally and globally.

We focus here on the far-reaching impacts of limited water quality and access on individuals, families, and communities. We seek to humanize these issues by detailing the real, human costs of unaffordable water by focusing specifically on the way water scarcity in Detroit threatens households

FIGURE 7

WATER – HIGH RISK TRACTS NATIONALLY



access to water and sanitation and erodes public health and environmental quality throughout the service area.

Water Shutoffs as a Revenue Generation Strategy

Water shutoffs in Detroit are a profound problem for households and communities. Resorting to shutoffs is rooted in the choice to sacrifice affordability in an attempt to cover expenses associated with aging urban infrastructure. Most of the older water and sewerage systems in the US– typically those in urban centers– require expensive upgrades. Many of those improvements are long overdue; however, resources to fund these efforts are lacking–and in some systems, revenues are in decline. In many cities, like Detroit, the costs of maintaining aging infrastructure–not to speak of funding system updates–are passed off onto users through water rates. Although water rates in many cities, like Detroit, are relatively low, they are still unaffordable for low-income people.

Atlanta, Georgia and Seattle, Washington have some of the highest water rates in the country, with average bills at $325.52 and $309.72 per month for a family of four, respectively.[121] In 2017, Philadelphia, Pennsylvania made 27,776 water shutoffs for non-payment of water bills.[122] A study showed that 227,000 Philadelphia customers–four out of 10 water accounts–were past due.[123]

Water shutoffs are a symptom of the incongruity between two systems. One on side are a set of strategies that determine how much water users are expected to pay for water. On the other side are strategies that finance costs of operation, maintenance, and infrastructure upgrades necessary to provide quality water.

Shutting off people's water is a fundamentally flawed strategy to cover a system's operation and maintenance–the underlying flawed rationale being that shutoffs will incentivize customers to pay. Studies have shown that water utility users in the US are willing to pay more to access quality water resources.[124] However, given the financial burden water costs pose for low-income people, willingness to pay does not always translate to ability to pay.[125]

Water shutoffs are ineffective in incentivizing people to pay their bills. However, even if they did incentivize users to pay past due bills, shutting off a household's water supply is not an acceptable point of intervention. The strategy should not even be on the table, as the inability to afford services should not result in an acute threat to human

AREAS FOR FURTHER INQUIRY

"To date, work on water affordability for low income households in developed countries has received somewhat less attention than work on water in the developing world. International work on affordability and case studies in the United States have highlighted specific communities where affordability is an issue. While valuable, the extent that water affordability is a widespread issue for US households, and where these households are located, remains unclear. This is vital to unravel since there is currently no federal statute or policy that ensures water access for poor residents."

(Citation: Mack, EA, Wrase S. (2017) A burgeoning crisis? A nationwide assessment of the geography of water affordability in the United States. PLOS ONE 12(4): e0176645. https://doi.org/10.1371/journal.pone.0176645

health and well-being. None of the problems associated with water poverty or water infrastructure are resolved through water shutoffs. Water poverty is a systemic effect–and needs systemic remedy.

While the national spotlight on shutoffs has dimmed since the UN rapporteurs visited Detroit in 2014, residential shutoffs have continued in massive numbers. DWSD points to marginal improvements in numbers year-to-year, but many thousands of residential shutoffs continue to occur in Detroit. While every home that is able to avoid a shutoff is important, any number of shutoffs is unacceptable.

Detroit community members have been especially appalled by the disparities between residential and commercial shut-offs. While water service is shut off in numerous homes with relatively low overdue bill amounts, commercial customers with substantially higher bills haven't experienced shut-offs. In 2014, the Metro Times reported that while residential customers with bills as low as $150 could experience shutoffs, large commercial customers, such as the Louis Arena and Park Gold Club, owed $80,000 and $200,000, respectively.[126]

Access to Water and Community Health and Well-being

Water Shutoffs and Public Health

Water shutoffs pose serious threats to public health and perpetuate disparate health outcomes along race and class lines. Individuals living without access to water are made vulnerable to a number of diseases and sicknesses–and existing health problems are intensified. Studies overwhelmingly confirm the links between water scarcity and significant negative health outcomes, including diseases associated with skin and soft tissue infections, water borne bacteria, and hepatitis.[127] Poor hygiene resulting from lack of water access can also spread and create water-related problems like skin diseases and gastrointestinal issues, as handwashing is the first line of defense against several communicable health problems.[128] With a lack of access to water within the home, dehydration and its associated problems complicates problems for those who have chronic diseases, as well as elderly and young people.[129] Additionally, water scarcity can affect nutrition, as the preparation of healthier foods are particular dependent upon water. The strong association between water shutoffs and water-associated illness, particularly as it effects populations under circumstances of "social vulnerability," has come to be known as the "W.A.S.H". literature.[130]

Disease burdens linked to scarce safe/clean water, sanitation and hygiene are disproportionately borne by the socially-economically-political vulnerable and fuel cycles of disadvantage and poverty. Not only are these groups already exposed to a variety of other socially-determined health

TABLE 1

NUMBER OF SHUT-OFFS IN DETROIT 2014–17

Year	# of Shut-Offs
2014	30,065
2015	23,000
2016	27,552
2017	17,689

Source: http://michiganradio.org/post/interactive-map-detroit-water-shutoffs-neighborhood http://www.detroitnews.com/story/news/local/detroit-city/2017/12/05/detroit-water-shutoffs-decline/108341678/ Detroit news, Bridge Magazine, Detroit News

WATER AS A HUMAN RIGHT

Global water crises have called attention to the need to affirm the human right to water. The Human Right to Water and Sanitation (HRWS) was recognized by the United Nations General Assembly in 2010.1

While foundational human rights documents do not make explicit reference to water, the right to water is implicated given water's centrality to human existence and thriving. The 1966 International Covenant on Economic, Social, and Cultural Rights advocates for "the right of everyone to an adequate standard of living for himself and his family, including adequate food, clothing and housing, and to the continuous improvement of living conditions."2

Similarly, the 1948 Universal Declaration of Human Rights notes that "Everyone has the right to a standard of living adequate for the health and well-being of himself and his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age, or other lack of livelihood in circumstances beyond his control."3

The fulfillment of both of those rights requires access to clean and affordable water.

In 2002, the Committee on Economic, Social and Cultural stipulated that water accessibility has four dimensions:4

Physical accessibility, meaning that water resources are in safe physical reach

Economic accessibility, requiring that water is affordable for all

Non-discriminatory accessibility, stipulating that water be available for the most vulnerable groups of the population

Information accessibility, noting the right to seek and receive information about water issues.

In Detroit, water is not affordable, particularly for the city's most vulnerable residents. Moreover, victims of shutoffs were often not provided with notices and information regarding their water bills and water was shutoff unexpectedly. Mass water shutoffs in Detroit offer a clear illustration of the violation of the human right to water.

Resolution 64/292: The Human Right to Water and Sanitation

The General Assembly…

1. Recognizes the right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human rights;

2. Calls upon States and international organizations to provide financial resources, capacity-building and technology transfer, through international assistance and cooperation, in particular to developing countries, in order to scale up efforts to provide safe, clean, accessible and affordable drinking water and sanitation for all;

3. Welcomes the decision by the Human Rights Council to request that the independent expert on human rights obligations related to access to safe drinking water and sanitation submit an annual report to the General Assembly.

Sources:
1 United Nations General Assembly Resolution 64/292, The Human Right to Water and Sanitation, A/64/L.36/ Rev.1, adopted July 28, 2010, http://www.un.org/es/comun/docs/?symbol=A/RES/64/292&lang=E.
2 UN General Assembly, International Covenant on Economic, Social and Cultural Rights, 16 December 1966, United Nations, Treaty Series, vol. 993:3, http://www.ohchr.org/EN/ProfessionalInterest/Pages/CESCR.aspx.
3 UN General Assembly, Universal Declaration of Human Rights, 10 December 1948, 217 A (III), http://www.un.org/en/universal-declaration-human-rights/.
4 UN Office of the High Commissioner of Human Rights, "General Comment No. 15: The Right to Water (Arts. 11 and 12 of the Covenant), Adopted at the Twenty-Ninth Session of the Committee on Economic, Social and Cultural Rights, E/C.12/2002/11, January 20, 2003, http://www2.ohchr.org/english/issues/water/docs/CESCR_GC_15.pdf.

AREAS FOR FURTHER INQUIRY: PUBLIC HEALTH CONSEQUENCES OF WATER ACCESS

There is a litany of well-established links between individual health outcomes and reliable access to clean water and adequate sanitation. There are similarly established links between water and sanitation access and public health outcomes. Situating Detroit within this long-standing line of research, it is wise to study public and individual heath has been effected by the number of water shutoffs in the city of Detroit.

TK: Bits about Community Research Collective, mapping the water crisis

Understanding the specific effects in Detroit will enable the best targeted strategies to address effects that exist in Detroit. The spirit of such a study is not to simply reveal problematic outcomes, but far more importantly to direct attention to systemic problems that need attention.

This is another opportunity for Detroit to be a national leader in extending study of water access in the domestic context. Many studies have been done internationally, but more research needs to develop unique problems that are presented within the domestic context.

As a matter of public circulation and understanding of this type of study it is important to understand standards of epidemiological investigation.

The utility of this type of study is any expectation to prove causation. Causation in epidemiological studies is not obvious. Probabilistic standards of causation are appropriate for epidemiological studies, not necessity-sufficiency standards. "...Epidemiological studies can never prove causation; that is, it cannot prove that a specific risk factor actually causes the disease being studied. Epidemiological evidence can only show that this risk factor is associated (correlated) with a higher incidence of disease in the population exposed to that risk factor. The higher the correlation the more certain the association, but it cannot prove the causation. ..."

Studies revealing association, or correlation, are meaningful and reveal new important insights.

Spatial analysis presents an important component of research in general, including the field of epidemiology. There are also limitations inherent in epidemiological study due to privacy standards of personal medical records. Studies that use individual patient data are routinely, and necessarily, aggregated to census tract level or zip code.

risks, but they also often have limited access to health care. These social determinates of health– i.e. increased exposure to environmental risk and limited access to health care resources– combine to perpetuate these disparate outcomes.[131] The deleterious effects of water scarcity and lack of health care resources have cascading effects that effect entire neighborhoods, as diseases are communicable; the combined effects of these risks mean that entire communities are further deprived of opportunities to flourish.

In the case of Detroit, the abstract of the Henry Ford Hospital Global Health Study provides us with a preview of such a strong association between social vulnerability and water-associated illnesses.[132] The study, conducted by researchers from the Henry Ford Health System's Global Health Initiative and Division of Infectious Diseases, examined 37,441 cases of water-borne illnesses between January 2015 and February 2016 in Detroit. Researchers compared that data with a list of addresses where water had been shutoffs, finding a significant connection between water-related illnesses and DWSD shutoffs. Currently and controversially, only the abstract of the study is released. Preliminary findings indicate that patients with water related illness were 1.48 times more likely to live on a block that has experienced water shutoffs.[133]

Additionally, mental health issues are also associated with lacking water, as water deprivation can exacerbate any existing mental health problems.[134] For example, irregular bathing and sanitation can negatively affect a sense of self-worth and the ability to perform at work or school.[135] Not to mention the accompanying stress of obtaining water on an emergency basis and worrying about how to pay to have service restored.

The compound effects of water shutoffs in Detroit, both in terms of clinical and non-clinical outcomes, actively contributes to Detroiter's "social vulnerability." As defined by the CDC, social vulnerability

"Through daily interaction with families forced to manage their lives without running water, We the People of Detroit gained insight into the ways deprivation of water disrupts essential family functions and rituals, heightens vulnerability to disease, especially among the children, and causes deep emotional trauma, some of which concerns the inability to provide security to one's children, as well as the difficulty of preserving one's standards of household organization and self care."

We the People Community Research Collective, Mapping the Water Crisis:

is the way in which exposure to certain social factors compromises people's immunity.[136] These factors include poverty, crowded or unsafe housing, housing insecurity, and lack of transportation, among others. The situation in Detroit speakers to the way in which water inequity and insecurity contributes to people's social vulnerability, as it leads to compromised physical and mental health while also worsening existing problems faced by sick and immune-compromised.

The Social Costs of Shutoffs

The costs of shutoffs are not limited to effects on the body. Shutoffs also have adverse social costs for individuals, families, and entire neighborhoods. Water shutoffs can contribute to foreclosure and blight, splitting up families, and even worsen water quality for entire neighborhoods, including homes where water service is uninterrupted. In addition, shutoffs can create feelings of shame and enforce a culture of silence that is only worsened by the practice of painting arrows in front of houses where water has been disconnected.

We the People of Detroit Community Research Collective has done and continues to do important research into the social and health costs of water issues in Detroit. Their report, Mapping the Water Crisis: The Dismantling of African American Neighborhoods in Detroit, Volume I (2016), visually represents data relating to emergency management, the history of DWSD and GLWA, home values and foreclosures, and the relationship between all these issues and shutoffs.[137] The Community Research Collective has been an integral resource in the making of this report.

Mapping the Water Crisis points to the significant correlation between high unpaid water and sewerage bills and high instances of property tax foreclosures.[138] This is in part due to DWSD allowing delinquent water bills to also attach as liens to properties in the same way unpaid property taxes are attached as a lien on a property. The 2014 Detroit Blight Removal Tax Plan codified this relationship, stating that homes with water lines that have been disconnected, removed, or damaged are subject to demolition.[139] If the bill amounts go unpaid or underpaid for three years, the property is eligible for foreclosure. While the water bills may not be the only or primary cause for foreclosure, they can shorten the timeline to foreclosure.

High rates of foreclosure compound the existing social problem surrounding urban blight in Detroit. Importantly, high water utility bills are affecting communities already heavily hit by the city's foreclosure crisis. We know that during the national foreclosure crisis of 2007, Detroit was especially impacted; thus the areas where the existing rate structure causes higher bills are already suffering from other economic harms.

It is important to remark here that many home mortgage loans that set households up for foreclosure were not due to a household's failure to balance their checkbooks. Rather, in Detroit especially, Black African American households were marketed subprime loans with unnecessary risks at a right higher than their White counterparts—regardless of where they lived and regardless of financial assets.[140]

Image from the film I Do My Dying. Coutesy of Kate Levy, available online at detroitmindsdying.org

root shock and displacement are perpetuated by draconian shutoff policies.

Water shutoffs also actively destabilize families. In an attempt to protect the safety of children, Child Protective Services (CPS) also considers a home without running water to be unfit for housing.[144] Extended water shutoffs put children at risk of being removed from their homes. Shutoffs thus threatens family cohesion, which is associated with an incredible number of positive outcomes. These include economic and physical well-being, long-term mental and physical health, interaction with the criminal justice system, and income and education.[145]

The threat of a child being removed from the care of their parents reinforces the culture of silence around shutoffs–if a child mentions that they do not have water at home, the teacher is required to report it. Still, schools across Detroit have responded by providing extra supports for children who have had their water disconnected. At the height of the shutoff crisis, one school opted to open at five in the morning to allow children to wash their clothes and shower before school.[146]

In addition to delving further into these social costs, We the People of Detroit Community Research Collective is currently conducting original research into the effect of water shutoffs on water quality in neighboring homes. Dr. Jade Mitchell and Dr. Jennifer Carrera have partnered at Michigan State University to conduct water experiments in neighborhoods in Detroit to test the water age and quality in homes where water has been shutoff or unused for an extended period of time. This experiment is a model for research that empowers and directly involves community members. A Community Advisory Board not only advised on the type and scope of water research, they also own the information (including residents' names and addresses) collected by community members who were trained as field workers. Dr. Mitchell's team tests water samples, but the samples are collected and owned by the community.

While results are still preliminary, once more conclusive evidence is gathered, the results of the experiment will be shared with the community so that they can decide on further action.

Conclusion

Water shutoffs have a variety of negative effects on individuals, families, and communities– from home foreclosure to family break-up to higher instances of water-related illnesses. The wide-reaching negative effects of shut-offs underscores the importance of protecting the human right to water, and prohibiting draconian collection practices that result in acute threats to human health and well-being. Water shutoffs also actively perpetuate disparate outcomes along race and class lines.

This is in part due to the way in which negative consequences associated with water scarcity contribute to high instance of daily stress, the effects of which are borne by low-income communities and communities of color. The cumulative health effects of daily stresses is often discussed in terms of "toxic stress" or "toxic inequality," referring to the biophysical effects of cumulative stress in response to adversity, which is disproportionately experienced by marginalized groups. Social marginalization can increase people's "allostatic load," or the wear and tear on the body resulting from prolonged exposure to chronic stress. Within the literature on toxic stress, toxic inequality, and allostatic load, repeated patters of racial differences exist. In fact, measures of increased allostatic load are thought to explain, in part, the persistent disparities of racialized health outcomes and in particular, the racial disparities in low infant birthrate and infant mortality–disparities that are shown to exist despite level of education, income, or employment.[147]

Water shutoffs produce have of negative consequences for the well-being of communities and public health– a problem on worsened by the multidimensional and persistent stress associated with water scarcity. All of these harms are disproportionately endured by low-income people and people of color.

THREATENING COMMUNITY SPACES: WATER INEQUITY AND DETROIT CHURCHES

"I really do think this is a prelude to other attack… Every attack on the church is an attack on the black community."
– Pastor Alan Evans of The Open Door Church of God in Christ in Detroit

"We don't mind paying our fair share… [but] you\re putting us out of business… This is redlining on steroids"– Reverend James Michael Curenton of United Church of Christ

Churches are cornerstones of Detroit communities, particularly of communities of color, and also the second-largest property owners in Detroit. Importantly, they are uniquely affected by water inequity.

More specifically, as discussed in Section II of this report, the current water distribution situation requires that customers pay unmetered drainage fees based on the quantity of impervious surfaces– such a parking lots and roofs– on their properties. As churches often have large quantities of impervious surfaces–from the size of the church itself, parking lots large enough to accommodate whole congregations, satellite community buildings, and even impervious surfaces on vacant properties churches have acquired–they are incredibly burdened by unmetered drainage fees.

Currently, DWSD-R customers are charged $750 per square acre of impervious surface. Note that drainage fees are costs associated with managing combined sewage overflows, or overflows of sewage and other potentially hazardous materials when the combined sewage system is overburdened. Overflow management is a symptom of Detroit's antiquated infrastructure. As described in Sections I and II, Detroit bears the burden of this antiquated system because of historic, systemic inequities.

Currently, the existence and financial well-being of 400 Detroit churches is endangered due to their inability to afford these charges.

In the past four years alone, Second Ebenezer Church, with a 40-year history and hundreds of congregants, has already seen their bill go from $1,900 per month to $8,000, and they are bracing for further hikes.

The Cathedral of St. Anthony's monthly bill rose from $165 to $1,200 per month. The burden drainage fees put on churches threaten communities' religious and secular support networks. In addition to buying up vacant lots in their communities, churches–as well as mosques, synagogues, and other places of worship–provide affordable housing, mentoring, scholarship awards, health support, voting support, programs for youth, older adults, and women, as well as crucial advocacy. Even if churches are able to afford the drainage fees, they still pose economic burdens, thus threatening churches' capacity to provide these key community services.

Church leaders and congregants are vocal advocates in the fight for water equity. They and their congregants offer a wealth of knowledge about the needs and capacities of the neighborhoods they serve. Their guidance, wisdom, and knowledge are essential in establishing a sustainable Detroit.

Foreclosures due to unpaid water bills in Detroit are not only alarming because of immense threats demolition poses for families and community, but also given the history of blight removal practices in the city decades ago, under the rhetoric of "urban renewal." In Detroit and elsewhere, blight removal-centered development strategies demolished incredible numbers of affordable housing units–far more units that were built under the program.[141] These demolitions intensified exiting problems with housing quality and neighborhood opportunity. The changes enacted under these blight removal projects also deepened segregation and destroyed existing neighborhoods where strong social ties and connections existed.[142]

Studies surrounding the effects of blight removal urban renewal strategies in the 1940-50s have revealed the significant connections between displacement and diminished health and well-being, often associated with a phenomenon called "root shock." Even when residents were able to move to nicer neighborhoods, they experienced a loss of belonging and a loss of appreciating and benefiting from deep social ties of the place they called home.[143] Root shock refers to the negative psychosocial impacts of displacement, a metaphor to the negative effects when plants is removed and transplanted elsewhere. This work has focused on displaced community residents moved in urban renewal projects in Philadelphia, Pittsburgh, PA and Roanoke, Virginia. Problems associated with

WATER ACTIVISM IN DETROIT

Detroit's robust nonprofit and grassroots infrastructure has mobilized in a variety of ways to fight water inequity in Detroit. In 2005, as challenges to accessing clean and affordable water in Detroit became increasingly apparent, the Michigan Welfare Rights Organization (MWRO)–which has long advocated for the rights of welfare assisted and low-income people–partnered with Michigan Legal Services and DWSD to design an income-based water affordability plan (WAP). The plan, written by affordable utilities expert Roger Colton was approved by the city council, but never implemented by DWSD.

In response to continued water shutoffs, the People's Water Board (PWB) was founded in 2008. The Water Board is comprised of a coalition of organizations that hold that water is a human right and should be accessible and affordable for all. Founding members of the Board included a number of organizations committed to environmental and social equity: MWRO, East Michigan Environmental Action Council, the People's Water Board, Sierra Club, Michigan Emergency Committee Against War & Injustice, Rosa Parks Institute, Detroit Black Community Food Security Network, Detroit Green, and American Federation of State, County and Municipal Employees Local 207. In the years leading up to the bankruptcy, the Water Board and other water advocacy organizations drew local and national attention to water access issues through outreach, forums, and public actions.

While Detroit was under emergency management, a variety of other activists became key allies in the water struggle. Notable are Detroiters Resisting Emergency Management (D-REM) and The People's Platform.

As shutoffs reached an all-time high in the summer of 2014, Detroit's nonprofit and grassroots infrastructure– specifically PWB, We the People of Detroit, and the Detroit Water Brigade– mobilized to provide immediate, on-the-ground assistance to shutoff victims by starting water hotlines and delivering water. The Detroit Water Brigade, for example, has: established community distribution hubs for bottled water, pulling together volunteers, resources, and a compassionate strategy. Each hub is located in each of Detroit's seven districts, beyond its Highland Park headquarters; created the Water Affordability Fund to supplement DWSD assistance programs; conducted door-to-door information campaigns; constructed rainwater collection systems; collected cold weather gear to help those denied access to water (and therefore, heat circulation).

In 2014 the People's Water Board filed a complaint with the UN Human Rights Counsel, which resulted in two UN special rapporteurs visiting Detroit. Meanwhile, Kate Levy– an activist and independent filmmaker– began work on Detroit Minds Dying, an in-progress documentary about access to affordable water in Detroit. Several of the images in this report are from that film, and we are indebted to Levy and other actors which made the film possible.

Public actions amidst widespread shutoffs took the form of large public marches and even actively blocking Homich shutoff trucks– Homrich was the private company contracted to carry out 70,000 shutoffs over a two-year period. Two actions of this sort took place over the summer of 2014, leading in the arrest of nine activists.

Meanwhile, Moratorium Now began weekly demonstrations at the DWSD headquarters.

Also, in response to shutoffs in the summer of 2014, Detroit civil rights organizations and citizens effected by the shutoffs filed a law suit against the city, on the grounds they did DWSD did not provide adequate shutoff notices and shutoff water to the most vulnerable Detroiters, while also not shutting off water to commercial delinquent accounts. The case, Lyda et.al v. City of Detroit, advocated for a moratorium on shutoffs and the implementation of a water affordability plan.

In recent years, resistance continues in myriad forms. We the People's Community Research Collective has completed crucial research on the effects of austerity and water inequity of on low-income communities of color in Detroit, recently publishing a report entitled "Mapping the Water Crisis." The Collective's work has been, and continue to be, fundamental to investigative efforts surrounding water inequity in Detroit, and correspondingly, central to the production of this report.

There are countless other allies who played key roles as activists responding to the water crisis. For example, Anishinawbe Women and Men, representing indigenous peoples of the region, have untaken multiple annual Mother Earth Walks, raising awareness for threats to the public trust of water. Another organization, the Detroit Light Brigade has staged "letters in light" and projected messages of resistance on buildings during public actions.

SECTION IV

THE LONG HISTORY OF DETROIT'S WATER & SEWERAGE DISTRICT

The Long History of Detroit's Water and Sewerage District

THE WATER CRISIS IN Southeast Michigan—like cities across the US—unfolds on a landscape created by over a century of the creation and development of cities and neighborhoods and regions. Decision-makers and policy that set the terms of this growth were designed according to racial prejudices and bias—and in places like Detroit, cities were even established during the period of chattel slavery, colonization of native land to expand the size of settler's territory—not to mention more recent decades that were informed by the Jim Crow system and profound economic change. It is not at all controversial to point out ways in which current cities and regions have inherited systems and institutions with basic design flaws and that addressing these flaws is a difficult and ongoing project. In the context of the regional DWSD system racialized systems are very literally concrete and easily intelligible. Inheriting systems from the country's racially divided history is not abstract.

Detroit's challenges—such as deindustrialization, white flight, and stark racial divisions—are not unique to the Southeast Michigan metropolitan region. Instead, they reflect familiar consequences of unfair and inadequate public investment. In the case of drinking and waste water infrastructure, decreasing revenues and unsustainable debt burdens hinder adequate affordable pricing structures and create pockets of water poverty across the country. Meanwhile, service providers are left to manage aging infrastructure that is not suited to withstand the impending consequences of global climate change.

The distribution of resources follows infrastructure design—especially in the case of drinking and wastewater system. Decisions at the national, state, and community level combine with and influence individual decisions people make every day about where to live and work. While these decisions may not be explicitly motivated by racism and other prejudices, they result in the unequal allocation of resources and opportunities along race and class lines. Detroit's water and sewerage infrastructure is put to the service of the universal goal and mission—to provide users with access to high quality wastewater service, safe and healthy drinking water, and do its part to ensure the quality of surface waters and its public health benefits.

There are contested narratives about the cause of Detroit's fiscal problems—and the dominant narrative reflects the way many cities' fiscal challenges are discussed in popular media. Struggling cities are framed as being unique or exceptional—the drivers of the problem are unique and limited to that specific location. Detroit is discussed as a "casualty" of the erosion of the US manufacturing economy and has been uniquely impacted because of the city's dependence on that industry. Cities are also described as struggling because local leaders and politicians were incompetent or corrupt—again suggesting that a specific city is experiencing unique harms. These factors are not unrelated to the fiscal challenges of some places. However, these are not at all the systemic and structural roots of fiscal distress. Such narratives can create popular support to support policies that simply remove decision making from cities and place it in the hands of supposedly more reliable decision makers. Detroit's emergency management and bankruptcy process offers a clear example of this suppression of local democratic control and the generation of popular support and justification provided through shallow and inaccurate analysis.

Detroiters Subsidize Regional Suburban Growth 1940s-1970s

Suburban development and urban infrastructure are closely tied. Development does not occur where water and sewerage services are unavailable, so that the ability to connect to Detroit's existing water and sewerage plants allowed the suburbs to form. Meanwhile, suburban development sapped population and resources from the city of Detroit.

Image from the film I Do My Dying. Coutesy of Kate Levy, available online at detroitmindsdying.org

In the 1950s, when the population began to shift from urban to suburban areas, the role of DWSD in subsidizing suburban growth was hotly contested. In 1954, L.H. Lenhardt—General Manager of the system since 1936—expressed concern about further expanding the water system and urged suburbs to develop their own infrastructure.[148]

His successor, Gerald J. Remus, director between 1955 and 1973, took the opposite stance and immediately reversed Lenhardt's suggested policies. The water system underwent a rapid expansion during Remus's directorship and took on a great amount of debt to do so.[149] In 1954, the city served 44 suburban wholesale customers. During Remus's eighteen years as director, 51 additional suburban municipalities were added, bringing the total to 96 in 1973.[150]

During this period of suburban expansion, it became apparent that the regional growth of the water system was a political issue that went far beyond civil engineering and was deeply embedded in racially inequitable development agendas. Remus was appointed to manage the water and sewerage system by Mayor Albert Cobo, whose rhetoric and policies revealed an obvious preference for the interests of the wealthy and white.[151] While Cobo was overseeing large-scale urban renewal initiatives, Remus was funding water infrastructure. These plans had a lasting impact on the racial landscape of today's Detroit and continue to influence the demographics of the city and suburbs.

Cobo's urban renewal projects were largely focused on blight removal and left Black residents in a greater housing crisis than the one the renewal ostensibly solved. This period of blight-removal-focused urban planning is often marked by the 1949 Housing Act, but even before the creation of this act, some cities, including Detroit, were already practicing "slum clearance." One example of this practice in Detroit is the Gratiot housing project, a redevelopment project that left residents living in conditions as poor as in their previous neighborhoods. In cities across the country, far greater numbers of affordable housing units were removed than rebuilt.[152]

Urban renewal and blight removal policies evolved into redlined maps, investment guidelines that cod-

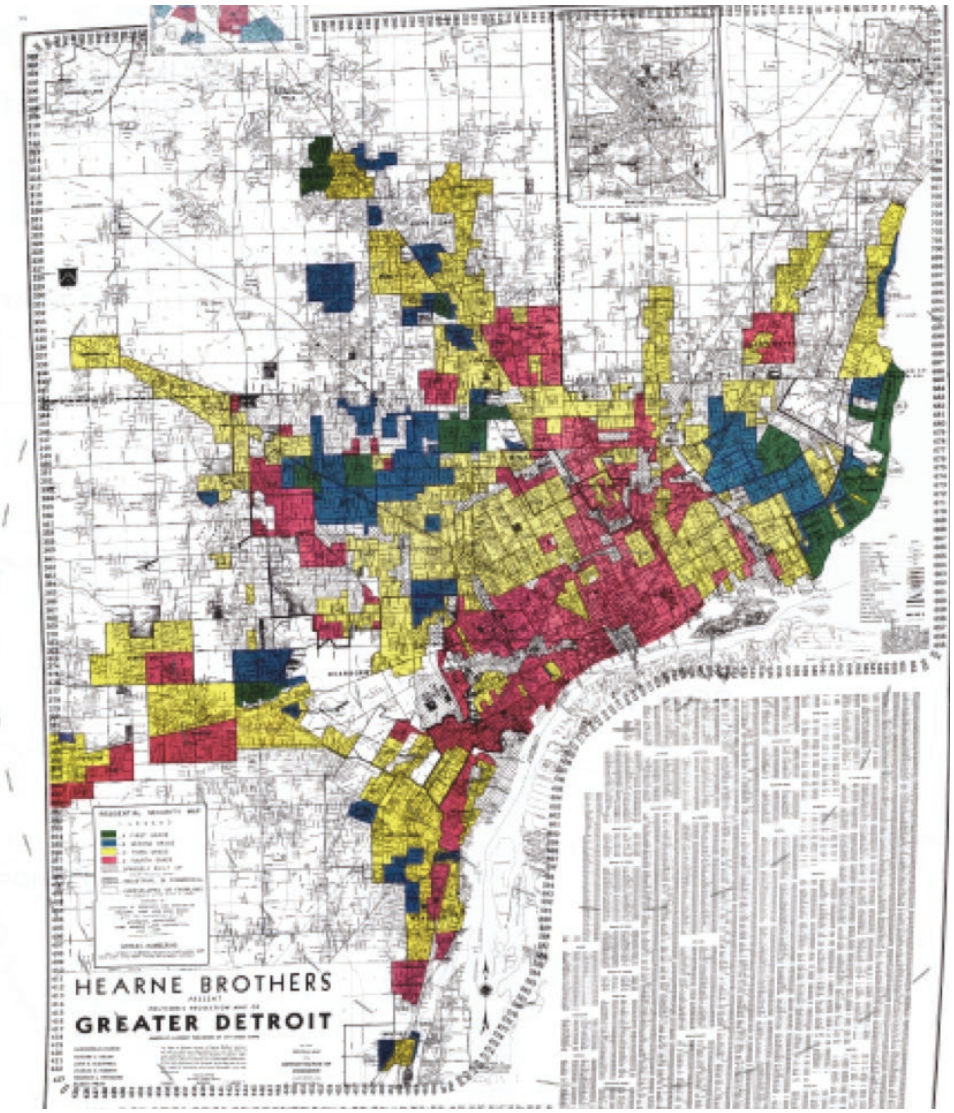


FIGURE 8

A REDLINING MAP OF DETROIT

Source: Robert K. Nelson, LaDale Winling, Richard Marciano, Nathan Connolly, et al., "Mapping Inequality," American Panorama, ed. Robert K. Nelson and Edward L. Ayers, accessed March 19, 2018, https://dsl.richmond.edu/panorama/redlining/#loc=10/42.3475/-83.1365&opacity=0.71&sort=71&city=detroit-mi&text=bibliograph.

ified racially inequitable development on paper and in practice. Redlining–which gets its name from the color of ink used to markup maps into "good" and "hazardous" investments–refers to the practice of withholding mortgage lending from specific urban neighborhoods, and particularly from neighborhoods with high proportions of immigrants and people of color.[153] Lender drew these boundaries using highly subjective and prejudiced criteria but they have made a lasting impact on the racial distribution of cities across the United States.

In 1939, a redlined map of Detroit indicates that 28 percent of the city was a "hazardous" investment, while 51 percent was "definitely declining."[154] Lenders only gave mortgage loans for homebuyers seeking to live in one-fifth of the city's neighborhoods. In other words, banks decided only one-fifth of the city's land was worthy of investment. By this time, any new water infrastructure funded by DWSD was outside the city. The banks considered Detroit a bad investment, and the city's water department followed suit.

By the late 1940s and with funding support from the federal government, the construction of the Davidson and Edsel Ford Expressways was underway. In Detroit, as in many other cities, expressways fragmented local neighborhoods in the city and created enclave communities where residents were separated by race. At the same time, highways enabled affluent white people to travel to their newly built homes in the suburbs. Water and sewerage systems grew to match these patterns of growth–creating systemic infrastructural barriers which underwrite the history of segregation and disparate investment in Detroit.

City planners were not necessarily motivated by personal animus toward the city's Black residents,

but their actions and policies existed within a larger system that rested on structural inequality. For example, some White business owners saw Black neighborhoods as valuable sites for future development and wanted Detroit's Black residents to leave those areas—a goal that was actualized through coded blight removal policies that removed Black residents from these areas to the benefit of select business owners' financial gain. These strategies were enacted by political leaders and planners operating under the pretext of a New Deal system, in which benefits ostensibly flowed to everyone, but in practice flowed towards White populations.

Jobs moved to the suburbs, along with the mobile white population. Economic barriers, along with more pointed exclusion in hiring and housing practices, prevented much of the Black population from leaving the urban center. In Detroit, population numbers plummeted, the job market shrank, and poverty and segregation grew.

Every suburban municipality in Detroit's metropolitan region owes its existence and strength to the forward-thinking effort of the city of Detroit. Detroit used its credit and resources (both financial and human) to bet on and support the future growth of the entire region. Water and sewerage infrastructure were central to this growth. Detroit has severely neglected long-overdue upgrades to its water and sewerage system. While Detroit's system has languished, infrastructure was improved in the suburbs. The region's storm and sanitary system was engineered, built, and paid for by DWSD. It did so in preference to the suburbs and in recognition of the growth potential in the region—and it did so at the expense of essential upgrades to the outdated infrastructure system within the city of Detroit.

As you approach any city in the United States by air, you can tell exactly where the water and sewerage infrastructure ends. At that endpoint, suburban development ceases. As you approach a city by car, all development you see occurred only after the infrastructure development of water and sewerage. When a city creates its water system, it is sowing the seeds for all future growth. When a city allows infrastructure to crumble, communities are gutted.

Regulatory Oversight and Outside Management of DWSD 1977-2013

Economic decline in Detroit is often portrayed as an isolated event brought on by a lack of competent local management—an assessment that ignores the structural and historical factors that pose comparable challenges to local governments across the country.

In 1977, the EPA initiated a suit against DWSD because its wastewater treatment plant's effluent discharge exceeded the amount permitted by its National Pollution Discharge Elimination System permit (NPDES).[155] NPDES permitting regulations were implemented in 1972 under the Clean Water Act.[156] Over the course of the 37-year EPA suit, DWSD management submitted multiple strategic plans aimed at bringing the DWSD system up to the standards of federal regulations created in the 1970s

Detroit was not alone in finding itself falling short of these federal regulations.

A consistent problem that left DWSD and other utility providers under court jurisdiction was the long-term feasibility of plans to resolve water quality issues, and in particular, the availability of sufficient financial resources to enact corrective plans. The original complaint that started the 37-year EPA suit was that DWSD's wastewater treatment plan violated the Clean Water Act.

In the absence of resources for massive public investment in infrastructure—significantly in terms of human resources—Detroit failed to meet the EPA's requirements, and the court's authority was protracted. The structural flaw of beneficial environmental legislation in the 1970s, including the Clean Water Act, was inadequate federal investment to support local utilities' efforts to meet new standards.

Ultimately, this created the need for the system to take out debt and create pricing structures predicated on cost-recovery, not affordability, models. Thus, during that period, the utility experienced increasing financial stress as risky debts were taken on in attempts to bring DWSD system up to federal standards and to make necessary updates to the system in general.

US District Court Judge John Feikens oversaw DWSD for over thirty years during the EPA trial.[157] During Feikens' oversight, he signed an agreement requiring Detroit to pay for 83 percent of combined sewerage improvements outside of Detroit, leaving the suburban wholesale customers responsible for only 17 percent of services they received.[158] This 83/17 split– also known as the 1999 Rate Settlement Agreements– applied specifically to "Non-Detroit Only" and "Non-Common to All" facilities, and there is little technical data to support this disproportional agreement.[159] This plan was approved and subsequently led to hugely inflated sewerage costs for Detroit customers. As described in the Section II of this report, the 83/17 split still applies to many costs today.

While overseeing the water and sewerage department, Judge Feikens also appointed Victor Merca-

TABLE 2

DEMOGRAPHIC CHANGE IN DETROIT: 1910-2010

Year	Total Population	Percent Black
1910	465,766	1.2
1920	993,675	4.1
1930	1,568,662	7.7
1940	1,623,452	9.2
1950	1,849,568	16.2
1960	1,670,144	28.9
1970	1,511,482	44.5
1980	1,203,339	63.1
1990	1,027,974	75.7
2000	951,270	81.6
2010	713,777	82.7

Data for 1910 to 1970 from Sugrue, Thomas J. (1996, 2014) The Origins of the Urban Crisis, Princeton University Press: Princeton, NJ. Data from 1980-2016 taken from US Census Bureau.

do as director of DWSD. Mercado had formerly worked for private water companies Thames North America and United Water and was personally involved in the privatization of several municipal water systems. During Mercado's tenure, many union jobs were outsourced to private contractors and DWSD's maintenance and repair staff was cut by 13 percent.[160] In 2014, Mercado was convicted of colluding with the mayor to fix $72 million worth of fraudulent DWSD contracts.[161] The EPA case was finally closed in 2013, and DSWD would have been returned to the City had emergency manager Kevyn Orr not taken over two days prior.

Predatory Lending, The 2008 Financial Crisis, and Water Access in Detroit

During the final years of federal oversight of DWSD, substantial financial deregulation at the federal level and austerity financing in local and state governments enabled banks to aggressively market predatory lending deals–in the form of adjustable-rate subprime mortgages–to working class Detroiters. The destruction this caused in economically burdened neighborhoods is well-known and has played out in communities across the United States. Detroit had one of the highest rates of subprime lending and foreclosures in the country: since 2005, at least 139,699 homes–or one in three homes in Detroit–have been foreclosed due to mortgage defaults or unpaid taxes.[162] A 2015 Detroit News investigation revealed that 56 percent of homes foreclosed because of mortgage defaults are now "blighted."[163]

The less well-known story is that municipal entities, and DWSD in particular, were subject to the same predatory lending tactics that impacted individuals. In 2005, the City of Detroit entered into a speculative $1.4 billion-dollar deal with UBS AG and Merrill Lynch Capital Services that included an interest rate swaps.[164] Interest rate swaps are structured to offset higher costs of borrowing that issuers with lower credit ratings may face with traditional bonds. These interest rates swaps are risky–and that risk was realized by many cities, including Detroit. If certain terms in the bond agreements are met, the bank can recall the bonds and cities are left to face exceptional costs. This is exactly what happened to many such issuers when the financial crisis hit and the markets crashed, DWSD was left with $537 million in fees to terminate the swaps deal.[165] DWSD had to borrow in order to pay off those swap termination fees and "refinance" debts. This further raised the utility debts–borrowing that did not go to pay for its services or its

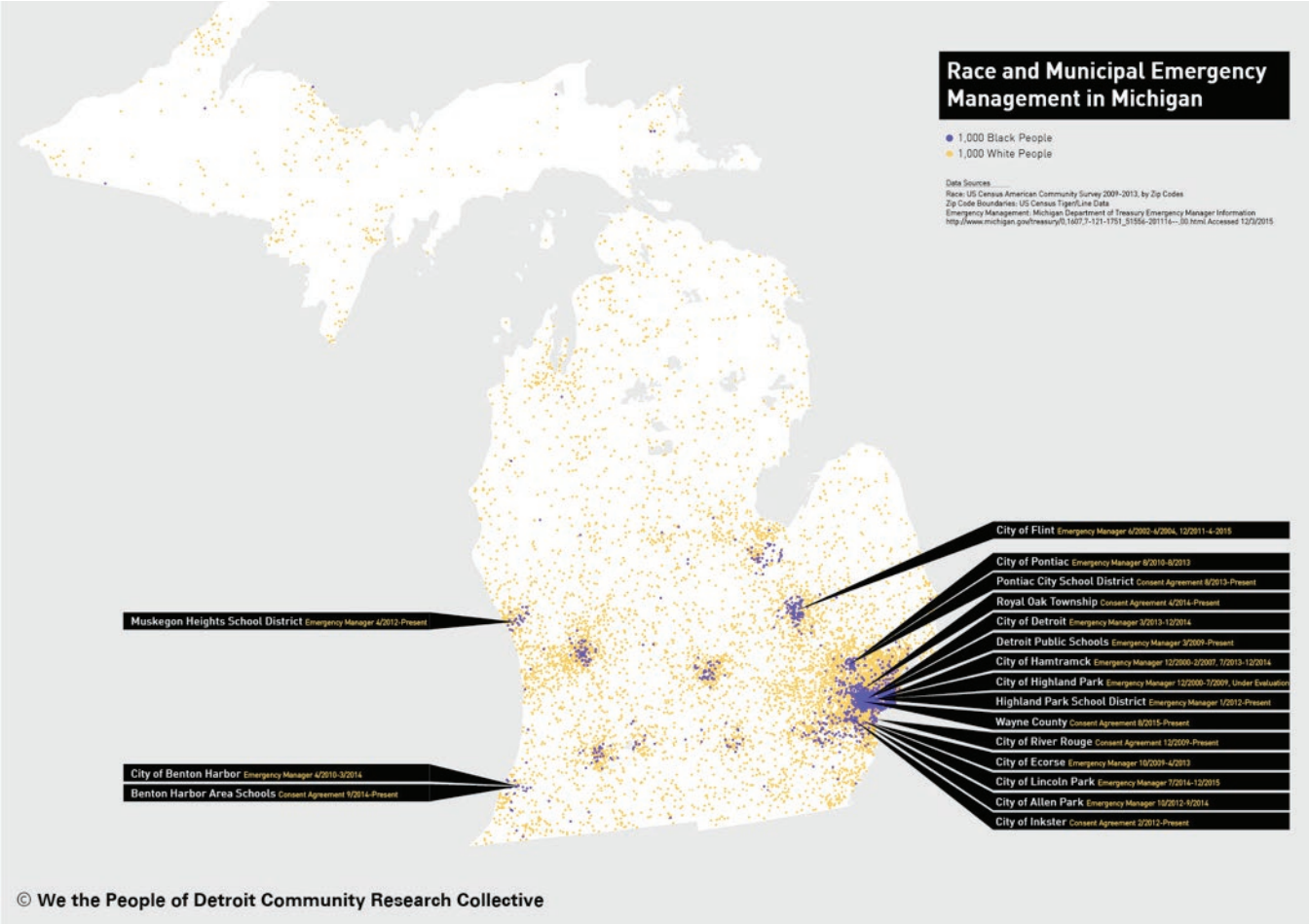
infrastructure. By 2012, 40 percent DWSD's revenue (i.e. customer's payments) was going towards debt service.[166] Detroit offers a clear example of how risk-laden products marketed by financial firms can send a city and its residents into crisis and how such crises disproportionately burden financially stressed local governments.

Meanwhile, in 2012, while DWSD was still under federal oversight, the board of water commissioners agreed to a no-bid five-year, $48 million contract with private consulting firm EMA, Inc.[167] The contract, intended to improve DWSD's compliance with federal standards and increase efficiency, would eliminate over 80 percent of DWSD jobs and cut pay for workers who continued at DWSD.[168] The contract represented a clear violation of union contracts with Local 207 of the American Federation of State, County, and Municipal Employee (AFSCME). This violation was only possible because of the broad discretionary powers of emergency management.

In response, DWSD workers went on strike, violating a state law that prohibits strike by municipal employees.[169] Cox issued an order prohibiting the strike, but the demonstrations continued. AFSCME Local 207 walked out of the DWSD plant: an expression that power needed to shift toward employees and away from traditional decision makers in the city government. The strike ended after five days, and thirty-five workers were fired and eventually reinstated. As a result, Cox agreed to hold a hearing to discuss the new contract, but

FIGURE 9

RACE AND EMERGENCY MANGAGEMENT IN MICHIGAN



From We The People Of Detroit Community Research Collective, "mapping the water crisis: the dismantling of african-american neighborhoods in detroit: volume one," available to order online at wethepeopleofdetroit.Com/communityresearch/water/.

little substantive change was realized.

In situations of shortages of public revenue, public functions are often devolved to private agencies under the pretense of cost-saving measures. As low-income people, women, and communities of color are often more dependent on public employment, municipal resources and social services, cutting municipal services has a disproportionate impact on them, thus perpetuating inequitable outcomes.

In situations of shortages of public revenue, public functions are often devolved to private agencies under the pretense of cost-saving measures. As low-income people, women, and communities of color are often more dependent on public employment, municipal resources and social services, cutting municipal services has a disproportionate impact on them, thus perpetuating inequitable outcomes. As the Detroit's revenue crisis deepened, water rates and shut off numbers increased. Local water activists organized and responded. The experience of these residents and organizers informed much of this report in discussion and using research they have conducted.

Municipal Bankruptcy and Emergency Management

After decades of deindustrialization, depopulation, and systemic divestment, Detroit's annual revenue became inadequate to meet its annual expenditures. In 2013, after declaring the city in a state of "financial emergency," Michigan's then governor Rick Snyder appointed Kevyn Orr as Detroit's Emergency Manager.

Orr is a lawyer who left his post at the international corporate law firm Jones Day to assume his role as the city's emergency manager. Subsequently, Jones Day became the legal firm representing the city.[170] After Detroit, Orr went on to serve as an aid to Atlantic City's emergency manager before returning to Jones Day.

Emergency management has roots in the 1986 appointment of a receiver for the city of Ecorse, Michigan.[171] In 1988, Public Act 101 created an "emergency financial manager" for the specific case of Hamtramck.[172] In 1990, Public Act 72 was passed, which enabled the appointment of an Emergency Financial Manager for any local government or governmental unit, including public schools.[173] And in 2011, Public Act 4 renamed the position to Emergency Manager and expanded the authority of the appointed position.[174]

The concept of an appointed emergency manager or emergency financial manager was challenged in court by Sugar Law Center. Ultimately, Public Act 4 was repealed by voters in the 2012 general election. However, Michigan state government seemed insistent on the expansion of authority enabled by Public Act 4, and in 2012, the state legislature passed Public Act 436, reinstalling the ability to appoint an Emergency Manager.[175]

In Detroit, not only was an emergency manager appointed as per Public Act 436, but the state legislature passed a separate law that formed a financial review commission that assumes ultimate authority over the city's finances upon exiting bankruptcy; the city is still subjected to state oversight three years after exiting bankruptcy, and after three consecutive balanced budgets, the financial review commission will vote to waive its authority.[176]

Financial managers, which temporarily supplant local elected officials and financial officers, have broad control over municipal operations, including the abilities to strip elected officials of their power, cut municipal workers' pay, restructure departments, outsource service city services, and even alter collective bargaining contracts.[177] Given these extensive powers, critics of these practices have complained that emergency management is at odds with local democratic representation.

Under Emergency Management in Detroit, citizens felt as though the power of elected city officials—and correspondingly, the power of Detroit citizens—was effectively disenfranchised and subjected to unelected governance. In recent years, the majority of Michigan's Black population lived under Emergency Management. Correspondingly, critics have complained that emergency management has been used a vehicle for suppressing the democratic voices of people of color. A report produced by We the People of Detroit's Community Research Collective described,

> *"Since 2009, Michigan's Governor has appointed an emergency manager to govern nine Michigan cities (Allen Park, Benton Harbor, Escorse, Flint, Hamtramck, Lincoln Park, Pontiac, Detroit). Six of the cities account for 49.8% of the state's African American population; in Michigan, then, emergency management has served to politically disenfranchise residents in African-American majority cities." – We the People of Detroit Community Research Collective, Mapping the Water Crisis*

During the city's financial emergency period, Orr was unable to reach a consensus with Detroit's creditors, unions, and pension board, and in July, per Orr's recommendation and Governor Snyder's approval, the city filed for Chapter 9 Bankruptcy. In December, the US Bankruptcy Court ruled Detroit eligible.

WATER AS A HUMAN RIGHT

Global water crises have called attention to the need to affirm the human right to water. The Human Right to Water and Sanitation (HRWS) was recognized by the United Nations General Assembly in 2010.1

While foundational human rights documents do not make explicit reference to water, the right to water is implicated given water's centrality to human existence and thriving. The 1966 International Covenant on Economic, Social, and Cultural Rights advocates for "the right of everyone to an adequate standard of living for himself and his family, including adequate food, clothing and housing, and to the continuous improvement of living conditions."2

Similarly, the 1948 Universal Declaration of Human Rights notes that "Everyone has the right to a standard of living adequate for the health and well-being of himself and his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age, or other lack of livelihood in circumstances beyond his control."3

The fulfillment of both of those rights requires access to clean and affordable water.

In 2002, the Committee on Economic, Social and Cultural stipulated that water accessibility has four dimensions:4

Physical accessibility, meaning that water resources are in safe physical reach

Economic accessibility, requiring that water is affordable for all

Non-discriminatory accessibility, stipulating that water be available for the most vulnerable groups of the population

Information accessibility, noting the right to seek and receive information about water issues.

In Detroit, water is not affordable, particularly for the city's most vulnerable residents. Moreover, victims of shutoffs were often not provided with notices and information regarding their water bills and water was shutoff unexpectedly. Mass water shutoffs in Detroit offer a clear illustration of the violation of the human right to water.

Resolution 64/292: The Human Right to Water and Sanitation

The General Assembly…

1. Recognizes the right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human rights;

2. Calls upon States and international organizations to provide financial resources, capacity-building and technology transfer, through international assistance and cooperation, in particular to developing countries, in order to scale up efforts to provide safe, clean, accessible and affordable drinking water and sanitation for all;

3. Welcomes the decision by the Human Rights Council to request that the independent expert on human rights obligations related to access to safe drinking water and sanitation submit an annual report to the General Assembly.

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At the time of Orr's appointment, he asserted that Detroit had $18 billion in debt. The figure was certainly high, but as Wallace Turbeville noted, the figure is "highly inflated and in large part, simply inaccurate."[178] For example, $6 billion in DWSD debt is included, which is not merely Detroit's responsibility but also the responsibility of the entire region.[179] DWSD's billions of dollars of debt was used to inaccurately portray Detroit's as a local failure marked by local incompetence and corruption.

One month into Orr's tenure, in attempts to recover DWSD's value, the city entered into a $5.6 million, two-year contract with private demolition company Homrich Wrecking Inc. to carry out 70,000 shutoffs on delinquent DWSD accounts.180 Notably, this exceeds the funds allocated for the currently-in-place Water Residential Affordability Program (WRAP).181 The summer of 2014 constituted a massive spike in shutoffs, as DWSD customer service department announced that "everybody is getting cut off who is $150 or 60 days in arrears. That is our policy, and we're ramping up on our enforcement of that policy."[182]

The attempt to remedy Detroit finances by way of maximizing the value of the city's asset offers a clear illustration of austerity finance: a strategy where the field of solutions to fiscal stress is limited to reducing services and restoring revenue through regressive measures including increases in fees for basic utilities or increasing sales taxes. Indeed, similar measures were implemented in other areas. For example, the "Plan of Adjustment" crafted by the Emergency Management Team and presented in US Bankruptcy Court in February 2014 involved cutting pensions by 34 percent for most municipal employees, and by 10 percent for police and fire retirees. At the same time, the city opted to pay secured bonds in full:[183]

At lease since 2010, there have been efforts to regionalize operation of DWSD, and under Emergency Manager Orr, there was also a request for proposals to put the district under private management. In 2013, the city ultimately opted to regionalize DWSD through the creation of a new regional water authority: the Great Lakes Water Authority, or GLWA. As the following section discusses, the GLWA arrangement continues the historical inequities governing the distribution of water in Detroit.

Image from the film I Do My Dying. Coutesy of Kate Levy, available online at detroitmindsdying.org

Conclusion

An examination of the history of Detroit's water and sewerage system reveals two major themes that are prevalent in similar systems across the United Sates.

First, the water and sewerage system played an integral role in suburban and regional economic growth, determining areas of residential segregation and regional fragmentation. As urban water and sewer systems developed and evolved during periods of extreme racial inequality, the location and expansion of areas served by the infrastructure were, and continue to be, deeply divided by class and race. This is in part because utility sys-

AREAS FOR FURTHER INQUIRY: PUBLIC HEALTH CONSEQUENCES OF WATER ACCESS

There is a litany of well-established links between individual health outcomes and reliable access to clean water and adequate sanitation. There are similarly established links between water and sanitation access and public health outcomes. Situating Detroit within this long-standing line of research, it is wise to study public and individual heath has been effected by the number of water shutoffs in the city of Detroit.

TK: Bits about Community Research Collective, mapping the water crisis

Understanding the specific effects in Detroit will enable the best targeted strategies to address effects that exist in Detroit. The spirit of such a study is not to simply reveal problematic outcomes, but far more importantly to direct attention to systemic problems that need attention.

This is another opportunity for Detroit to be a national leader in extending study of water access in the domestic context. Many studies have been done internationally, but more research needs to develop unique problems that are presented within the domestic context.

As a matter of public circulation and understanding of this type of study it is important to understand standards of epidemiological investigation.

The utility of this type of study is any expectation to prove causation. Causation in epidemiological studies is not obvious. Probabilistic standards of causation are appropriate for epidemiological studies, not necessity-sufficiency standards. "...Epidemiological studies can never prove causation; that is, it cannot prove that a specific risk factor actually causes the disease being studied. Epidemiological evidence can only show that this risk factor is associated (correlated) with a higher incidence of disease in the population exposed to that risk factor. The higher the correlation the more certain the association, but it cannot prove the causation. ..."

Studies revealing association, or correlation, are meaningful and reveal new important insights.

Spatial analysis presents an important component of research in general, including the field of epidemiology. There are also limitations inherent in epidemiological study due to privacy standards of personal medical records. Studies that use individual patient data are routinely, and necessarily, aggregated to census tract level or zip code.

tems developed in response to growing populations, and these population dynamics were deeply informed by race and ethnicity–for example, periods of immigration from European countries, the migration of Black people from the South to the North's industrial centers, and White flight from central urban areas.

The development of urban and suburban regions was deeply informed by an interest in segregating races and resources. Physical infrastructure bears the traces of this legacy and has played a significant role in perpetuating it. Infrastructure dictated where people lived and worked, where businesses could open, and where industry could grow. Thus, the footprint of utility services follows the historic patterns of regional and municipal segregation along race and class lines. Similarly, the water system's management practices and system operations reflect dominant and shifting stories of need, priorities, and management policy. In this way, Detroit's water and sewerage system is not a technical feature of the city that standards apart from its social history. Instead, the water and sewerage system is a central component of structures that determine the inequitable distribution of resources within the region.

Secondly, for almost four decades leading up to, during, and following the bankruptcy, Detroit's water and sewerage department fell under multiple management structures that each implemented different policies in an attempt to ensure regional water quality. This included a long process to create a feasible and durable compliance schedule with the EPA to ensure the system would meet environmental quality standards. DWSD operated under court supervision from 1977 until 2013. Upon conclusion of the court process Kevyn Orr was appointed as emergency manager.

However, while the duration of outside system management in Detroit is exceptional, the extent to which the water utility has struggled to meet

federal regulations is unexceptional. Current environmental regulatory standards and practices date back to President Nixon's administration in the 1970s, and water utilities were pushed to implement changes to meet them.184 The pressure to meet these standards presented challenges for many water systems, and particularly for those with limited financial resources. These challenges–and the fines that accompany them–continue to affect water utilities across the country.

The history of the water system in Detroit echoes the significance of the relationships between public infrastructure, the equitable distribution of vital resources, urban development, and structural racism. Power comes from democratic voice and resources, and in the case of Detroit, both were denied. Suburban growth was enabled by Detroit's support, and that of the water system in particular. While blame for the current situation cannot and should not be placed on one event or a single individual, it is clear that the problem would not have developed to this extent if the community had more of a voice in the workings of this department that shapes their lives in so many ways. All discussion of the current water crisis must always fall in the context of the social and financial circumstances that created it.

ENDNOTES

Endnotes

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65 "Provisions for periodic review of the terms of the agreement are detailed in the "Water and Sewer Services Sevices Agreement" between the City of Detroit and Great Lakes Water Authority, June 12, 2015, Section 5.04, (c); Section 5.07, available at https://outreach.glwater.org/LinkClick.aspx?fileticket=ZGgKOqkj-es%3D&tabid=39."

66 The currently proposed plan will be referred to as WAP from here on.

67 Implementing an income-based affordability plan is a central demand of the People's Water Board, member organizations of which include AFSCME Local 207, Baxter's Beat Back the Bullies Brigade, Boggs Center – Detroit, Cities of Peace Detroit, Detroit Black Community Food Security Network, Detroit Greens, Detroit Jews for Justice, Detroit Social Justice Team United Church of Christ, Detroit People's Platform, Detroiters Resisting Emergency Management, East Michigan Environmental Action Council, Ecumenical Theological Seminary, FLOW, Food & Water Watch, Great Lakes Bioneers – Detroit, Highland Park Human Rights Coalition, Immaculate Heart of Mary (IHM), MECAWI, Matrix Theater Company, Michigan Citizens for Water Conservation, Michigan Coalition for Human Rights, Michigan Unitarian Universalist Social Justice Network (MUUSJN), Michigan Welfare Rights Organization, Moratorium NOW, National Boricua Human Rights Network, Rosa and Raymond Parks Institute for Self Development, Sierra Club, Sisters of Mercy, Sisters, Servants of the Immaculate Heart of Mary (IHM), Justice Peace Sustainability Detroit Office, Small Ville Learning Farms, St. Peter's Episcopal Church, Voices for Earth Justice, We the People of Detroit

68 Notably, the EPA figures determine the affordability of water based on medium household income of service areas for water, while using figures for national MHI for determining the affordable burden for water. Colton's plan, on the other hand, determines affordable burdens on the basis of household, estimating the number of participants in the program. According to multiple sources, including the American Water Works Association, United States Congressional Budget Office, UNC Environmental Finance Center, independent experts, and EPA's own Science Advisory Board, median household income (MHI) is a poor input for calculations on affordability. Econometric studies have shown a very small correlation between MHI and poverty, making MHI a poor indicator for economic need. MHI does not take actual income distributions into account, meaning it does not capture economic impacts across different groups. Depending on the income distribution, lower income groups could face dire need even in areas without low MHI. The basic calculations EPA makes based on system-wide MHI do not factor in other household burdens, such as non-discretionary spending, which can vary widely between communities. Additionally, use of a single-year MHI number does not capture historical or future economic or demographic trends such as population decline, changes in the unemployment rate, or other indicators of poverty like use of public assistance programs. See United States Environmental Protection Agency, "Affordability Criteria for Small Drinking Water Systems: An EPA Science Advisory Board Report," A Report by the Environmental Economics Advisory Committee of the EPA Science Advisor Board, December 2002, https://nepis.epa.gov/Exe/ZyNET.exe/P100JOKY.TXT?ZyActionD=ZyDocument&Client=EPA&Index=2000+Thru+2005&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C00thru05%5CTxt%5C00000033%5CP100JOKY.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL; United States Conference of Mayors; American Water Works; Water Environment Federation. 2013. Affordability Assessment Tool for Federal Water Mandates, at 4; Fisher, Sheehan, & Colton. 2005. "Defining "Affordable" Water Rates for Low-Income Affordability Programs." FSC's Law and Economics Insights 05 (2); nvironmental Finance Blog, UNC Environmental Finance Center. Percent MHI as an Indicator of Affordability of Residential Rates: Using the US Census Bureau's Median Household Income Data. http://efc.web.unc.edu/2013/01/09/percent-mhi-indicator-of-affordability-of-residential-rates-using-the-u-s-census-bureaus-median-household-income-data/

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Table 3: Meter Charges and Offsetting Water Affordability Program Costs

	Number of Customers	Monthly Meters Charge	Annual Meters Charge	Total Revenue
Residential	$260,439.00	$1.00	$12.00	$3,125,268.00
Commercial	$16,182.00	$20.00	$240.00	$3,883,680.00
Industrial	$1,506.00	$275.00	$3,300.00	$4,969,800.00
Municipal	$510.00	$80.00	$900.00	$459,000.00
School	$587.00	$80.00	$900.00	$528,300.00
Housing	$612.00	$80.00	$900.00	$550,800.00
Total Revenue				$13,516,848.00
Total Program Cost				$13,515,916.00
Annual Excess/ (Shortfall)				$932.00

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74 On November 27, 2017, our team submitted a Federal Open Information Act (FOIA) request to GLWA. Many of the figures we requested were not provided by GLWA, including data for average bills, number of customers in particular classes (residential, commercial, industrial, etc.), and the number of shutoffs. In order to comprehensively calculate the cost of the water affordability program and to present a cost recovery mechanism, these figures are required.

75 Baltimore WAP

76 Given the quantity of these classes of customers in Detroit in 2005, the costs of the program played out in the table below. As shown, the affordability scheme is offset by the meter charges.

Roger Colton, "A Water Affordability Program for The Detroit Water and Sewerage Department," January 2005, http://www.fsconline.com/downloads/Papers/2005%2001%20Detroit%20Water.pdf.

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83 Note that under the current structure, wholesale customers and DWSD Retail have their own "Collection Rules and Procedures" and related documents. It is thus possible for GLWA to encourage all wholesale customers and GLWA to implement the policies, or to author and implement new, system-wide procedures.

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85 http://www.dwsd.org/downloads_n/customer_service/customer_information/collection_rules.pdf

86 City of Detroit Water and Sewerage Department, "Interim Collection Rules and Procedures," December 22, 2003, http://www.dwsd.org/downloads_n/customer_service/customer_information/collection_rules.pdf.

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156 US Environmental Protection Agency, "Federal Water Pollution Control Act," last amended 2002, https://www.epa.gov/sites/production/files/2017-08/documents/federal-water-pollution-control-act-508full.pdf.

157 The EPA filed suit in 1977 as part of a wave of enforcement activities intended to oblige water systems across the country meet the regulatory standards set by new environmental legislation, including an important set of amendments to existing legislation that came to be known as the Clean Water Act. It was under the Clean Water Act that the EPA filed suit.

158 While the original 1999 Rate Settlement Agreement is not available, its key tenets are outlined in the "Water and Sewer Services Agreement" between City of the Detroit and GLWA, June 12, 2015, attachment 2, "Agreement to Revise CSO Project List," https://outreach.glwater.org/LinkClick.aspx?fileticket=ZGgKOqkj-es%3D&tabid=39. The deal is described in also the Winter 2001 DWSD "In the Flow" newsletter (Vol. 1, No. 2) .

The rate settlement agreement reflects Feiken's obvious preference toward the wealthy and white. Relatedly, in a 1984 interview with the Detroit Free Press, the judge remarked, "One of the things we have to give black people the time to learn to do is to learn how to run city governments." The city moved to disqualify Feikens as federal overseer, claiming that the judge's statement "have been viewed by members of the public as showing his bias or prejudice against the mayor and other city officials." The city's motion was eventually denied. See James Barron, "Judge is Critical of Detroit Mayor," New York Times, September 2, 1994, http://www.nytimes.com/1984/09/02/us/judge-is-critical-of-detroit-mayor.html.

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Note that these sorts of risky deals were possible by The Commodity Futures Modernization Act of 2000, which allowed the swaps market to metastasize from $180 billion in 1998 to $6 trillion in 2004 to $57 trillion by the summer of 2008. See Josiah Rector, "Neoliberalism's Deadly Experiment" Jacobin, October 21, 2016, https://www.jacobinmag.com/2016/10/water-detroit-flint-emergency-management-lead-snyder-privatization/.

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166 Darrell Preston, "Detroit Shows Wall Street Never Loses on Bad Swaps: Municipal Credit," Bloomberg, September 13, 2012, https://www.bloomberg.com/news/articles/2012-09-13/detroit-shows-wall-street-never-loses-on-bad-swaps-muni-credit.

167 City of Detroit News Release: Water and Sewerage Department, "Detroit Water Board Authorizes DWSD to Go Forward with EMA Contract," September 7, 2012, http://www.dwsd.org/downloads_n/announcements/press_releases/pr09072012_bowc_authorizes_dwsd_to_go_forward_with_ema_contract.pdf.

168 Detroit Water and Sewerage Department, "Detroit Water Board Authorizes DWSD To Go Forward with EMA Contract" September 7, 2012, http://www.dwsd.org/downloads_n/announcements/press_releases/pr09072012_bowc_authorizes_dwsd_to_go_forward_with_ema_contract.pdf.

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170 Emergency management has roots in the 1986 appointment of a receiver for the city of Ecorse, Michigan, which ended in 1990. In 1988, Public Act (PA) 101 created an "emergency financial manager" for the specific case of Hamtramck. In 1990, Public Act 72 was passed, which enabled the appointment of an Emergency Financial Manager for any local government or governmental unit, including public schools. And in 2011, Public Act 4 renamed the position to Emergency Manager and expanded the authority of the appointed position.

The concept of an appointed emergency manager or emergency financial manager was challenged in court by Sugar Law Center. Ultimately, PA 4 was repealed by voters in the 2012 general election. However, Michigan state government

seemed insistent on the expansion of authority enabled by PA 4, not being content with PA 72. Even after PA 4 was repealed by voters in 2012, the state legislature passed Act 436, reinstalling the ability to appoint an Emergency Manager. In Detroit, not only was an emergency manager appointed as per PA 436, but the state legislature passed a separate law that formed a financial review commission that assumes ultimate authority on the city's finances upon exit of bankruptcy. The city is still subjected to state oversight three years after exiting bankruptcy (after three consecutive balanced budgets, the financial review commission will vote to waive its authority).

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184 The National Environmental Protection Act, passed in 1970, created the Council on Environmental Protection within the Executive Office of the President. In 1970, Nixon created the Environmental Protection Agency to consolidate environmental program administration into a single agency. These were the years of major amendments to the Federal Water Pollution Control Acts–known as the Clean Water Act of 1977.

Endnotes: Executive Summary

1. Elizabeth A. Mack and Sarah Wrase. "A Burgeoning Crisis? A Nationwide Assessment of the Geography of Water Affordability in the United States," PloS One 12, no. 1 (2017): e0169488, http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0169488.
2. States and local governments are directed to take the lead in investing in infrastructure. There is rationale to this recommendation because investments in water infrastructure can have greater benefit to economic growth than other types of investment. Vale of Water Campaign, "The Economic Benefits of Investing in Water Infrastructure," Available at www.thevalueofwater.org. However, the federal government has capacity for investments that local and state governments do not possess. The recommendation for states to take the lead on infrastructure investment is often one based in pragmatism because the federal government has not made adequate investments in recent decades and the current presidential administration is not an exception in this regard. "President Trump's infrastructure proposal seems to omit many important areas of need. The plan in the President's proposed 2018 budget consists of tax credits to private-sector investors, which would boost investment in projects that will generate revenue like tolls or user fees (such as new roads and bridges) but leave out maintenance of existing roads, bridges, and water lines, and construction of public schools and many public transit projects. [1] Also, less profitable projects like roads in rural areas likely wouldn't attract private investment even with new tax credits." Elizabeth McNichol, "It's time for states to invest in infrastructure," August 10, 2017, Center for Budget and Policy Priorities. Accessed August 28, 2018. https://www.cbpp.org/research/state-budget-and-tax/its-time-for-states-to-invest-in-infrastructure
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4. Congressional Budget Office, "Public Spending on Transportation and Water Infrastructure, 1956-2014," March 2015, available www.cbo.gov/publication/49910.
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6. This was mentioned primarily regarding the potential for the large scale of water shutoffs to increase water age in the system. Water age is a well-known problem for water quality and is currently under discussion for further research.
7. Elizabeth A. Mack and Sarah Wrase. "A Burgeoning Crisis? A Nationwide Assessment of the Geography of Water Affordability in the United States," PloS One 12, no. 1 (2017): e0169488, http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0169488.
8. The project team orients its work and research within the attempt to enable the formation of a targeted universalist policy agenda for the future of GLWA's operation and management of the DWSD system–and the alignment of interests across the region. In short, targeted universalist policy is a platform that will enable groups with disparate needs to benefit from different strategies that are tailored for their circumstances. At the same time, designing policies that are designed to resolve structural barriers for those groups can also benefit other people and places. Ultimately, a well-aligned and well-designed set of targeted policies and strategies can supplement each other such that the entire service area can enjoy a universal goal of water security, increased environmental quality, and public health.
9. Articles of Incorporation of Great Lakes Water Authority, Article 4. https://www.oakgov.com/exec/Documents/great_lakes_water_authority/All_Comments_Clean_Final_090814_GDP.pdf Further details on the formation and definitions of Authorities are found in MCL 124.281 Sec. 1 and 2. MCL 124.281 Sec. 1. found here https://www.legislature.mi.gov/(S(yq05baucoujntx4xbgjqqpwg))/documents/mcl/pdf/mcl-124-281.pdf MCL 124.281 Sec. 2. Found here https://www.legislature.mi.gov/(S(fylbv2zccv1kr4bkkmuy0ctr))/mileg.aspx?page=getObject&objectName=mcl-124-282 The general powers that a municipal authority has include adopt bylaws, sue and be sued in its own name, the ability to issue bonds, including revenue bonds, and the ability to "acquire, hold, and dispose of real and personal property in the exercise of its powers and the performance of its duties." See Act 233 of 1955, MCL 124.284 here https://www.legislature.mi.gov/(S(guvjpzhk1pmukhv4muvbthys))/mileg.aspx?page=getObject&objectName=mcl-124-284
10. The key elements of GLWA/DWSD lease agreement are described in the "Memorandum of Understanding Regarding the Formation of The Great Lakes Water Authority," September 9, 2014, http://www.dwsd.org/downloads_n/announcements/general_announcements/ga2014-09-09_regional_authority_MOU_executed.pdf/.
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12. Flint Water Advisory Task Force, "Final Report," State of Michigan (March 2016), p14. https://www.michigan.gov/documents/snyder/FWATF_FINAL_REPORT_21March2016_517805_7.pdf
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and Sustainability," Water Policy (2002), 1-17, https://sswm.info/sites/default/files/reference_attachments/ROGERS%20et%20al%202001%20Water%20pricing%20to%20promote%20equity.pdf.

14. "Memorandum of Understanding Regarding the Formation of The Great Lakes Water Authority," September 9, 2014, executed by representatives from the City of Detroit, Wayne County, Oakland County, Macomb County, and the State of Michigan, http://www.dwsd.org/downloads_n/announcements/general_announcements/ga2014-09-09_regional_authority_MOU_executed.pdf.
15. The four percent cap was the result of the study conducted by the public accounting and business advisory firm Plante Moran, which identified the possibility of capping rates at four percent given that only $4.5 million was budgeted for water affordability. A comprehensive affordability plan would require significantly more funds, and thus the cap is based on an artificially low estimate of the costs of affordability. Some key points from Plante Moran's study are described in a presentation delivered in July 2015, see https://outreach.glwater.org/LinkClick.aspx?fileticket=YrzXZ-JuQfIY%3D&tabid=39.
16. Detroit Water and Sewerage Department, "Trust Receipts and Disbursements Worksheet: DWSD Local System," secured through a F.O.I.A. request to DWSD, submitted November 2, 2017.
17. GLWA's compiled Master Bond Ordinance No. 2015-02 is available here on GLWA's website, https://www.glwater.org/wp-content/uploads/2018/06/GLWA-Compiled_Master_Sewer_Bond_Ordinance_as_amended_through_8_10_2016.pdf This text reflects the initial October 2015 ordinance and amendments adopted in December 2015 and January and August 2016. The issuance documents for the 2016 Series B and C sewage disposal system revenue refunding bonds is available here on MSRB's website, https://emma.msrb.org/EP960481-EP745021-EP1146524.pdf The issuance documents for the 2016 Series A & B water supply system revenue bonds and Series C and D revenue refunding bonds is available here on MSRB's website, https://emma.msrb.org/EP960480-EP745020-EP1146523.pdf
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19. The issuance documents for the 2018 Series A sewage disposal system revenue bonds and Series 2018B and C revenue refunding bonds is available here on MSRB's website, https://emma.msrb.org/ES1200337-ES937769-ES1338587.pdf The issuance documents for the Series 2018A water supply system revenue refunding is available here on MSRB's website, https://emma.msrb.org/ES1200329-ES937761-ES1338580.pdf These bonds' credit rating was also raised by Moody's to A2 or A3. Moody's Investors Service, August 31, 2018, Rating Action: Moody's upgrades Great Lakes Water Authority, MI's sewer revenue bonds to A2 and A3; outlook is stable. Accessed August 5, 2018, available here https://www.moodys.com/research/Moodys-upgrades-Great-Lakes-Water-Authority-MIs-sewer-revenue-bonds--PR_905493778 In Moody's words, "The upgrade…reflects the continued trend of strong financial performance by an essential service enterprise whose customer base includes a substantial share of the state's population. The rating balances the sewer system's health debt service coverage and liquidity against high leverage. The rating also considers the large share of system-wide revenue generated by retail operations in the City of Detroit… The A3 rating on sewer revenue bonds incorporates the subordinate claim on pledged net revenue..."
20. These bond series' credit rating was raised by Moody's to A2 or A3. Moody's Investors Service, August 31, 2018, Rating Action: Moody's upgrades Great Lakes Water Authority, MI's sewer revenue bonds to A2 and A3; outlook is stable. Accessed August 5, 2018, available here https://www.moodys.com/research/Moodys-upgrades-Great-Lakes-Water-Authority-MIs-sewer-revenue-bonds--PR_905493778 In Moody's words, "The upgrade… reflects the continued trend of strong financial performance by an essential service enterprise whose customer base includes a substantial share of the state's population. The rating balances the sewer system's health debt service coverage and liquidity against high leverage. The rating also considers the large share of system-wide revenue generated by retail operations in the City of Detroit… The A3 rating on sewer revenue bonds incorporates the subordinate claim on pledged net revenue..."
21. We the People of Detroit Community Research Collective, "Mapping the Water Crisis: The Dismantling of African-American Neighborhoods in Detroit: Volume One," available to order online at http://wethepeopleofdetroit.com/communityresearch/water/.
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my of Public Administration's findings regarding the critiques of EPA's existing metrics and possible alternatives. Despite the independence of my own literature review and interviews, there was significant overlap with experts and authors used by NAPA. Because NAPA's findings are presented as a meta-analysis, and because of NAPA's unique position as a highly respected and objective organization chartered by Congress and tasked directly by the Senate Appropriations Committee to study this issue and provide recommendations to EPA, they will be referenced more heavily than other sources. It should be understood that a single citation to NAPA rests on input from a very wide variety of published and interviewed sources, both by them and independently by me.

45. Czerwinski, et al., at 48-49. Forthcoming, Zarella, Rick and Wendy Ake (2018) Measuring Water Affordability: Alternative place-based and current metrics, Haas Institute for a Fair and Inclusive Society.
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47. S.3021 is America's Water Infrastructure Act and was signed into law on October 23, 2018. Available here, https://www.congress.gov/bill/115th-congress/senate-bill/3021?q=%7B%22search%22%3A%5B%22water+infrastructure+act%22%5D%7D&r=93 https://www.congress.gov/bill/115th-congress/senate-bill/2800/text
48. Founded in Detroit, NCLAWater is comprised of local, state, and national organizations advocating for legislation that guarantees "comprehensive access to safe, affordable drinking water and sanitation – the human rights to water and sanitation." They are committed to ensuring that water is accessible, safe, and affordable for all people. Learn more at http://affordablewaternow.org/.
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83. Because of the complexities of system design of the DWSD and its connections to suburban retail customers and, in turn, the design of the system within those areas, there are not documented measures to establish the degree to which suburban systems add to the probability of over flows in Detroit's CSO.

Additionally, while the majority of retail systems have separate sanitary sewers, there are some retail systems that are CSO and that 'part' of the system then makes use of "Detroit's" CSO management structures. This document was able to provide some analysis of the details of system design throughout the region. However, a full analysis is still needed to provide a clearer appraisal of the mutual dependency and use between the DWSD, DWSD-R, and other retail clients.

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We the People of Detroit, founded in 2008, has been at the forefront of the activist response to the water crisis. We the People is dedicated to community coalition-building and to the provision of resources that inform, train and mobilize the citizens of Detroit to improve their quality of life. The organization has provided immediate disaster relief through delivering water to shut-off victims and advocated for policies that ensure access to affordable water. We the People's activism and research has been central to investigative work into the Detroit water crisis, and this report reflects and builds upon those crucial insights. Their Research Collective conducts original research on water, land, and education issues in Detroit. The collective is committed to using knowledge to equip Detroit citizens to fight for community equity and sustainability. Learn more at wethepeopleofdetroit.com.

National Coalition for Legislation on Affordable Water is a coalition of national, state, and local organizations, religious institutions, legal organization, unions, and others working to win the passage of national legislation and state legislation to ensure comprehensive access to safe, affordable drinking water and sanitation– the human rights to water and sanitation. Learn more at affordablewaternow.org.

The Great Lakes Environmental Law Center is a Detroit-based nonprofit that offers community education, policy support, and various legal services to address environmental, resource, and energy issues affecting communities in and around Detroit, all over Michigan, and throughout the Great Lakes region. Learn more at www.glelc.org.

The Haas Institute for a Fair and Inclusive Society brings together researchers, community stakeholders, and policymakers to identify and challenge the barriers to an inclusive, just, and sustainable society in order to create transformative change.

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