

AGENDA REPORT

SUBJECT: Report on July 22-23, 2011 Storm and Flood Event and Stormwater Management Strategies

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Introduction

In the week since the rain storm that inundated the Village late Friday night and early Saturday morning on July 22 and 23, Village staff has focused on four key tasks: (1) to make sure that Winnetka's citizens received prompt and courteous assistance in dealing with the aftermath of the storm; (2) to take all necessary steps to compile and transmit information documenting the extent of damage so as to maximize opportunities for State and/or federal aid; (3) to provide information to residents as soon as it becomes available; and (4) to analyze the event so as to provide the Council and community with a full report of what transpired and what actions can be taken to reduce future risks of recurrence. This Agenda Report focuses on the fourth task.

Description of the Storm and How the Rainfall Was Managed

1. What happened?

In the overnight hours of July 22-23, the Village of Winnetka was impacted by a significant rainfall that overwhelmed the Village's sewer systems and led to severe flash flooding and basement flooding throughout the Village. A Cook County Precipitation Network rain gauge located in southwestern Winnetka, which remotely records precipitation in 10-minute intervals, recorded 3.99 inches of rain between 11:00 p.m. and midnight on July 22, including 0.98 inches between 11:40 p.m. and 11:50 p.m. alone.

The heaviest rainfall occurred between 11:00 p.m. and 1:30 a.m., during which time 5.99 inches of rain fell. According to the County rain gauge, a total of 6.61 inches of rain fell by the time rain completely stopped at 10:00 a.m. Saturday morning. Preliminary data from a Winnetka Park District weather station located on the golf course indicated rainfall from the storm of nearly 7 inches. (See Attachment 1 for rainfall data.)

2. How does our system work?

With the exception of a narrow strip along and west of Green Bay Road, Winnetka is what is known as a separate-sewer community, meaning that there are two separate sewer systems. The storm sewer system collects stormwater runoff from streets and yards,

downspouts, and sump pump discharges, while the sanitary sewer system collects wastewater from interior plumbing systems.

The Village's storm sewers drain either to the Skokie River and its tributary, the East Diversion Ditch, or to Lake Michigan. Although the two watersheds are generally divided by the Union Pacific Railroad tracks, an area around North Shore Country Day School does drain east under the railroad towards Lake Michigan.

The Village's sanitary sewers drain to a network of intercepting sewers operated by the Metropolitan Water Reclamation District of Greater Chicago ("MWRD"). These intercepting sewers convey wastewater to the North Side Treatment Plant located near Howard Street and McCormick Boulevard in Skokie, where it is treated and discharged to the North Shore Channel and, ultimately, to the North Branch of the Chicago River.

3. What about the Wilmette Locks?

If there is a most frequently asked question received by staff, it is: "Have the Wilmette Locks been opened yet?" or some variant thereof. The "locks" at Wilmette Harbor actually refers to a 32-foot gate mechanism that operates as a level control on the North Shore Channel. In its normal closed configuration, this gate prevents treated or partially treated sewage from flowing into Lake Michigan, instead directing wastewater and stormwater south into the North Branch of the Chicago River. When the gate is opened, a combination of wastewater and stormwater is directly discharged to Lake Michigan.

According to the MWRD, the primary purpose of opening this gate is to prevent overbank flooding on the North Shore Channel and the North Branch of the Chicago River, by allowing a second outlet for the channel. As reported in the Chicago Tribune, the gate was opened at approximately 2:20 a.m. on Saturday morning. An additional gate at Navy Pier was opened approximately one hour later. This was done to prevent serious overbank flooding along the Channel and the North Branch of the Chicago River.

Opening the gate at the Wilmette Locks does not affect either the level of Lake Michigan or the level of the Skokie River, meaning that the Village's storm sewer systems are completely independent of this gate. It is less clear whether this operation has any effect on the operation of the Village's sanitary sewer system.

4. What worked?

The Village operates stormwater pumping stations at Tower Road, Sunview Lane, Ash Street, Mt. Pleasant Street, Evergreen Lane, and Winnetka Avenue. None of these pump stations lost electrical service during or after the storm, and based on staff observations and on pump hour meters (where equipped), each of the pump stations, with the exception of the Ash Street pump, functioned during and after the storm.

5. What didn't work?

The area between Hibbard Road, Glendale Avenue, Oak Street, and Willow Road is tributary to a stormwater pump station located at Ash Street and Hibbard Road. Stormwater is

discharged to a control structure on the west side of Hibbard Road to drain into the Hibbard Road storm sewer, with an overflow accommodation to drain to Duke Child Field.

The pump station at Ash and Hibbard failed at some point during the storm when debris in the storm sewer system became clogged in the pump and jammed the impeller. The pump was reset, but continued to clog and had to be removed, manually cleaned, and reinstalled in the lift station. This operation took approximately 1 hour, and was completed by about 1:00 p.m. on Saturday. Once the pump was reinstalled, and because of the amount of water that had accumulated in the watershed, additional pumping capacity consisting of 6 portable pumps with discharge hose diameters ranging from 2 to 4 inches was employed. These 6 portable pumps were operated from about 3:00 p.m. on Saturday until about 1:00 a.m. Sunday morning, when the water level dropped sufficiently that the single underground pump could sufficiently drain the system.

6. Damage Data

The Village received 219 emergency service calls during and immediately following the storm. These calls dealt with a variety of issues, including tree damage and power outages, but the vast majority of the calls were for flooding of streets and basements.

There was particularly widespread basement flooding as a result of the storm. Some basements flooded because sump pumps failed or were overwhelmed by the amount of water coming in, many basements flooded as a result of sanitary sewer backups, and other basements flooded directly, as a result of water overtopping foundations or flowing in through window wells.

A complete and accurate count may never be available; however, a count of the debris piles placed on the parkways on the Monday and Tuesday after the storm indicated 749 such piles. This is likely an undercount, given that piles were still being placed out on Friday, July 29, after the storm. (See Attachments 2 and 3 for location maps showing the location of emergency calls and of debris piles counted on Monday and Tuesday.)

Possible Engineering Solutions for Severe Rain Storms

1. What type of system would be required to handle the recent storm?

Christopher Burke Engineering was asked to perform a rough calculation of the detention volumes needed to accommodate a 100-year level of flood protection for just the northern and southern study areas in the 2009 assessment.

The 2009 study recommended constructing 10.4 acre-feet of detention located at Duke Child Field. To accommodate the 100-year storm, for both areas, a total of 101.6 acre-feet of storage are necessary, a nearly tenfold increase. In addition, larger conveyance systems would be required to move the water to the proposed detention facilities.

2. How would the \$14.1 million improvements have handled the July 22-23 storm?

The recommended improvements from the 2009 and 2011 Flood Risk Reduction Assessments were designed to alleviate flooding for up to the 10-year design storm event. The July 22-23 storm produced twice the rainfall depth used to design those recommended improvements.

Christopher Burke Engineering modeled the July 22-23 storm across the proposed improvements, assuming that all of the recommended improvements had been implemented, and determined that the improvements would have provided little flood reduction for this event. For example, Cherry and Berkeley, the two Greenwood areas, Pine east of Hibbard, Spruce east of Hibbard, the Sunset pedestrian walkway, Oak and Sheridan, the Ravines, the upper Provident areas, and the Winnetka underpass all would have flooded to within 0.3 feet (3.5 inches) of what occurred on July 22-23. Only Maple and Sheridan, and the Tower Manor area (assuming these improvements were added to the recommendations) showed significant reductions.

3. What has already been done?

Since 1985, the Village has invested significantly in storm and sanitary sewer improvements. In 1985, the Village undertook a \$4 million+/- Sanitary Sewer Rehabilitation Program that resulted in correcting broken, leaking, and undersized sanitary sewers Village-wide through sewer replacement, lining, cross-connection elimination, and a new pumping facility at the bottom of the Sheridan Road Ravines to eliminate sewage overflows to the Lake. The Village has also performed multiple and ongoing sewer lining projects to restore and seal sanitary sewers using trenchless methods. The Village has also completed the following storm sewer improvements since 1994, at a cost of \$3,567,000:

Winnetka Ave Pump Station (1994)	\$505,000
Sub-area 8 Improvements (1995)	\$354,000
Hibbard Road Improvement (1998)	\$414,000
Spruce Street Outfall (2001)	\$118,000
Tower Road Improvements (2002)	\$551,000
Golf Course Improvements (2003-04)	\$416,000
Ravines Outfall (2004)	\$147,000
Sunview Lane Improvements (2005)	\$230,000
Tower Pump Station (2005)	\$50,000
Cherry Street Outfall (2005)	\$186,000
Ash Street Improvements (2008)	\$151,000
Spruce Street Improvements (2008)	\$445,000

Possible Next Steps

Clearly, the question of the day is “Now what? What can we do to eliminate or reduce the chances of this happening again?”

1. Redirect Cost-Benefit Analysis.

The Village has already engaged Christopher Burke to perform a Cost-Benefit Analysis of the recommended improvements to prioritize what should be done first, for a fee of \$14,800. Given what occurred last week, this analysis is no longer relevant, and Staff recommends that this contract be immediately re-directed to an analysis of the Sunset/DeWindt study area and the Northern Study area (Pine to Willow east of Hibbard) to identify possible improvements that would provide effective flood damage risk reduction for larger storms including the 25-year, 50-year, and 100-year rainfall events.

The deliverable of this contract would be a technical report and exhibits detailing flood conveyance and storage improvements to protect low-entry elevations within the selected watershed for the 25-year, 50-year, and 100-year events. Staff is identifying these two areas for the basic reason that these areas were inundated for the longest period of time, and to the greatest extent. This is not to say that other areas were not affected severely, but the magnitude and duration of flooding in these areas was extreme. This is the same reason why these two drainage areas were selected for the initial analysis after the 2008 flood event. A third area, the Greenwood area, could be included in this analysis for an additional \$2,000, and the Tower/Foxdale area could likewise be added for an additional \$3,000. Depending on the areas selected, the cost range for this work would be \$15,000 to \$19,000. Staff will provide a formal cost proposal for Council consideration at the August 2, Council meeting.

2. Identify and Pursue Open Space for Detention.

It is anticipated that providing larger-scale flood protection will require significant storage of floodwaters, using all available open spaces. Unfortunately, all of the larger open spaces suitable for detention are owned by other governmental units, including New Trier High School (Duke Child Field), District 36 (Skokie-Washburne field), the Winnetka Park District (Skokie Playfield, Crow Island Park/Woods, Corwin Park), and the Cook County Forest Preserve.

While open space is very useful for stormwater detention, it also has other passive and active uses, and the landowning agencies have missions other than providing stormwater relief. The Village will need to engage in serious, direct, and ongoing dialogues with these agencies to either acquire or obtain usage rights to all suitable open space to construct stormwater detention facilities.

It is important to note that the \$14.1 million for the currently proposed project does not anticipate land-acquisition costs, which could be significant.

Options for Financing Stormwater Improvements

As the Village evaluates the level of stormwater improvements, there are options available for financing those improvements. As of the latest report, the amount of funding required is approximately \$14 million, which would require additional financial resources to accomplish.

Costs associated with stormwater improvements include engineering for the design of improvements, acquisition of retention land, regrading of land, and the installation of storm sewers, and pumps.

The following options for financing storm water improvements fall into three categories: User Fee, Property Tax, and Use of Reserves.

1. User Fee: Create a Storm Water Utility

Under Home Rule powers, the Village could establish a stormwater utility to finance storm water improvements. The stormwater utility is an exceptionally flexible way of paying for storm water improvements and can be customized as desired.

The charge could be a fixed fee spread evenly among all property owners or could cover just select areas of the community. The fee could also be based on other factors, such as the relative amounts of impervious surface on individual parcels. The charge could be added to utility bills and collected with other utility payments.

Storm water utilities are becoming a more common means of paying for storm water improvements because their benefits such as:

- Providing a reliable source of funding;
- Being essentially a user fee leading to equitable cost assessment;
- Being able to increase or decrease funding quickly to meet needs;
- Using the proceeds to pay for capital projects, equipment, maintenance, and compliance; and
- Addressing unfunded federal mandates related to storm water.

A stormwater utility would generate a revenue stream that would be dedicated towards improving specific infrastructure needs. As with the Village's electric utility, a stormwater utility can have a flexible structure of rate categories. The various rate structures can be scaled to reflect land use categories and take into consideration zoning districts or development patterns. The rate structure can also be adjusted to reflect the potential use of General Fund Reserves, benefits derived from jurisdictional transfers from the State of Illinois, and the potential receipt of any grant funding or intergovernmental collaboration.

The following table delineates the costs of issuing \$10-, \$15-, and \$20-million dollars in debt and what that would cost residents, assuming those costs were to be split equally among all parcel owners. For example, a \$15-million dollar project spread over 20 years would cost about \$246.67 per year per parcel (bold amount on chart).

	Total Amount Financed	Annual Cost **		
		10 Year Level Debt	15 Year Level Debt	20 Year Level Debt
Debt Total	\$ 10,000,000	\$ 1,230,000	\$ 900,000	\$ 740,000
Per Parcel (4,500) *	\$ 2,222	\$ 273.33	\$ 200.00	\$ 164.44
Monthly		\$ 22.78	\$ 16.67	\$ 13.70
Debt Total	\$ 15,000,000	\$ 1,845,000	\$ 1,350,000	\$ 1,110,000
Per Parcel (4,500) *	\$ 3,333	\$ 410.00	\$ 300.00	\$ 246.67
Monthly		\$ 34.17	\$ 25.00	\$ 20.56
Debt Total	\$ 20,000,000	\$ 2,460,000	\$ 1,800,000	\$ 1,480,000
Per Parcel (4,500) *	\$ 4,444	\$ 546.67	\$ 400.00	\$ 328.89
Monthly		\$ 45.56	\$ 33.33	\$ 27.41

* Parcels including residences, commercial, and governments assumed at

4,500

** Based on the following present value factors, 4% interest:

0.123

0.090

0.074

Over the past several years, there has been an increase nationally in the creation of stormwater utilities, as municipalities have sought to mitigate the impact of flooding upon private as well as public properties. The creation of these utilities reflects an accepted method for equitably assessing the costs of the system toward solving a problem that affects an entire community, not just the properties that are directly impacted.

Recommendation:

A storm water utility is recommended if significant storm water improvements are pursued.

2. Property Tax Options

A. Special Service Area

The Village could finance the improvements by defining the areas improved and assessing a charge to properties in that area. This financing option allocates the cost based on the assessed value of the properties in the special service area.

The special service area has several benefits: it is a reliable source of on-going funding, the costs are assessed against the properties that benefit from the improvements, the tax can be

adjusted annually, and it is easy to explain to customers. The fees also rebalance themselves as property values increase in the areas improved.

The following table delineates the costs of issuing \$10-, \$15-, and \$20-million dollars in debt and what that would cost residents. The following table is based on a homeowner with a current total property tax bill of \$20,000, of which the Village portion is about 13.1% or \$2,635.

	Total Amount Financed	Annual Cost **		
		10 Year Level Debt	15 Year Level Debt	20 Year Level Debt
Debt Total	\$ 10,000,000	\$ 1,230,000	\$ 900,000	\$ 740,000
Annual Cost		\$ 247.00	\$ 181.00	\$ 149.00
Debt Total	\$ 15,000,000	\$ 1,845,000	\$ 1,350,000	\$ 1,110,000
Annual Cost		\$ 371.00	\$ 271.00	\$ 223.00
Debt Total	\$ 20,000,000	\$ 2,460,000	\$ 1,800,000	\$ 1,480,000
Annual Cost		\$ 495.00	\$ 362.00	\$ 298.00

* Assumes \$20,000 property tax bill, \$2,635 Village portion, or 0.020106% of total Village Property Tax Levy.

** Based on the following present value factors, 4% interest: 0.123 0.090 0.074

The downside to using a property tax method is that the costs are directly proportional to property values as determined by the County, which is not necessarily related to the nature and extent of the benefit received. Additionally, if the size of the area paying for the improvement is relatively small, the cost per parcel can become prohibitively high.

Recommendation:

Special service areas are an option to address localized problems that are not community-wide problems.

B. Increase Village-Wide Property Taxes

The Village has increased property taxes less than most other governmental entities that tax our residents. From 1997 to 2009, staff estimates that while, overall, property taxes increased by about 74%, the increase in the taxes levied by the Village over the same time period was about 34%, less than half the overall rate.

Currently, the Village portion of a typical property tax bill is approximately 13%. The Village could raise property taxes an extra 3% each year for three years. If those dollars were dedicated for storm water purposes, at the end of three years, the Village would have a revenue stream of \$1,170,000. A \$1,170,000 annual revenue stream could support about \$15,600,000 of bonds (assuming a 20 year term and 4% interest rate).

While property taxes generate additional revenues, there are many concerns with this option, including: property tax increases are not popular, properties would be assessed based on the tax value of the parcel rather than on the extent that they contribute to the problem or benefit from the improvement, and tax exempt entities would not be required to pay.

Staff would estimate that a homeowner with a \$20,000 total property tax bill would pay an additional \$79.02 annually for a 3% increase in the Village's portion of the property tax levy (\$20,000 total x 13.17% Village portion x 5% = \$79.02).

Recommendation:

Given the community sensitivity to property taxes, staff does not recommend this option.

3. Strategic Use of General Fund Reserves

As of March 31, 2011, the Village's General Fund had an available cash balance of \$17.23 million¹. The Village's policy is to maintain a minimum cash balance of at least \$11 million for operational needs and to allow for unforeseen events. Maintaining an appropriate fund balance is prudent, given the age of the Village's infrastructure, the desire to potentially fund other projects (downtown repairs, sanitary sewer repairs, roads, and other infrastructure needs), and the current economic environment.

If the Village were to determine that almost all of the discretionary General Fund reserves should be dedicated for storm water improvements, up to \$6.23 million could be available. However, if all \$6.23 million were allocated to storm water improvements, few if any reserves would be available to pay for other capital projects or meeting exigent circumstances.

Recommendation:

Staff would suggest that up to \$5.0 million of reserves could be used to fund storm water improvements on a 1:3 matching basis with any new revenues created or bonds issued for storm water improvements (i.e., for every \$3 of new revenues or \$3 of bonds issued, \$1 of General Fund reserves would be used).

4. Other Considerations

The Village can also issue debt under each of the above options. This process takes approximately three to four months to accomplish. Debt provides a source of funds that allows a municipality to complete a project in the near term and pay for that benefit over an extended time period. This is similar to buying a home and amortizing that cost over the term of the mortgage.

Stormwater improvements tend to have a long life, exceeding 30 years, which makes the use of debt an appropriate instrument for such expenditures. This allocates the cost of these

¹ Calculated as \$19.87 million on page 7 of 3/31/2011 CAFR, less deposits payable (\$1.57 million), accounts payable (\$.61 million), and due to other funds (\$.46 million) = \$17.23 million.

improvements over time to those who will likely benefit and avoids making current residents pay the full cost of benefits they might not receive if they move.

A rough calculation can be made to estimate how much debt a given revenue stream can support. For every \$75,000 of annual revenue created, \$1,000,000 of bonds can be issued assuming a 4% interest rate and 20 year repayment schedule. A 15-year repayment schedule requires about \$90,000 of annual revenue.

The Village has about \$140,000 of annual debt service that will cease in calendar year 2015. This \$140,000 would support about \$1.8 million in bonds, assuming a 20 year repayment schedule.

Potential Service Enhancements

1. Backflow Prevention Program.

In 2006, as a means of helping property owners protect their property from sewer backups, the Village of Winnetka instituted a program to participate in the cost of installing backflow prevention devices on individual sanitary sewers. A backflow prevention device consists of a one-way valve placed on the sewer line serving a building that prevents sewage from flowing back into a building's basement. Outgoing wastewater is pumped around the one-way valve into the system. These systems are very effective, but not fail-safe, in preventing basement flooding of the type experienced by some residents during the July 22-23 flash floods.

The program also provides reimbursement for homeowners that wish to convert their homes to overhead sewer. This is a more robust project that eliminates any below-ground direct connections to the sanitary sewer by the use of an ejector pit and pump that collects wastewater from basement plumbing and floor drains and discharges and pumps it out to the sewer system. Ground-floor and upper floor plumbing continue to drain via gravity. This is significantly more expensive, but is also more reliable as a protective measure. All new construction is built with overhead sewer by code.

Since the Village has instituted the program, 13 applications for reimbursement have been submitted, at an average system cost of just under \$6,000 per installation. The most expensive installation for which reimbursement was requested was \$11,885. The Village's reimbursement level is 50% of the cost up to a maximum reimbursement of \$2,500. Given the effectiveness of these systems, it is reasonable to say that if more homeowners had taken advantage of this program, fewer basements would have suffered flood damage.

As a means of encouraging more homeowners to take advantage of this program, staff is proposing two possible modifications to this program for the Council's consideration.

The first modification is to increase the Village's maximum reimbursement cap to cover more expensive installations, perhaps capping the Village's reimbursement at \$4,000 or \$4,500. Of the 13 reimbursement requests, nine were capped at less than 50% of the installation cost.

The second modification would be for the Village to jointly bid the program to establish standard, and hopefully reduced, costs for installing a backflow prevention system. The

Village's purchasing power could be used to provide a resident potentially better pricing than they could obtain on their own.

2. Floodproofing Assessment.

In several cases of basement flooding, water entered the basement through specific locations or entry pathways, such as a low window well or entry point. These situations could possibly be addressed by individual property improvements, rather than by area-wide infrastructure improvements.

Staff recommends that the Council consider the possibility of providing a Village-wide program whereby homeowners could receive an individual property flood protection assessment. Such a program anticipates a site visit by an engineer, internal and external property inspections, and a flood risk reduction report containing recommendations to reduce the risk of flooding for a property owner. The property owner would then be free to act on the report as they wish, implementing some, all, or none of the recommendations. The Village could administer this program by competitively soliciting proposals from engineering firms to provide a standard property evaluation fee, which could be paid for in full by the Village, in full by the property owner, or some combination thereof.

Recommendation:

1. Provide policy direction on Possible Next Steps (p. 5, points 1 and 2).
2. Provide policy direction on Recommendations (pp. 7, 8 and 9).