

# **Sewers and Sickness: Archaic Infrastructure in Milwaukee Threatens the Health and Wellbeing of UWM Students.**



Milwaukee Journal Sentinel

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*What are combined sewer overflows?*

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From academics and athletics to jobs and internships, most students at UWM are fully occupied with the hustle and bustle of college life, so they are likely not too concerned about the quality of water they use and drink on a daily basis. Even though the bulk of UWM students would likely not deny this reality, mounting research regarding sewer overflows is now suggesting that this will need to change. To a large extent, municipalities tend to operate one of two sewer system varieties: separate or combined; separate sewer systems, otherwise known as sanitary sewer systems, utilize multiple pipelines to process both storm and wastewater accordingly, whereas combined sewer systems carry this out with just a singular pipe (Village of

Shorewood). In the event that a sanitary or combined sewer is said to have overflowed, what this means is that instead of liquid refuse undergoing filtration at a treatment facility, Milwaukee Metropolitan Sewerage District (MMSD) for example, it was prematurely spilled into the



USGS

surrounding community (EPA). This unprocessed material could end up in both commercial buildings and even private homes, but, by and large, the greatest amount of drained effluent will redeposit in the next available water body (Rhea). “Blockages, inadequate carrying capacity, leaking pipes, and power outages,” as stated by the USGS, are several factors with the potential to generate sanitary or combined sewer overflows — the latter, more importantly, representing the heart of this issue. While the combined configuration is normally not a problematic method

for controlling sewage, irregular weather events — something the Midwest has no shortage of — too often reveal the fatal flaw of this design (EPA). According to the Milwaukee Metropolitan Sewerage District, periods of elevated rainfall or snowmelt may lead to a combined system’s capacity being surpassed, causing raw sewage, a mixture of “human and industrial waste, toxic materials, and debris,” to be rerouted into the next “best” option: public waters like the Milwaukee River and Lake Michigan. Ergo, the combined nature of CSOs, a common abbreviation for combined sewer overflow, becomes very clear; within the sewer system, a sudden surge in stormwater is permitted to combine with unfiltered wastewater before breaching the environment (Village of Shorewood). There is simply nothing homogenous about the kind of waste entering a combined sewer system, so this is exactly what is allowed to leave when one overflows (CT DEEP). Unlike how the partitioned design of a separated sewer system works, the indiscriminate mixture cultivated in combined sewers is an enormous health hazard when expelled in an overflow, therefore, as mentioned by the United States EPA, the potential for this to endanger the public is quite significant. For UWM students in particular, the vast assortment of diseases fueled by this kind of overflow is a reality that should not be taken lightly.

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*Are combined sewer overflows an issue in Milwaukee?*

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Based on factors like overall efficiency of a sewer system, overflow frequency, and infrastructure budgets, municipal actions taken to reduce the number of CSO incidents widely varies city by city (Rhea). Unfortunately for UWM students and the broader Milwaukee community, the combined sewer system currently in use has been underperforming for far too long (Milwaukee Riverkeeper). Prior to implementation of the “deep tunnel system,” a seventeen

mile-long and three-hundred-foot-deep network of buried channels, MMSD stated that annual overflows totaling fifty to sixty was standard performance at the time. Today, with the aid of this monumental project and improved capacity it provided, MMSD now claims they have been able to achieve an average two to three combined sewer overflows per year. However, MMSD's ongoing track record of combined sewer overflows seems to indicate otherwise. Given that MMSD has conducted far more than just two or three overflows in select years, it is obvious that this figure should only be interpreted as a best-case scenario for Milwaukee's sewer system. To give an example, Milwaukee Riverkeeper, a non-profit association committed to protecting and sustaining the Milwaukee River Basin, released a statement expressing their alarm over the six overflows MMSD was responsible for in the year 2018 alone. Furthermore, Milwaukee Journal Sentinel reporter Laura Schulte was one of the first to bring into the limelight an immense raw sewage discharge that had occurred only a short while ago. Earlier this summer during the month of August, Schulte wrote that following a period of torrential rainfall in Milwaukee, MMSD was forced to pump a staggering "380 million gallons" of untreated sewage into waterbodies including the "Menomonee, Kinnickinnic and Milwaukee Rivers, Lincoln Creek, and Lake Michigan." From these examples and countless more that have all been documented, it is safe to say that completion of the deep tunnel project succeeded in shrinking the volume of CSO events, but it ultimately failed to be the full solution Milwaukee is well overdue for. Even though these circumstances are certainly less than ideal, the fact of the matter is that for students currently attending UWM, this is an issue very close to home (City of Milwaukee).

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*How might UWM students be exposed to combined sewer overflows?*

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Although it is essential for UWM students to understand what encompasses a combined sewer overflow, this knowledge is not valuable unless there is also awareness of how CSO exposure can take place. With discharge from Milwaukee’s combined sewer system acting as a vector for pathogens of all varieties, contact with the contents of a combined overflow is needed before there can be any threat to personal health (City of Portland). Depending on the nature of one’s lifestyle, the probability of an individual encountering some sewage-borne pathogen can be higher or lower than another’s — something that goes for UWM students as well. This is only reinforced by the United States EPA who, in a recent article, pointed out that drinking water, public spaces like beaches, shellfish, and even inhalation or skin absorption are all avenues for contact between raw sewage and the public. Keeping in mind how UWM students normally



Wisconsin Public Radio

interact with the Milwaukee area, exposure to infected sewage is, in reality, likely going to happen from one of two scenarios: swimming in public beaches or consuming water from the tap (MMSD). As for the former, beach closures, such as the July 2020 shutdown of Bradford Beach covered by WISN, are not

too uncommon during the rainier months, and sewer spills are largely what is responsible for them. Secondly, with Milwaukee residents depending on Lake Michigan for clean and consistent drinking water, a 2018 journal from PLoS Medicine emphasized the strong possibility of “drinking water distribution systems” driving a lot of the community exposure to “pathogens

from sewage” (Olds et al.). The authors expressed that raw sewage could breach the distribution pipes themselves, or the pipes may spread water from beneath the ground as well as Lake Michigan that has already been polluted (Olds et al.). Due to there being such a variety of mechanisms for CSOs to reach members of the UWM or greater Milwaukee community — especially through public beaches and tap water — the overall scope of this phenomenon is truly much larger than what many would expect it to be (EPA).

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*Why do combined sewer overflows endanger the UWM community?*

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As was alluded to earlier, the public health dilemma created by combined sewer overflows stems from the materials passing through them (Parmet). At Penn State University, CSOs are considered a thoroughly hazardous brew of “untreated human and industrial waste, oil and grease, metals, sediment, deicing chemicals, floating debris, and other stormwater pollutants” (Rhea). While there is likely not a single university student that would not be bothered if any of these substances appeared in their tap water or at their favorite beach, most pathogenic, aka disease-causing, substances originate from the human and animal feces often found in the spillage (McClary-Gutierrez et al.). Referencing a 2015 journal published in Environmental Health Perspectives, typical pathogens spread via the feces in CSO events encompass “protozoa, viruses, and bacteria such as cryptosporidium, salmonella, norovirus, escherichia coli, streptococcus, and enterococcus” (Messier et al.). As a side note, Milwaukee has quite the history with the cryptosporidium species of protozoa; citing the Encyclopedia of Milwaukee, the year 1993 was when this pathogenetic parasite triggered around 400,000 cases of cryptosporidiosis and nearly 100 deaths (Pulido). Despite the cryptosporidiosis epidemic

representing what now would be an extremely rare microbial outbreak, every pathogen, even at a smaller scale, mentioned in this 2015 journal is still dangerous enough to deliver a number of serious illnesses (Tibbetts). Turning to the experts in the field, award-winning scholarship from UNC’s Gillings School of Global Public Health perfectly captured the harm pathogens in combined sewer overflows are capable of inflicting on public health (Messier et al.). In his longitudinal study, doctoral student

Kyle Messier and a team of researchers explored the intensity of GI infections following the dispersal of raw sewage into public waters — a project that, when finished, was able to directly

attribute combined sewer overflows to “an increased risk for

GI illness.” On top of the infamous cryptosporidiosis condition, additional sicknesses distributed by fecal material, as specified by the Indiana Department of Health, concern typhoid fever, gastroenteritis, hepatitis A, bacillary dysentery, as well as several others. After contracting any of these diseases, the resulting symptoms are likely to include “nausea, vomiting, abdominal pain, diarrhea, cramps, and fever” (Watercolor Management). All things considered, these findings and others like them make one thing clear: treating public waters as an extension of a combined sewer system — a toilet to be brutally honest — is nothing less than a recipe for disaster. Even if one of these GI conditions does not necessitate a trip to the hospital, the symptoms accompanying them are debilitating for just about anyone, so while it may not seem necessary —



MDPI

especially as college students — it is simply not safe to judge Milwaukee Waterworks or the Milwaukee Metropolitan Sewerage District as fully competent services (Parmet).

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*Are there any alternatives to combined sewer overflows?*

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Across sewage management agencies in the Midwest, MMSD included, the same narrative always seems to make an appearance when answering the question of why; why must heavily contaminated sewage be emptied into the environment to begin with? “[To] protect the cities from back-ups of raw sewage into homes” is how Connecticut’s Department of Energy and Environmental Protection justifies the role of CSOs in their community, and the same argument is heard from the Milwaukee Metropolitan Sewerage District when claiming CSOs are their “only weapon” capable of keeping sewage out of basements. Nevertheless, these assertions are certainly not exaggerations; if a combined sewer system reaches capacity and then is not allowed to fall back on neighboring water bodies, excess sewage will inevitably be redeposited throughout the community — UWM’s facilities not being an exception (Village of Shorewood). For instance, this very scenario routinely unfolds in Syracuse, New York when large volumes of rain impact the area (Baker). A 2019 investigation in Syracuse found that by using sewer pipes “over 100 years old,” the city permits flooding in approximately 4,000 residential basements “due to sewer backups” (Baker). In light of what happens when overflows are not initiated, it is apparent that agencies like MMSD and Connecticut’s DEEP are simply choosing the better of two evils in this situation. After all, a sidewalk, basement, or even lecture hall full of untreated sewage is a surefire way to contract at least one bacterial or viral infection (Evans). It is obvious that no progress can be made by simply not conducting overflows as needed, so, with this being

the case, the ongoing conversation on how best to eliminate CSOs in Milwaukee as well as the entire Great Lakes region is primarily centered on the sewer systems themselves (CT DEEP). Referring to an Environmental Health Perspectives article written by John Tibbetts, a technique known as “blending” or “bypassing” has been adopted by a number of sewage facilities in an effort to cut back on CSOs. Tibbetts describes this procedure as basically being a shortcut in the sewage treatment process; rather than direct all raw sewage through both the primary and secondary filtering, sewage departments may “route a portion of peak wastewater flows around the [secondary] treatment units, then combine the rerouted flows with the portion of wastewater



Chicago Magazine

that went through [secondary] treatment.” Although this shortened approach to sewage management does provide some degree of treatment to the ejected wastewater, public health and environmental experts contend that this practice, in actuality, leads to CSOs with an even larger dose of

pathogens (Tibbetts). Alternatively, Milwaukee, Chicago, and other more populated cities have explored storing excess wastewater in oversized tunnels as a solution for overflows. While far from being completely efficient or inexpensive to construct, these subterranean reservoirs, nevertheless, remove a sizeable portion of sewage that would have otherwise ended up in natural waterways or community buildings (MMSD). Whether it be through adapting the treatment of

sewage or how it is collected, Tibbetts noted that fully rectifying sewage systems, therefore fully eliminating CSOs as well, hinges on “greater federal investment in wastewater infrastructure.”

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*Can UWM students lower their risk of combined sewer overflow exposure?*

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Part of what is special about UWM is the vibrant and dynamic city it is situated in, so the fact that this has been repeatedly tainted by pathogen-ridden raw sewage is a reality no college student wants to acknowledge — let alone act according to. However, until sewage infrastructure receives the financial support it has warranted for quite some time, CSOs and the public health ramifications they impose will continue to impact the lives of everyone who calls Milwaukee home (Lydersen). Knowing how often services like MMSD or Milwaukee Waterworks fail to adequately promote the community’s health, it is up the general public, UWM students for example, to be mindful of the potential for CSO events and take action if need be (Milwaukee Riverkeeper). First of all, it is important to highlight that since CSOs generally do not occur on a perennial basis, the probability of exposure tends to fluctuate throughout the year (City of Portland). Elevated levels of rainfall or snowmelt is typically



WISN

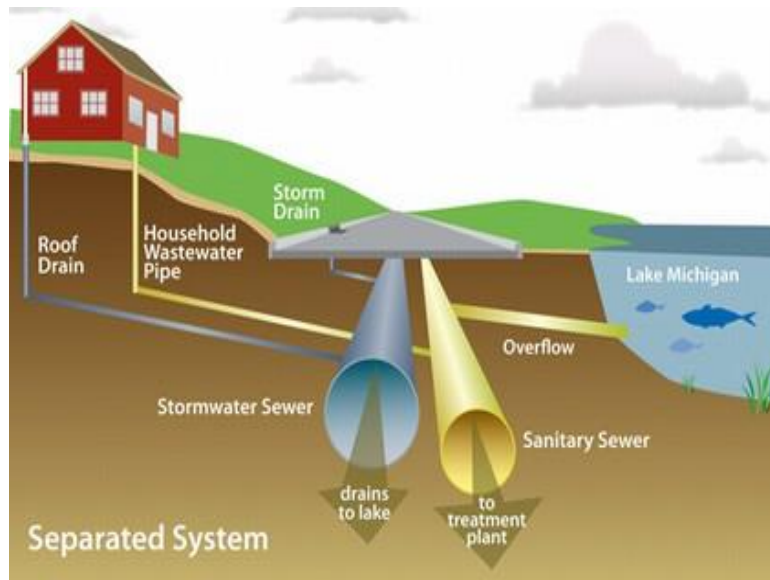
what is behind sewer systems having to overflow, and according to Portland’s Bureau of Environmental Protection, “October [through] May” is the period when sewers become especially susceptible to overflows. Considering that Milwaukee experienced a CSO lasting three entire days in May of last year, paying close attention to CSOs reported by MMSD or other official offices is vital during these eight months (MMSD). Nevertheless, Milwaukee’s sewers can, and have, overflowed well out of season, so it will never hurt to be familiar with what steps to take after an overflow has been announced. Along with being cognizant of the CSO season, preventing CSO exposure in Milwaukee can generally be accomplished just by heeding beach advisories from the Milwaukee Health Department. With UWM’s main campus only minutes away from the Lake Michigan waterfront, students tend to frequent Bradford, McKinley, and South Shore Beaches — a low-risk activity as long as swimming does not happen while yellow or red placards, meaning unsafe water, are being displayed (Milwaukee Health Department). Despite now being more of a rarity, CSOs have additionally been shown to transmit pathogens into drinking water (Parmet). After city governments suspect this to have occurred, boil advisories, a method the CDC states can destroy microorganisms, must also be followed if one happens to be issued. All in all, Milwaukee’s sewer system, for the time being, presents serious perils to the UWM community, but with a little vigilance and common sense, these perils can thankfully be greatly minimized.

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*Where does Milwaukee go from here?*

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With so much at stake, namely the health of anyone serviced by Milwaukee's combined sewer system, not addressing the overflows this system is responsible for will never be a viable option. Milwaukeeans simply deserve better than almost annual CSOs putting everyone at risk; what is deserved are real solutions that reflect the magnitude of this issue. Enactment of the deep tunnel in 1994 was a considerable step forward for the safety of Milwaukee's nearly 1 million residents, though time has shown that this project was unfortunately more like one piece of the puzzle (MMSD). Year after year, as was aforementioned, intense rainfall can quickly overwhelm the deep tunnel's 520-million-gallon capacity, forcing large amounts of wastewater straight into Milwaukee's prized waterways (Behm). Knowing that CSOs have been persisting in spite of all the protection provided by the deep tunnel, the crucial question this begs is what else can be done to bring an end to combined sewer overflows in Milwaukee? Although it appears as if expanding the deep tunnel currently in use is all that needs to happen, fully preventing future CSOs is not that straightforward in fact (Biello). Scientific American put forward that without "seven more deep tunnels," this approach to controlling CSOs will never stop one in its entirety (Biello). This of course arises from the staggering volume of stormwater entering Milwaukee sewers during severe weather. Clearly, rethinking Milwaukee's deep tunnel reservoir is not exactly within the realm of possibility, so, alternatively, the better strategy constitutes rethinking what waste needs to remain in the sewer and what necessarily does not (Wavin). Since there is frankly no practical method of containing or detoxifying the total expanse of liquid waste generated in large cities, the composition of sewer contents being discharged in Milwaukee is where an opportunity exists to meaningfully improve this city's sewers. In the opinion of Sustainable Sanitation and Water Management (SSWM), Sewage Free NJ, the City of Vancouver, and countless more organizations, once storm and wastewater is transported in individual pipelines to different



Village of Shorewood

destinations, the basic principle behind any sanitary or separate sewer system, the potential for unprocessed sewage infecting the surrounding area, a CSO in other words, is essentially nonexistent. This is commonly described as sewer separation, and it arguably offers a brighter future for sewage

management across many cities (Sewage Free NJ). Amongst others, the primary advantage of a separated sewer is how it regulates wet weather; stormwater certainly poses a far lesser threat to community health than wastewater, so the bulk of it is independently channeled into nearby water bodies like “canals or detention basins,” thus allowing all sewage to consistently arrive at the treatment facility and not be pushed into the environment by major precipitation (Stauffer and Spuhler). Right now, the strongest argument against sewer separation initiatives is the price tag — an important detail that may altogether set U.S. taxpayers back as much as “\$88.8 billion” per The Atlantic (Evans). Nevertheless, considering that combined sewer systems, as NJ Spotlight’s Chris Strum puts it, embody a “public-health hazard and environmental problem but also a constraint on future growth and development,” it is unlikely that anyone within the UWM community and beyond would be opposed to city leaders pursuing such an investment.