



Water Management
Department

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DATE: October 16, 2017

TO: Timothy Frenzer, Village Manager

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

Subject: October 14th, 2017 Rain Storm

The purpose of this memorandum is to provide a summary of the October 14, 2017 rain Event, including the operation of the West Park Sanitary Storage Reservoir, Pump Over Lift Station (POLs), Stormwater Pump Station (SWPS) and Public Work's Response.

This rain event occurred between 3:00 AM on October 14th and 00:00 AM October 15th (see the attached rainfall trend).

The table below summarizes the total rain amount received on the west side of the town (SWPS) and the east side of the town (water plant) and recurrence interval, see attachment 2:

Location	Rain Amount	Duration	Recurrence Interval
SWPS	4.2"	~ 21 hour	7 - Year storm
Water Plant	3.8"	~ 21 hour	5 - Year storm

Public Work's Response

Public Works crews responded to 28 locations during the storm. A summary is as follows:

Number of calls	Problem	Resolution
3	Sewer Backups	All Private Sewer Issues
23	Street Flooding	Leaves blocking inlets
1	Street Flooding	Rodded Sewer
1	Poor Drainage in Alley	Engineering to Inspect Grading

All locations were addressed and streets clear by approximately 4:00am on Sunday morning.

During storm events, Public Works crews open manholes to inspect the level of the flow in the sewer systems (storm, sanitary and combined). Based on the inspected locations, none of the sewers were more than two-thirds full, and were flowing properly. The exception was the 3200 block of Sprucewood where storm sewer rodding was required to clear debris from a catch basin to the mainline storm sewer.

The Village's sewer systems responded as expected for rain events categorized as 5 to 7-year storm events. The highest hourly rainfall during the storm was 0.70 inches. The majority of the event rainfall was in the 0.10 to 0.25 inch/hour range, therefore the storm sewers were generally able to keep up with flows.

Separate Sewer System

The Wilmette sanitary facilities constructed from 2013 – 2015, which serves the area west of Romona Road (see attachment 1), prevented 3.5 million gallons (MG) of **sanitary water** from backing-up into basements during the storm event of October 14th.

Additionally, the check valve which prevents sanitary flow from the MWRD interceptor (from neighboring communities) from entering Wilmette's sanitary sewer system, was closed for 33 hours. While there is no way to determine how much sanitary water was kept out of the Wilmette system, the check valve has kept MWRD flow out of Wilmette's system for nearly 100 hours this year, thereby preventing a significant number of basement back-ups.

Pump-Over Lift Station (POLS)

Sanitary water started to enter the station at 6:00 am on October 14th. This indicates that the check valve on the 36" sanitary line had closed due to the MWRD interceptor being surcharged, thereby preventing any sanitary water from the MWRD interceptor entering Wilmette. Shortly after the station started filling, the sanitary pump of this station kicked on to pump over this check valve and relieve Wilmette sanitary water. This pump has the capacity of 700 gallons per minute (gpm) per the requirements of MWRD.

The pumping operation over the check valve ended about 3:00pm on Sunday, October 15th indicating that the MWRD interceptor was no longer surcharged. The total volume of sanitary water pumped over the check valve is approximately 1.4 MG.

No operational issues were observed at the POLS during this operation.

Note that when the Village's 36" sanitary sewer line, between the MWRD interceptor and the check valve, is full and surcharged, this does not necessarily mean that the rest of the Village's sanitary sewer system is surcharged. This is supported by the fact that there were no reported sewer backups as a result of sanitary system surcharging.

West Park Sanitary Storage Facility

The West Park station started receiving surcharged sanitary water from Manhole 7-52 starting around 7:30am on Saturday, October 14th. Sanitary water will overflow from the

manhole to the tank once the elevation level reaches above 607.5" elevation in that manhole (see attached West Park trend). Sanitary water will first enter the pumping sump (wet well), and as the sanitary water continues to flow, the level in the tank starts to rise.

The level in the pumping sump (wet well) reached about 10.4 feet and the tank level reached 5.0 feet by 6:30am on Sunday October 15th. (The difference in elevations is due to the pitch of the floor from the south to the north toward the pumps pit. The location of the level transducer in the tank is at the south side of the tank).

At these levels, the tank had approximately 2.1 MG of sanitary water during this event.

No operational issues were observed at the West Park Storage Facility during this event. The pumping down and cleaning of the station started on the morning of Monday, October 15th and is expected to last 48-68 hours.

Stormwater Pumping Station (SWPS)

The station was staffed from 5:00am on Saturday, October 14th to 6:30am on Sunday, October 15th. The table below shows the hours of operation of each pump at the SWPS and an estimation of the total **storm water** pumped to the Chicago River:

Pump	Capacity, gpm	Estimated hours of Operation	Gallons	MG
Pump 1	14,000	20.5	17,220,000	17.22
Pump 2	54,000	2	6,480,000	6.48
Pump 3	54,000	18	58,320,000	58.32
Pump 4	70,000	1.7	7,140,000	7.14
Pump 5	70,000	0	0	0
			Total	89.16

There were no operational or power issues at the SWPS during this event.

Combined Sewer System

The Village’s combined system connects to MWRD interceptors which flow to the MWRD treatment plant under normal conditions. Under severe storms, the interceptors overflow into the Deep Tunnel and then into the North Shore Channel. The 96" diameter Greenleaf Avenue relief sewer connects to MWRD and overflows to the Deep Tunnel. When the Deep Tunnel is at capacity, the 96" sewer overflows into the North Shore Channel at the Greenleaf junction chamber structure.

Lake Michigan is connected to the North Shore Channel but separated by lock and gate structures. Under normal conditions, the Chicago River levels are kept lower than Lake

Michigan. During heavy rain events, gates slow the release of excess river water into the lake. Under severe storm conditions, the locks may be opened by MWRD (the Village does not control whether or when the locks are opened) to provide a greater amount of storm relief into the lake.

MWRD opened the locks on Saturday at 1:47pm and closed them on at Sunday 9:02am.

Due to the height of the Village's outfall into the North Shore Channel, the Village's combined sewer system (east of Ridge Road) does not realized improved performance when MWRD opens the locks.

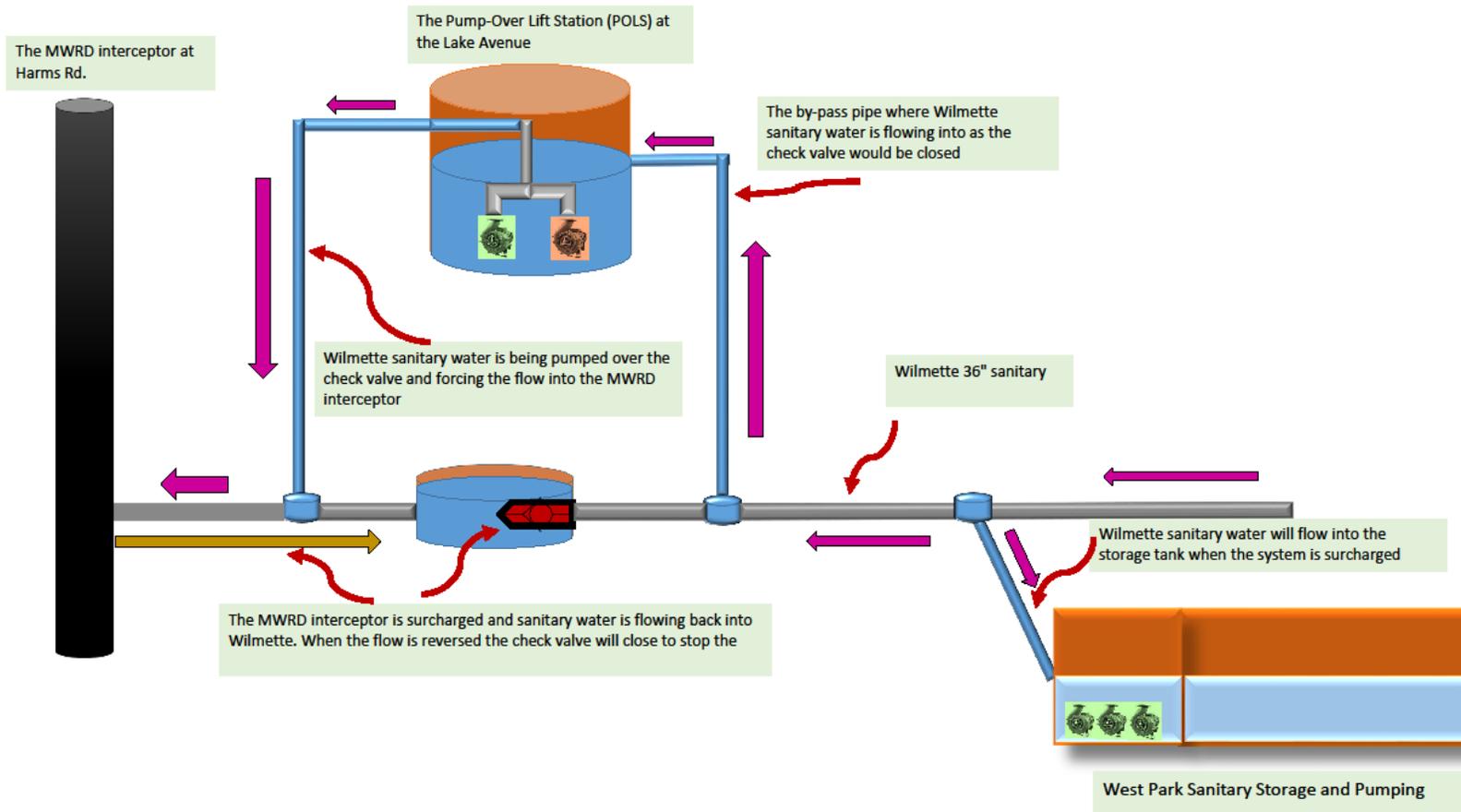
The following elevations demonstrate why there is no benefit to Wilmette residents when the MWRD locks are opened:

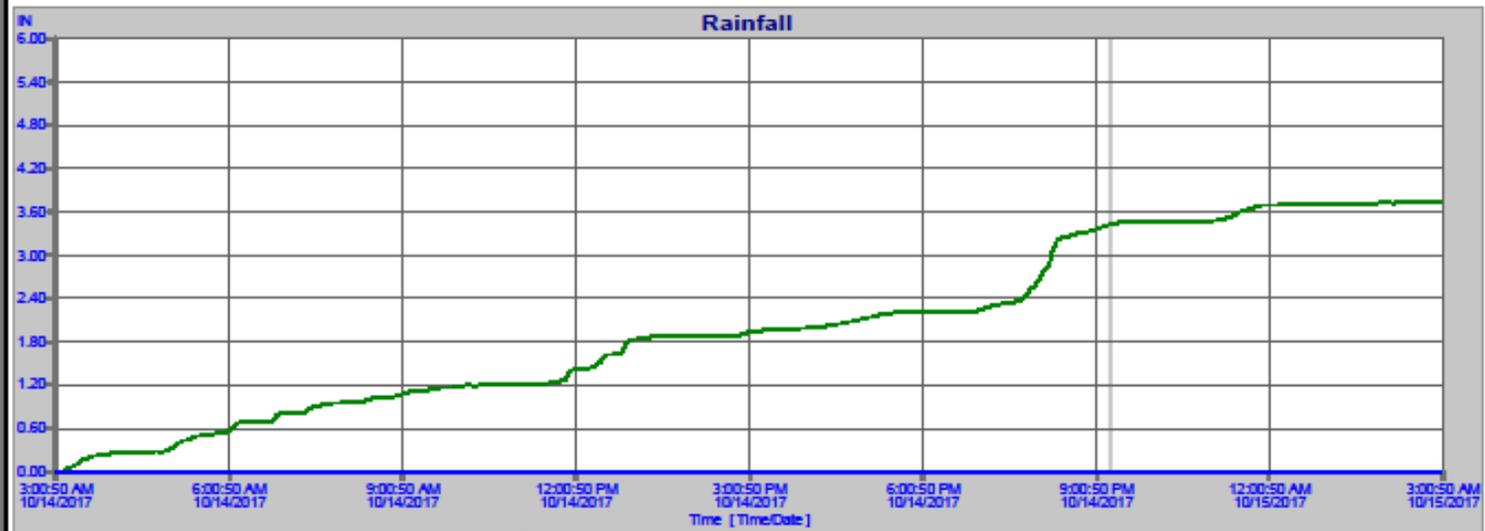
- 96" Wilmette invert at 4th and Greenleaf Avenue structure is 4.4' higher than the normal water line of the North Shore Channel.
- 96" top of Wilmette pipe is 12.4' higher than the normal water line of the Channel.
- MWRD opens the gates when the elevation of the Channel is 5.0' above the normal water line.
- 18" combined sewer invert at 4th Street and Greenleaf Avenue is 18.4' above the normal water line of the Channel.

These elevations clearly demonstrate that Wilmette's system is higher than the normal water elevation of the Channel and the high water elevation of the Channel that triggers flow reversal into Lake Michigan.

To summarize, during severe storms, MWRD sewers overflow into the Deep Tunnel and then into North Shore Channel. The Village's combined sewers flow into MWRD interceptors and Village relief sewers, all of which are higher in elevation than the North Shore Channel. This elevation differential forces flows to overflow into the North Shore Channel. Therefore, local flooding is due to the capacity of the combined sewers and not due to back pressure from the water elevation of the Channel.

West Park Sanitary Storage and Pumping Facilities Operational Schematic (MWRD Interceptor Surcharged)





Hist:SCADA:SWPS_RAINF_CV Storm Water Rain Gauge 0.00 Inches
Hist:SCADA:WPRAINF_CV Water Plan Rain Gauge 3.42 Inches

SWPS 0.00 IN WP 0.00 IN

Print Report

Signed: _____

Storm Date: _____

24:00:00 12:00:00

12:00:00 24:00:00

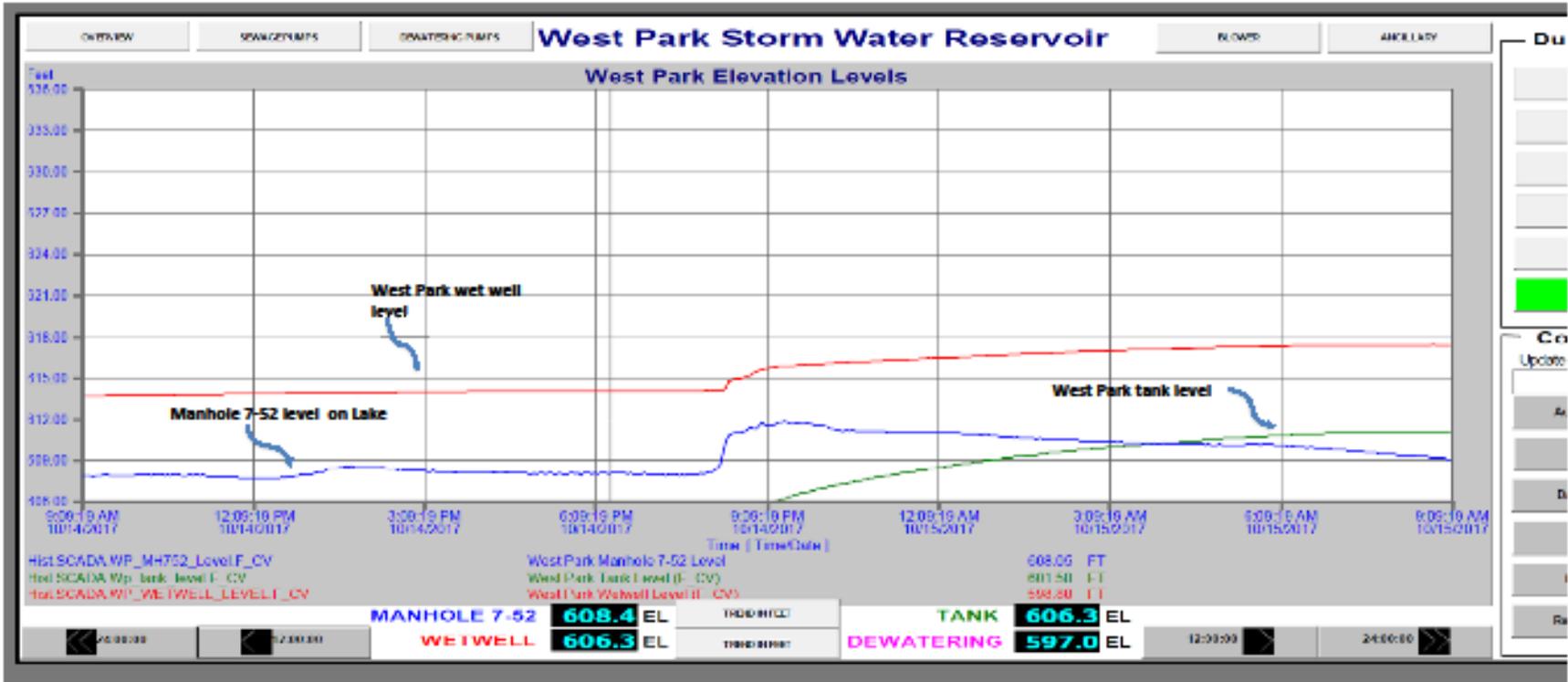
Duration

-
-
-
-
-
-

Configure

Update Rate (min)

2:00



The 36" Sanitary Check-Valve Closure Events in 2017

Date	Rain Amount	Storm Recurrence Interval	Rain Duration	POLS	West Park	
				Check-Valve Closure Duration	WW Level	Tank Level
March 30, 2017	1.53"	4 month	12	14 hours	5.3'	0
April 5-6	1.2"	2 month	22 hours	3.5 hours	2'	0
April 29-30	2.92"	1-year and 2-month	8 hours and 24 hours	8 hours	7.4'	2.2'
May 10, 2017	1.22"	4-month	4 hours	3 hours	1.2'	0
June 28-29	1.81"	2-year	2 hours	4 hours	5.1'	0
July 11-12	2.85"	3-year	12 hours	21 hours	9.4'	4'
July 20, 2017	0.4" & 1.6"	1 year	1.5 & 2 hours	6 hours	4.2'	0
July 22, 2017	1.2	2-month	9 hours	6.5 hours	2.2'	0
October 14, 2017	4.2"	7-year	21 hours	33 hours	10.4'	5'