DATE: July 25, 2016

TO: Mayor and Village Board

FROM: Randy Recklaus, Village Manager
Tom Kuehne, Director of Finance
Jim Massarelli, Director of Engineering
Scott Shirley, Director of Public Works

SUBJECT: Analysis of Stormwater Control Studies

Introduction

The three recently completed Stormwater Studies provided a large volume of information to analyze. The studies attempted to define relatively uniform stormwater service levels across the community. The studies also identified potential improvements that would help the Village achieve those service levels, and the projected cost of the improvements. It should be noted that despite the large scale and high cost of the improvements identified, they are not designed to provide complete protection against a storm event like the one the Village experienced in 2011. If a storm with a similar intensity and duration occurred again, it is likely that extensive damage would still occur with or without the implementation of the improvements identified.

The Village must determine which of the improvements should or should not be pursued, considering the costs and benefits of each project. In addition, the Village must identify potential sources of funding for any improvements to be pursued. Given the complexity of our stormwater system and its impacts, these are not easy tasks.

Staff has been reviewing and organizing the data from the current stormwater studies. This memo will provide Village Staff's analysis of that information and a recommended process for acting on the concepts provided in the studies. Staff's analysis to date will be presented in detail at the August 1st Village Board meeting. It is our hope that the Board will be able to provide feedback and guidance to staff on some key issues (to be outlined in this memo) at that meeting.

Given the inter-related nature of the challenges presented by the stormwater studies and identified improvements, this memo will give a broad overview of each of the key challenges that must be addressed prior to decision making, and how they affect one another. After that overview, Staff has outlined a number of unanswered questions for each topic area, for which Staff would ask feedback and guidance at the August 1st Village Board meeting.

After the Board discussion, much work will still need to be done given the scale and complexity of the potential stormwater improvements identified. Staff will develop a recommended action plan in late 2016 based upon the direction given by the Board on August 1st. The goal will be to put the Village in a position to begin planning for any major stormwater improvement program as part of next year's Capital Improvement Planning process, including the identification of funding.

The following challenges to be discussed and resolved prior to the development of an action plan have been identified by staff.

How to Categorize Projects – Key Challenge 1

One of the challenging aspects of implementing any major improvement plan is being objective for all sections of the Village. This project is no exception. The three studies that were completed were separated into Combined Sewered Tributary Area (CSTA), prepared by CDM Smith, and Separate Sewered Areas (SSA), prepared by Christopher Burke, and a letter report issued last week that analyzed the Cypress area (also separately sewered). The combined sewer area drains storm water and waste water within the same conduit through the Village's combined sewer network discharging to TARP (deep tunnel), and then to the Metropolitan Water Reclamation District (MWRD) treatment plants, while the separate sewered areas drain storm water through storm sewers to a creek/stream, and waste water through sanitary sewers to the MWRD treatment plants.

Each of the areas have unique issues that create challenges in attempting to compare the proposed enhancements. The one issue that is difficult to evaluate is the level of service in the CSTA vs. level of service in the separate sewered area. The CSTA was developed prior to the development of detention basins. The CSTA conveys both rain water and sanitary flows in the same pipe. Within the CSTA, the storm water control (combined sewers) provide between a 10 - 25 year level of service. The sanitary service line that connects a house to the combined sewer will also act as a conduit for excess storm water to enter the house, which is how basement backups occur. One important item of reference is that a home in the CSTA can prevent sewer back up from occurring during extreme storm events by installing overhead sewers. In the separate

sewered areas, a design for the 100 year storm event is achieved with the installation of storm water control/detention basins.

The effort to categorize the types of potential improvement produced three sub-categories of the impact of stormwater on a home or neighborhood. The first sub-category, Structure flooding, has the most negative impact to homes. Once water enters the lower level of a structure, the potential damage can range from walls, furnaces and water heaters to personal belongings such as furniture, stored items and floor coverings. Structure flooding includes basement back-ups. The next sub-category is standing water greater than one foot in depth. This category impacts the ability of vehicles from traveling safely on the roadway. This is most significant to emergency vehicles but also affects the residents' ability to leave their home. An additional concern is the 'wake' effect created when vehicles try to navigate the deep water. The wakes can exacerbate the impact of the flooding above the level of the standing water. The third sub-category is street flooding less than one foot. This sub-category has the least negative impact but still creates a safety issue. As a note, detention facilities on parking lot surfaces are currently allowed to be designed with a maximum depth of one foot.

Exhibit 2 has the number of residences' that are affected by each of the sub-categories.

Evaluating Cost Effectiveness of Improvements – Key Challenge 2

The first step in evaluating the cost effectiveness of any proposed flood control improvement is to establish a value for the property damage prevented by a specific improvement. What could also be factored into the benefit side of this equation is the value of the "peace of mind" a flood control improvement would provide to the benefited residents. For purposes of moving forward, no monetary value will be assigned to this intangible "peace of mind" benefit.

Based on the feedback from the questionnaires returned after the July 23, 2011 storm event, the average reported damage in the effected single family homes was approximately $8,500 (adjusted to today's dollars). It should be noted that the calculation of this average is completely unscientific and does not represent all of the survey respondents, as many did not give a dollar value. Furthermore, we know that the survey was not responded to by all the property owners that had predicted backups based on the CDM Smith analysis. Some of these homes may have installed overhead sewers or back-up control without permits or before the Village's cost sharing program was implemented. However, Staff also believes that many homeowners do not report back-ups to the Village.

On the cost side of the cost/benefit analysis, the projected improvement costs are relatively easy to estimate. The costs can also be adjusted to be more accurate as time

goes on with inflation adjustments. Unfortunately, the benefit calculation is more difficult as was alluded to previously. Every resident will assign a different value for damage, to restoration, and to peace of mind.

In the combined sewered areas where basement backups are the concern, quantifying the number of benefited properties is relatively straight forward, and we believe accurate. For purposes of this analysis, any water in any living unit is considered "structure flooding".

The bigger challenge is estimating the number of homes/properties that are used in the cost/benefit calculation for ponding or street flooding problem areas. The reason that this is difficult to estimate is that a definition has to be established for what level of water on Village streets is acceptable. After discussions, staff decided that for purposes of street ponding, up to 1 foot of water on pavement is considered acceptable for two reasons. First, emergency vehicles can cross up to one foot of water with minimal chance of becoming damaged, as 12" near the typical curb height equates to around 9" in the center of the road. Second, our restricted pavement areas in the CSTA are designed to allow up to a maximum of 12" of temporary water ponding on pavements and parking lots. This level is seldom seen, and to our knowledge we have not experienced these levels in the CSTA at this depth since July 23, 2011.

COMBINED SEWER TRIBUTARY AREA (CSTA)

The CDM Smith report went into great detail analyzing the eight problem areas, proposed improvements for each and the cost per home protected. The report summarizes potential improvements necessary to bring the problem areas within the CSTA up to a 10-year service level of flood protection. The most intense rainfall in the 10-year service level was the 2.1 inches in 1-hour rainfall. The analysis revealed that the current level of service within the problem areas of the CSTA provides protection for basement backups for 1.8" in a 1-hour rain event (with a ± 15% level of accuracy, or 0.3 inches). Outside the problem areas, the system meets the desired service level.

The following paragraphs summarize the various alternatives for all the problem areas in the CSTA. For the basement backup areas, there are relief sewer 'only' options and overhead sewer/relief sewer options. For the overland flow problem areas, there is only a relief sewer option.

The 'relief sewer only' improvement alternatives consist of the installation of new enlarged local combined sewers to provide additional capacity and diversion connections from enlarged combined sewers to existing sewers to make use of available capacity. Construction of new relief sewers provides the system with additional capacity and the improved level of service. A regional relief sewer provides protection to a determined level of service and all properties tributary to the relief sewer benefit from

the improvement. However, larger rainfall events that exceed the Village's design event could exceed the new relief sewer capacity and still result in basement backups in these and other areas of the Village.

The total estimated cost of the 'relief sewer only' alternative is approximately $13 million.

In keeping with the Village Board's decision in 2001 to fund a cost sharing program for the installation of overhead sewers within individual private properties, CDM Smith was tasked with investigating the impact of this scenario in the eight basement backup problem areas.

Once the model of the CSTA was developed, CDM Smith evaluated the impact if all affected properties within each problem area installed overhead sewers. Prior to the development of the model, it was not possible to evaluate the effect this would have on adjacent properties. When an overhead sewer improvement is completed on a house, the property increases its flood protection significantly by raising its lowest possible opening several feet (therefore not affected by higher Hydraulic Grade Lines (HGLs). HGL is the engineering term for the pressure and flow depth of water in a sewer.

Development and evaluation of the overhead sewer improvements for each problem area identified that although the overhead sewers provided a more robust way to address basement backups, several of the problem areas still experience high HGLs during the design event. To reduce HGLs during the design events, a relief sewer component was added to the overhead sewer improvements in those problem areas where warranted. Therefore this alternative is being referred to as the overhead sewer/relief sewer alternative to distinguish it from the 'relief sewer only' alternative described earlier.

Because of the impracticality of installing overhead sewers in commercial properties, two of the areas were not evaluated for overhead sewers and only include a relief option for this analysis. The estimated cost of the installation of relief sewers in the overhead sewer/relief sewer alternative is approximately $11 million. This estimated cost for the overhead sewer/relief sewer alternative assumes the Village continues its overhead sewer cost share program with homeowners and therefore the total private component of the cost is not included in the $11 million figure.

If the Village were to fund 100% of the private property overhead sewer improvements, the approximate $11 million cost for this alternative would increase to approximately $15.5 million.

In addition to the eight problem areas in the CSTA with re-occurring basement backups, three additional locations were identified that experienced street ponding that causes

structure flooding during intense rain events. It should be noted that these areas were analyzed using the most intense one-hour rainfall event (2.59") for a 25-year service level. The current design standard for separate storm sewer areas is for 100-year protection, but this is not feasible in a combined system because of the complications posed by the detention of combined sewage and because storage is provided by Metropolitan Water Reclamation District's Deep Tunnel. The consultant reviewed potential improvements at the 10-year and the 25-year protection level. Staff determined that providing the 25-year protection level was the lowest level of protection that resulted in passable levels of water on pavements to facilitate emergency vehicle access. Additionally, a number of these areas cannot be controlled by inlet restriction, due to their proximity to State and County owned roadways.

Alternatives for implementation of improvements at the three street ponding locations to provide protection from severe street ponding and structural flooding for the 2.59 inches in 1-hour storm events is estimated to cost $3 million. The $2.7 million cost of the Campbell and Sigwalt area improvements are not included, as these same improvements are provided within the cost of the relief sewer alternative.

SEPARATE SEWERED AREAS

The Burke Study analyzed the performance of our system in seven areas that have experienced significant overland flooding in the past. According to Village records and resident reports, the flooding in these areas has occurred several times over the last 15 years.

The report summarizes potential improvements necessary to eliminate the excessive flooding within the seven specific problem areas.

The potential improvements for these areas include re-grading, installation of relief sewers, underground or surface detention or some combination thereof.

The relief sewer improvement alternatives consist of the installation of new enlarged local storm sewers to provide additional capacity and diversion connections from these surcharged storm sewers to existing sewers to make use of available capacity. Construction of new relief sewers will provide the system with additional capacity and an improved level of service.

Stormwater detention improvements could include surface detention or underground detention vaults. These detention facilities would essentially store stormwater until the peak of any storm event passed and then drain or possibly be pumped into the system once capacity is available. The cost for acquiring any easements or land necessary is not included in the estimated costs.

How will we pay for any storm water control projects? – Key Challenge 3

BACKGROUND

Since 1962 the Village of Arlington Heights has issued numerous General Obligation bonds to continue the Village's ongoing program to reduce the impact of heavy rainstorms on Village residents. Over the years the Village has spent over $141 million dollars (inflation adjusted) on this program. In FY2014 the Village's stormwater efforts were consolidated into one fund called the Storm Water Control Fund. This fund has not had a dedicated source of revenue, but has relied on transfers from other funds. Recent infusions of cash have come from an FY2014 transfers-in from the General Fund of $1 million and another transfer-in of $500,000 during the 8-month transition period. A proposed $2.7 million transfer-in during 2017 due to the closing of the Emerald Ash Borer (EAB) Fund is included as revenue in the Storm Water Control Fund.

Over the last couple of years the Village has included two ongoing programs in the Storm Water Control Fund budget. The Neighborhood Drainage Improvement Program, budgeted at $300,000 per year provides new or improved access for residents to Village storm sewers. The program only covers work on public right-of-way with any connections or work on private property being the responsibility of the property owner. As part of the Water and Sewer Study completed in 2014, it was also noted that the Village does not currently have a storm sewer rehabilitation program. The first step of establishing such a program is the overall assessment of the system's condition. Based on the size of the Village's system, the Storm Water Control Fund includes an annual budget of $500,000 to lightly clean, televise, and analyze the condition of the Village's system. This portion of the program will take seven more years to complete, after which the entire annual budget would be devoted to storm sewer maintenance, rehabilitation, and replacement work. As shown in the Storm Water Control Fund 5-Year financial projection (**Exhibit 1**), these ongoing program expenses will draw down current reserves to $0 by 2022. At this point, the Village needs to identify a sustainable revenue source for the Storm Water Control Fund to ensure that the ongoing programs can be continued and any flood study projects can be considered.

There are a number of funding options that could be considered to pay for ongoing Storm Water Control projects and new improvements. The ongoing projects outlined above will require a sustainable revenue source that will generate consistent revenues on an annual basis. On the other hand, new improvements can be financed with new one-time revenues or ongoing revenues that are sufficient to cover annual debt service costs. The general options for funding these types of expenses are shown below:

Ongoing Storm Water Control Programs

- Storm Water Utility Fee
- Increase property taxes

New Improvements

- Bond Issue – using a Storm Water Utility Fee sufficient to cover annual debt service costs (paid by all residents)
- Bond Issue – increase in property tax level to cover annual debt service costs (paid by all residents)
- Bond Issue(s) – debt service paid by special service area(s) (paid by residents living in areas where storm water control work is completed)
- Grant Funding – MWRDGC Phase 2 Funding identified in the Flood Studies (Likely that only one project from the community would even be considered)
- Grant Funding – FEMA, IEPA identified as possibilities in the flood studies
- Low interest loans from other agencies

As with any new funding source, the Village would have to consider equity issues and service levels across the Village. For instance, if a portion of the Village is not protected up to a certain level of flood control that the rest of the Village enjoys, should those lacking in a base level of protection pay for the new improvements or should this be borne by the Village as a whole? However, if a resident or a portion of the community was being improved beyond the base level, should those residents be responsible for the cost or the entire Village? Answers to these types of questions can help frame what projects might be selected to move forward with, as well as the timing of when a project might be programmed.

Of the revenue options outlined above, the storm water utility fee option has already been implemented by many of our surrounding communities. Currently, Buffalo Grove, Des Plaines, Hoffman Estates, Palatine, Rolling Meadows, and Wheeling have all implemented this type of fee. Based on staff's review of a storm water utility fee there are three basic ways it can be implemented:

1. Complete a detailed analysis of impervious surface for each property in the Village and calculate a charge based on its total square feet of impervious surface; (This would be a time consuming and costly process and would require periodic updates)

2. Calculate an equivalent residential rate as an average for all single family residential units, but calculate a higher fee for other large property owners (businesses, churches, etc.);

3. Charge a flat rate for all property owners.

When establishing a basis for storm water utility fees a number of questions can arise including:

- What is equitable based on storm water runoff?
- What is administratively feasible? Who and how would changes in impervious surface be monitored?
- Should churches and schools be charged and if not, why not?
- If larger properties are charged more – how much more?

SUMMARY OF FLOOD STUDY COST ESTIMATES AND ESTIMATED STORMWATER UTILITY FEES

The three stormwater studies included cost estimates for each improvement. To provide an outline of the total estimated costs for ongoing storm water control programs and potential new improvements, **Exhibit 2** shows a list of these costs. For comparison purposes only, **Exhibit 3** shows estimated storm sewer utility fees estimated to sufficiently cover ongoing storm water control costs as well as fees needed to cover estimated debt service costs at various levels assuming 20 year bonds at 4% interest. To make the estimates as simple as possible at this point in time, this analysis also assumes a flat storm water utility rate charged to all property owners.

These Exhibits show that basic ongoing storm water control program costs amount to $800,000 per year. This would result in an estimated storm water utility fee of $3.25 per month to cover just the Village's ongoing costs with no further improvements to the system. New infrastructure improvement options identified through the flood studies total between $47 and $52 million depending on the extent of the work completed. It is unlikely that all of the new infrastructure improvement options will be selected or completed in the short-term. A 20 year $10 million bond issue would require an additional storm water utility fee of $3.00 per month, and a $50 million bond issue would require an additional $14.75 per month added to the amount needed for the ongoing programs.

How should project costs be distributed, Village-wide or locally?-Key Challenge 4

Currently, the Village pays for some small neighborhood level stormwater projects through the stormwater fund and reimburses 50% of the costs up to $7,500 on the installation of overhead sewers (OHS) for existing single family homes in the combined sewer area. New homes built in the combined sewer area must include overhead sewers at the builder's expense. The Village has spent approximately $831,000 over the past 15 years to assist with the installation of OHS for approximately 171 homes in this district.

The CDM Smith study indicated that an expansion of the OHS program with some supporting public improvements would be one of the most cost effective ways to enhance the CSTA system. However, it is unlikely that participation by home owners will increase dramatically without an increase in the Village's level of financial participation. An increase in the Village's cost sharing percentage, a higher maximum benefit or both could be considered to increase participation in the OHS program.

It should also be noted that many of the other improvements identified in the separate sewer system are designed only to address neighborhood street and yard flooding. The OHS program for the combined system is designed to help reduce basement back-ups. It can be argued that prevention of basement back-ups is a higher priority than yard and street flooding. Therefore, asking residents who have experienced basement back-ups to directly share in the costs of their improvements while not asking residents who are experiencing yard and street flooding to do so could be considered unfair. However, completely eliminating the cost sharing feature of this program after 171 homes have already performed the work could also be seen as unfair. It can also be argued that overhead sewer systems are essentially private improvements that increase the utility of a residence by allowing the finishing of basements. In the past many homeowners did not finish their basements and simply tolerated occasional flooding issues. However, property owners' expectations of their ability to finish their basements has evolved over time. In this way, overhead sewer systems do not benefit the overall stormwater control system, they only benefit the property owner who installs it, suggesting a private contribution to the cost is only fair.

By the same token, neighborhood flooding improvements in separate sewered areas could, arguably be partially funded by Special Service Areas, special assessments or other mechanisms as well. Unfortunately, these mechanisms can be complex and time consuming to establish and may result in high individual property owner costs for a neighborhood depending on the total cost of the project and the number of households that are asked to fund a project. For this reason, it may be difficult to utilize SSA's or similar mechanisms for stormwater projects.

While the studies encompassed many parts of the Village, each study had boundaries and limits based upon the available funding. Staff understands there are still other areas in town with drainage issues that need to be studied. Over time, and with proper funding, other areas can be evaluated, and the model can be expanded and enhanced.

Request for Board Feedback and Direction:

Based on discussion and analysis of the issued described above, Staff has reached certain conclusions, but is also requesting feedback on the following unanswered questions for each of the challenges identified:

Challenge 1: How to Categorize Projects

Staff believes it possible to prioritize projects within the different project areas, but next to impossible to provide equal comparisons of a combined sewer project to a separate sewer project.

Every neighborhood has specific needs and if we are going to pursue a Village wide funding source, then we believe we should at least have a plan to take on projects in all three areas as a system wide approach.

Individual projects can be prioritized or eliminated from consideration entirely based on the cost and projected benefit of each project within each study area.

Question a: Should Staff continue with the assumption that projects in 3 areas be pursued equally, or should projects that focus on reducing basement back-ups / structure flooding only be given precedence over street flooding projects?

Challenge 2: Evaluating the Cost Effectiveness of Projects

The studies show the size of affected areas and the number of homes involved. Staff believes the cost effectiveness of various projects (improvement in existing conditions vs. cost of homes) may suggest certain projects be placed on the backburner, or not pursued at all.

Question a: Does the Village Board want staff to prioritize the projects within the different areas, based on cost effectiveness, so that they can be considered and funded individually, or should all projects currently identified by the consultant studies, remain in consideration, as they are based on a unified "standard of service" within the study area.

Question b: Should projects with high cost per home values be eliminated from consideration or deprioritized?

Challenge 3: How do we pay for any stormwater control project?

No funding exists for any of the identified improvements nor for ongoing maintenance of the system beyond 2017. The Board has various options for establishing new revenue to support the stormwater program.

Question a: Is the Village Board interested in implementing a new storm water utility fee to pay for ongoing and one-time water control projects? If yes:

I. What is an administratively feasible basis for such a fee: impervious surface area by property vs. an equivalent residential rate?

II. Should not-for-profit entities be charged? Why not?

III. If larger properties are charged more – how much more?

Challenge 4: Distribution of Costs

Staff believes that expansion of the OHS program is worthy of pursuit as it is the lowest cost option for the combined sewer area. As noted in the CDM Smith study, this option still requires some general improvements in addition to the installation of OH Sewers. Both changing the funding formula and keeping it the same present equity issues as described above. However, unlike other projects, the OHS program involves public funding of private improvements for individual homes. Therefore it can be argued that some sort of cost sharing is justified. Based on this conflict, staff is seeking direction from the Board on the following unanswered questions:

Question a: Does the Village Board wish to entertain continued sharing of project costs with residents for the OHS program, or should "fully funding" both public and private improvements be pursued as part of this effort?

Question b: Does the Village Board wish to modify the current funding formula for the OHS program to encourage greater participation?

Question c: Does the Village Board wish to consider other neighborhood project funding mechanism such as an SSA in any of the study areas to supplement a general stormwater fee?

Conclusion:

Staff wishes to get feedback and direction from the Board on the issues identified above at the August 1st Village Board meeting. Once we have guidance on the issues above, a more comprehensive set of recommendations can be developed by Staff consistent with the timeline described above.

As always feel to free to contact us with any questions you may have on this complex issue.