



VILLAGE OF WINNEBAGO

MEMORANDUM

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Meeting Name:	Committee of the Whole
Meeting Date:	August 28, 2024
Item Name:	Village of Winnebago Stormwater Management

Background:

The Village of Winnebago is committed to maintaining and improving our aging stormwater system, particularly in the older sections of the village where the impacts of time are most evident. As with any stormwater system, aging infrastructure can lead to decreased efficiency due to sediment buildup, pipe deterioration, and reduced capacity, which heightens the risk of flooding and infrastructure failure. Heavy rain events in recent years have underscored the system's vulnerabilities, especially where issues begin at the system's outfall points—where stormwater is ultimately released into local waterways or drainage basins—and then compound as water backs up and spreads upstream through the system. These outfall points, or ending discharge locations, are critical junctures in the stormwater network, and their capacity and functionality directly impact the overall performance of the entire system.

To mitigate these risks, the Village has taken proactive measures by regularly clearing clogged culverts, addressing problem areas as they arise, and performing essential maintenance to ensure debris and sediment are removed from drains. These low-cost, easily implemented actions are the first line of defense in maintaining system functionality. Intermediate steps might include retrofitting existing infrastructure with more efficient technologies, like installing permeable pavement or upgrading to larger capacity pipes. Additionally, the Village also requires proper engineering with all new developments to ensure that any new structures and surfaces properly account for runoff.

Looking forward, the Village recognizes that larger-scale investments may be necessary to secure long-term stormwater management. Green infrastructure projects, such as the creation of wetlands, rain gardens, or bioswales, offer natural solutions to manage runoff. Additionally, massive projects like redesigning and expanding the entire stormwater network, or constructing large underground retention basins, can provide long-term solutions to accommodate increased runoff.

The most efficient and effective approach to improving stormwater systems is to begin at the discharge points, where water exits the system, and work backward. Starting at the endpoint ensures that the system can handle the increased flow that results from upstream improvements. If enhancements begin at the upper sections of the system, they may increase the volume and speed of water flowing downstream before the downstream infrastructure is capable of managing it, potentially exacerbating flooding issues. By addressing the capacity and functionality of the discharge point first, the system can gradually be upgraded in a way that reduces risks, supports the natural flow of water, and ensures each improvement effectively integrates with the existing infrastructure.

Current Challenges:

The Village of Winnebago is currently facing significant challenges with its stormwater and sanitary systems, particularly highlighted during the recent storms on July 13th and 14th. These heavy rain events led to widespread flooding and sewer backups, affecting numerous residents. The underlying issues stem from a combination of factors that put undue stress on our aging infrastructure.

While inflow and infiltration (I/I)—the process where groundwater and stormwater enter the sanitary sewer system through cracks, joints, and other openings—was initially suspected to be a significant issue, recent smoke testing conducted by the Four Rivers Sanitation Authority (FRSA) suggests that I/I may not be the primary culprit in this case. The testing showed that the system is relatively secure, meaning that the majority of the excess water is likely coming from illicit sump pump discharges rather than from widespread infiltration of stormwater into the sanitary sewers.

The Soper Street Pump Station was particularly affected, as it was overcome by the stormwater flow. The average sanitary flow to the station in the days prior to the storm (July 1st to July 13th, 2024) was 210,504 gallons per day. However, on July 15th, the flow through the station surged to 1,526,040 gallons (7.25 times the dry weather flow), significantly exceeding its permitted capacity of 1,164,960 gallons per day. The actual capacity for a single pump at the station is 1,296,000 gallons per day, roughly six times the volume of normal dry weather flow, whereas IEPA design guidelines generally consider a peak flow factor of just over 4. Comparatively, other pump stations like Greenlee and Winnebago Corners experienced much smaller increases in flow (1.37 and 1.64 times their respective dry weather flows), which are within acceptable ranges for sanitary sewers.

From the data provided by FRSA, Illicit sump pump discharges have been identified as a primary contributor to these problems. In conjunction with the above findings, FRSA conducted smoke testing in 2022 as part of its efforts to locate and repair sources of high I/I upstream of the Soper Street Pump Station. The testing identified 88 smoke defects, with the most significant public sector defects being related to sanitary manholes and private sector defects related to laterals. The total estimated I/I flow identified from the defects is approximately 103,968 gallons per day.

The report concludes that both public and private sector sources contribute to the I/I, with lateral and manhole frame seal defects being the most significant contributors. Recommendations from the report include conducting further manhole inspections, televising and rehabilitating lateral and mainline defects, and replacing missing or broken cleanout caps to mitigate these issues.

According to data from FRSA, that many the primary culprit (59%) of defects came from private property, and a common culprit being residents redirecting their sump pumps into the sanitary sewer system instead of allowing the water to flow into the stormwater system or yard. This is often done to avoid having a wet yard on the part of the homeowner, but it significantly increases the volume of water entering the sanitary sewers during heavy rain events. This additional, unauthorized discharge can overwhelm the system, leading to backups and flooding. Despite efforts to enforce compliance, including required inspections upon the sale of any residential homes within the village, as well as the initial village wide inspections completed by January 8, 2013 after completing the transition to the sanitary district, that ensured 100% of buildings in Winnebago had their clearwater discharge systems correctly installed, illicit discharges remain a problem.

To address the root cause, stormwater infrastructure in some parts of the village is inadequate to handle the volume of water generated by intense storms. This aging infrastructure, especially in older sections of the village, has reduced capacity due to sediment buildup, pipe deterioration, and other factors that limit its effectiveness. When these

systems are overwhelmed, water cannot be efficiently diverted away from homes and streets, leading to localized flooding.

Comprehensive Stormwater Study:

To effectively move forward with any substantial improvements to the Village of Winnebago's stormwater system, staff advises that the first and most critical step be to conduct a comprehensive stormwater study. This study would provide detailed insights into the existing conditions, identify the most pressing issues, and recommend specific improvements. The cost of such a study can vary, but it could be in the range of \$40,000 or more, depending on the scope and complexity of the analysis.

For example, in a similar study conducted by the Village of Stillman Valley, the study included an analysis of existing conditions, hydrologic and hydraulic modeling, an evaluation of current infrastructure, and the development of improvement alternatives. The study also provided detailed cost estimates for various improvement scenarios and identified the potential impact of those improvements on flood risk and system performance. Such a study in Winnebago would likely involve similar components, including an assessment of the entire drainage basin, the capacity of existing culverts and ditches, and the development of potential improvement plans tailored to our village's specific needs. Investing in this study would enable the Village to make informed decisions about future stormwater projects, ensuring that any funds spent are directed toward the most effective solutions.

Funding for Future Stormwater Projects and Study:

Funding is a crucial component for moving forward with necessary improvements to the Village of Winnebago's stormwater system. Municipalities tackle stormwater management funding in various ways, each with its own set of advantages and challenges. Some municipalities rely on operating expenses from their general fund, which allows for immediate action but often pulls resources away from other vital services. This approach can be sustainable for smaller, incremental improvements, but may fall short when it comes to financing larger-scale projects that require significant investment. It should also be noted that Public Works currently addresses drainage issues at this level already; challenges arise when any larger projects that require significant capital outlay are needed.

Another option is the creation of a stormwater utility fee or tax, which dedicates specific revenue streams to stormwater management. In other municipalities, this fee may be calculated based on a property's impervious surface area, meaning those who contribute more runoff would pay more toward the system's maintenance and improvement. Implementing a stormwater utility fee can provide a stable and equitable funding source that grows with the community's needs, making it a viable option for financing both immediate repairs and long-term infrastructure projects.

Village staff are also continuously on the lookout for grant opportunities that could help fund stormwater projects. While grants can provide valuable financial assistance, they are not a reliable or consistent solution for long-term funding. Grants often come with specific criteria and competitive processes, meaning they cannot be solely relied upon to cover all necessary expenses. However, when successfully secured, grants can help offset costs and supplement other funding methods.

Another option to consider is bonding for a stormwater project. By issuing bonds, the Village can secure the necessary funds upfront to undertake significant improvements or complete a large-scale project all at once. Bonding spreads the cost over many years, making it more manageable for the community and aligning the financial burden with the long-term benefits of the project. While this approach does involve taking on debt, it allows the Village to

address pressing infrastructure needs immediately without relying solely on the current budget or imposing a new fee. This option would not be necessary until a large project is identified, which may be the case once a comprehensive study is completed and specific improvements are recommended. Bonding could be particularly attractive if the Board wishes to make substantial, impactful upgrades to the stormwater system in a shorter time frame.

Next Steps:

With these options in mind, staff is seeking input from the Village Board on how to proceed with future stormwater projects. The key questions are: (1) Should staff budget for the completion of a Comprehensive Stormwater Study in 2025, and (2) How does the Board prefer to fund future stormwater initiatives? The Board could consider exploring the development of a stormwater utility fee, which would provide a dedicated revenue stream for these improvements. Alternatively, staff could examine the current budget to identify what could be funded out of the general fund, with the understanding that this would inevitably divert resources from other essential services. Additionally, bonding could be considered as a funding option, but this would not be necessary until a large project is identified—something that may become clear once a study is completed and specific improvements are recommended.

Staff is prepared to provide more detailed information on the potential for a stormwater fee or bonding options, including how it could be structured and the revenue it might generate. However, we first seek the Board's direction on whether to pursue this option or to focus on other solutions.