DATE: May 16, 2017

TO: Timothy J. Frenzer, Village Manager

FROM: Brigitte Berger P.E., Director of Engineering & Public Works
Nabil Quafisheh, Director of Water Management

SUBJECT: Description of the Combined Sewer System and MWRD

The Village's sewer system serves a population of approximately 27,500. The area east of Ridge Road is serviced by a combined sewer system, while the area west of Ridge Road is serviced by a separated sanitary and storm sewer system. The entire system collects wastewater from approximately 9,000 residential, commercial, and institutional buildings, and stormwater from approximately 2,500 acres of intensely urbanized area.

The purpose of this memo is to focus on the description of the combined sewer system and its relationship to MWRD.

Metropolitan Water Reclamation District (MWRD)

MWRD treats sanitary wastewater for 128 suburban communities and the City of Chicago for an equivalent population of 10.35 million people. They have 560 miles of intercepting sewers, seven treatment plants and 22 pumping stations and treat an average of 1.4 billion gallons of wastewater each day. In addition to treating Wilmette's wastewater, MWRD is the agency that issues permits for sanitary and combined sewer improvements and regulates stormwater for Wilmette and all of Cook County.

Separated Sanitary and Storm System

In the separate sewer system located west of Ridge Road, the stormwater is directed to the Village's pumping station on Lake Avenue and is pumped to the North Branch of the Chicago River. The sanitary sewage is directed to the Metropolitan Water Reclamation District of Greater Chicago (MWRD) interceptors (large diameter sewers) which then convey the flow to MWRD's O'Brien Water Reclamation Plant in Skokie for treatment. Refer to Figure 1.

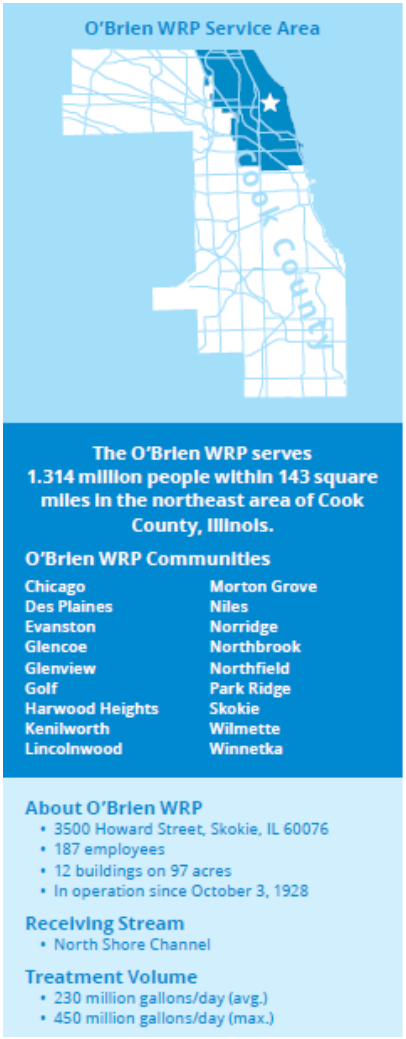


Figure 1. Source: MWRD

Combined Sewer System

East of Ridge Road, both stormwater and sanitary sewage drain into the same pipes. Homes, businesses and street drains are connected to the local combined sewers, which are owned and maintained by the Village of Wilmette. Local sewers flow by gravity into MWRD's intercepting sewers (large diameter sewers), which then convey the flow to MWRD's O'Brien Water Reclamation Plant in Skokie.

In the 1990's and 2000's, the Village built a series of large diameter relief sewers to add capacity to the combined sewer system. In addition, drainage berms (they look like speed humps) and inlet restrictors were installed to store stormwater on the streets until the combined sewers can accept the stormwater. This investment has greatly improved the performance of the combined system.

The Village's combined sewer system consists of over 207,000 feet of sewer and over 850 manholes.

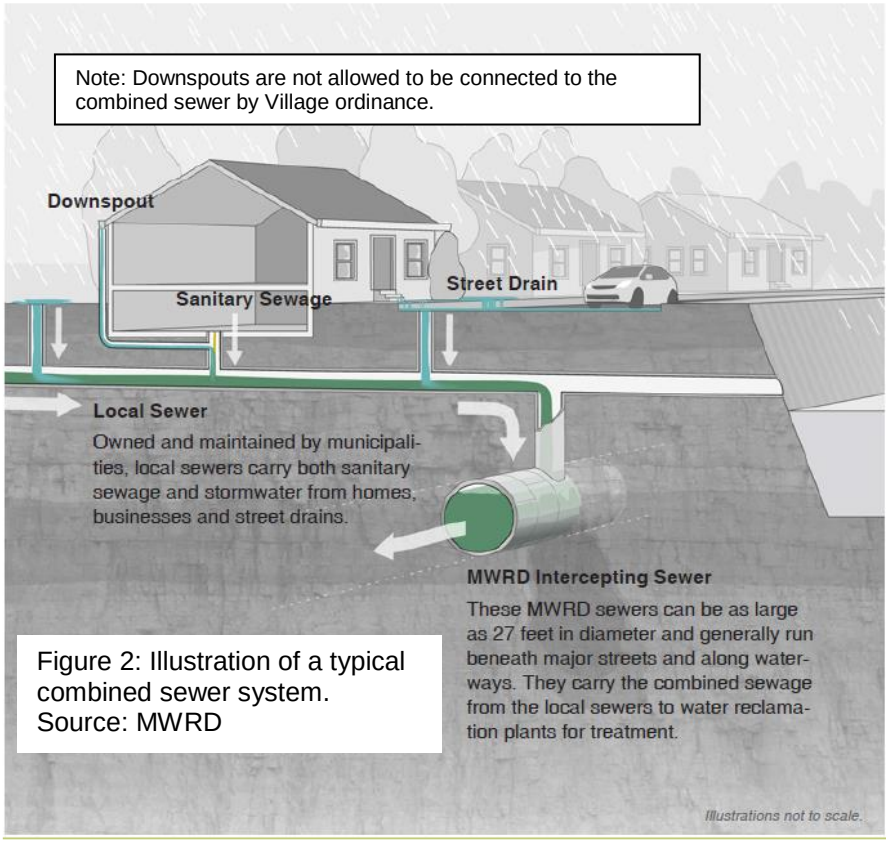


Figure 2: Illustration of a typical combined sewer system. Source: MWRD

What is a combined sewer overflow?

During normal weather conditions, all wastewater is treated by MWRD before it is released into the rivers and streams that make up the Illinois Waterway System. During heavy rain events, however, wastewater flows can become so high that MWRD's intercepting sewers and water reclamation plants do not have enough capacity to treat the wastewater. This means that sewage which is typically treated by MWRD is released into Lake Michigan untreated.

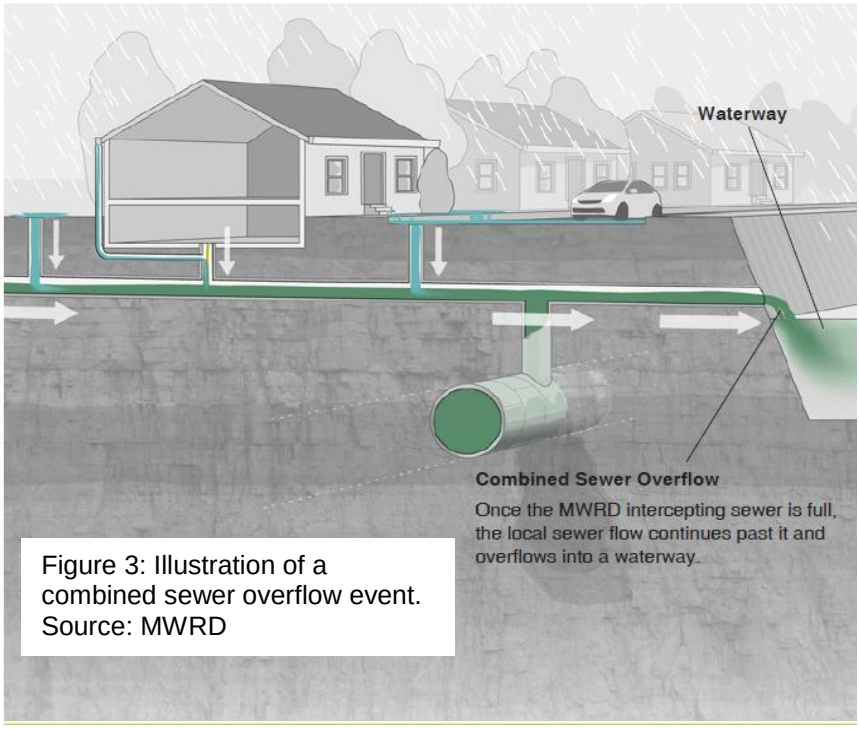


Figure 3: Illustration of a combined sewer overflow event. Source: MWRD

What is the "Deep Tunnel," or TARP (Tunnel and Reservoir Plan)?

The MWRD's Tunnel and Reservoir Plan (TARP) or "Deep Tunnel" system is designed to reduce flooding and pollution caused by combined sewer overflows. TARP tunnels act like very large intercepting sewers, capturing the excess flow from the combined sewers before it can reach the waterway. Excess flow is stored in the tunnels but will also be sent to the large storage reservoirs. The "tunnels" portion of TARP was completed in 2006 and is fully operational. The "reservoir" portion of TARP is currently under construction. The Village is served by the McCook Reservoir which is currently under construction and, when completed, the reservoir will have a total capacity of 10 billion gallons (BG). McCook Reservoir Stage 1 will be completed in 2017 and provide 3.5 billion gallons of storage. Stage 2 will be completed in 2029 and provide 6.5 billion gallons of storage. The McCook Reservoir will provide more than $114 million per year in flood damage reduction benefits to 3,100,000 people in 37 communities. (Source: MWRD)

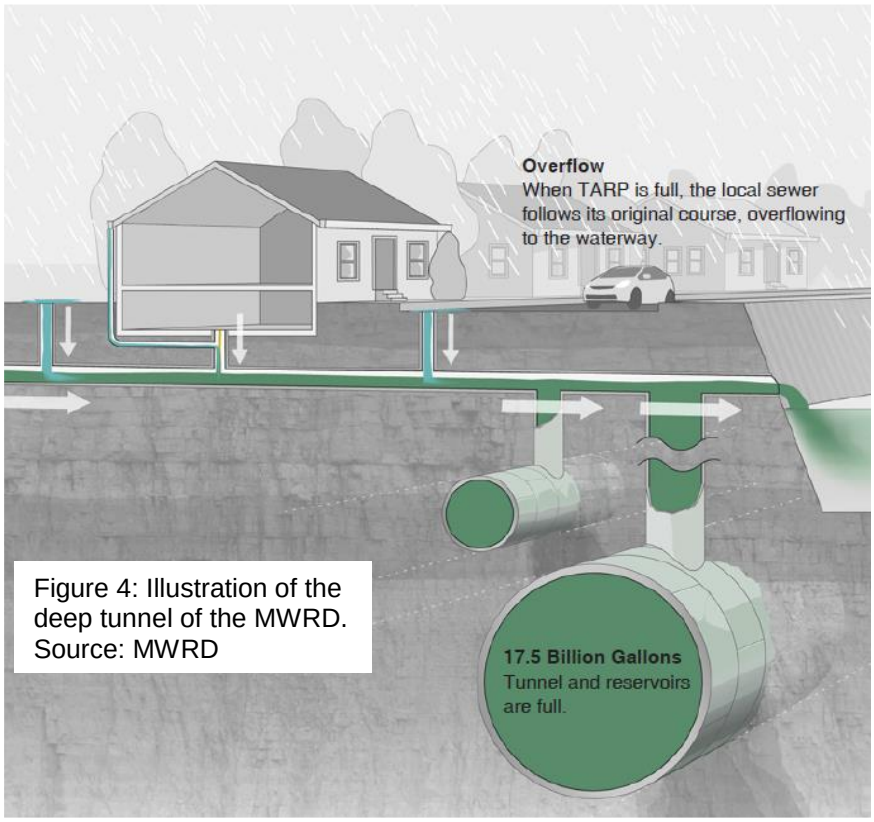


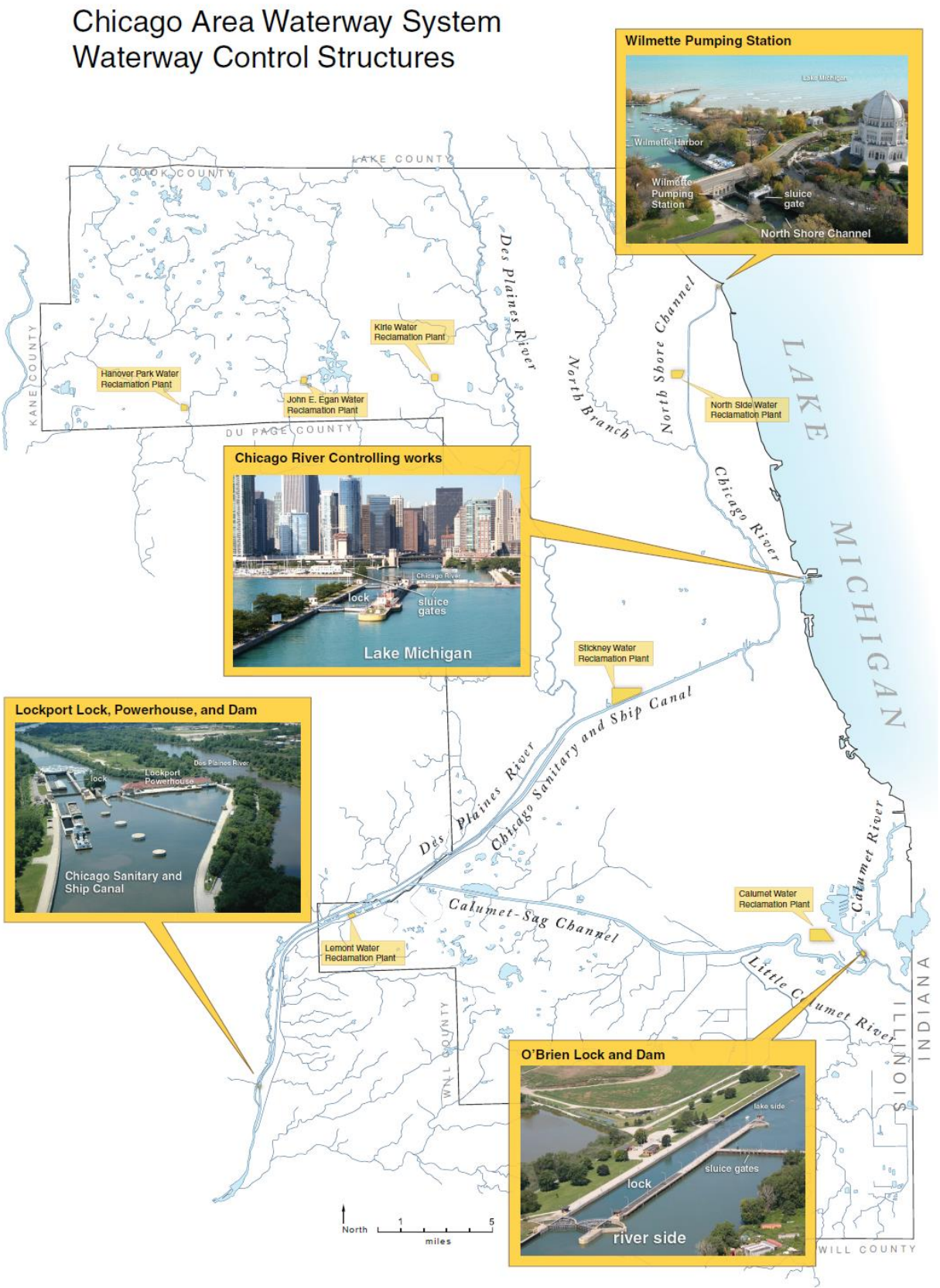
Figure 4: Illustration of the deep tunnel of the MWRD. Source: MWRD

How do the gates and locks of the MWRD work?

The MWRD manages a system of waterways connected to Lake Michigan and separated by locks and gate structures to control the amount of water flowing from the lake into the streams and to prevent flow of water into the lake at these points. MWRD's pumping station in Wilmette is the northernmost control structure. Refer to Figure 5 below.

The Chicago River levels are kept lower than Lake Michigan, so controlled amounts of water from the lake can flow into the river, forcing the river water to flow southward.

Figure 5: MWRD facilities in the Chicago are waterway system
Source: MWRD



When are the Wilmette locks/gates opened and who makes that decision?

The normal position of the Wilmette locks is closed to keep the channel level lower than the lake (see Figure 6 below).

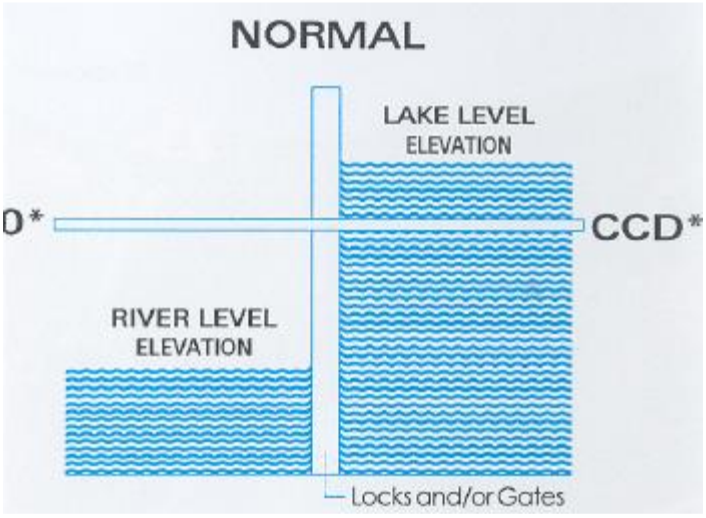
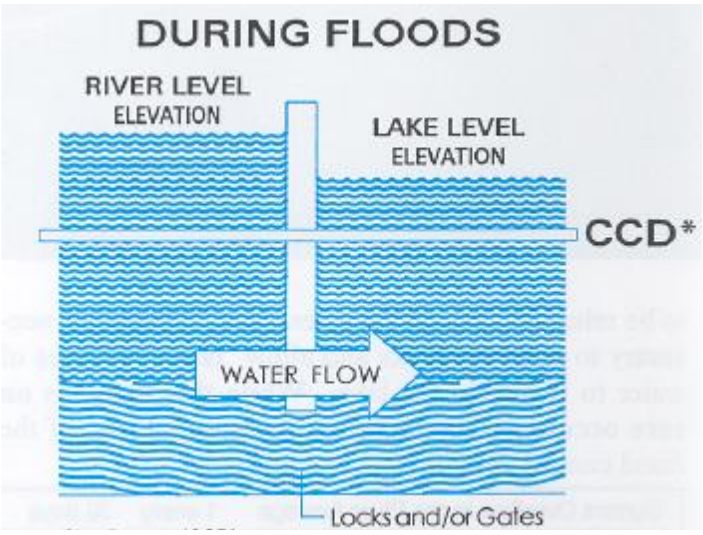


Figure 6 Source: MWRD

During a storm, while the river is rising, the locks remain closed until the level of the river approaches flood level **and is higher than the lake** (see Figure 7 below).

The decision to open or close the Wilmette gates **is made only by MWRD** (owner) based on the level in the river as described above. The MWRD communicates with the Village when the locks have been opened and closed.

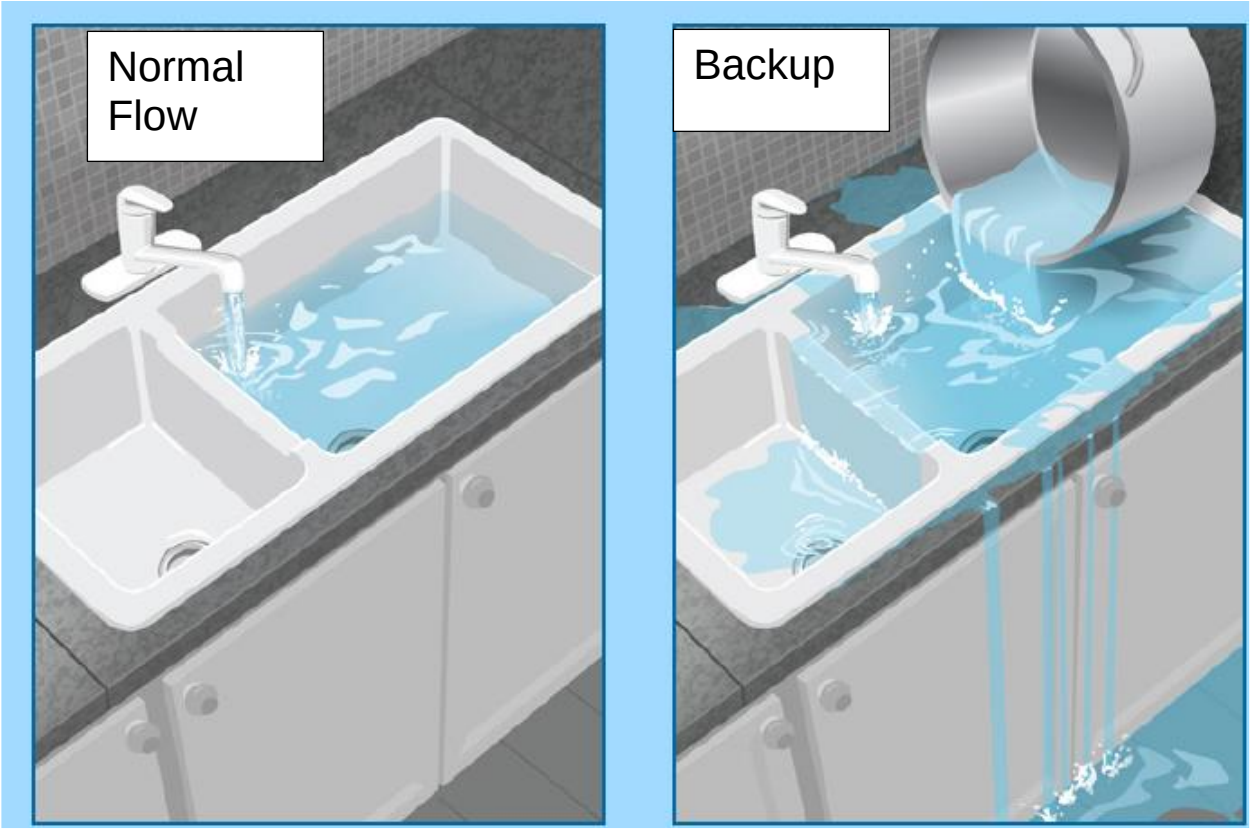


The combined sewer overflows released into the lake (mostly stormwater) comes from multiple neighboring communities depending on how widespread the storm and the intensity of the storm in a particular area. Wilmette's flows alone would not cause the locks to open and wastewater to flow into Lake Michigan.

Figure 7 Source: MWRD

What impact does opening the locks have on the east side combined sewer system?

Opening the locks will prevent the North Shore Channel from continuing to rise and flood properties downstream of Wilmette. Opening the locks, however, **will not** prevent sewer backups in basements or eliminate street flooding in Wilmette which are determined by the **flow capacity** of the Village's local sewer system. The Wilmette system might not be able to drain as fast as it is being filled (see the illustration below). Thus, opening the Wilmette locks does not translate into an immediate benefit to the Village's sewer system (the Village's system does not drain faster because the locks have been opened).



Additionally, the overflow of Wilmette's combined sewer system is hydraulically higher than the flood level of the North Shore Channel. Thus, the Wilmette sewer system will always continue to drain into the North Shore Channel, even during significant rain events when the river is at flood level and the MWRD locks are opened.

How does opening the Wilmette locks impact the drinking water?

The Wilmette water plant will receive notification from MWRD upon opening the locks. Generally, the plume of the water released stays south and far away from the water intakes. However, adjustment to the treatment (chemically) will be made and monitoring of the raw water quality will be performed.