Emails regarding any agenda item are welcomed. Please email rbahan@winnetka.org, and your email will be relayed to the Council members. Emails for the Tuesday Council meeting must be received by Monday at 4:00 PM. Any email may be subject to disclosure under the Freedom of Information Act.

STUDY SESSION
WINNETKA VILLAGE COUNCIL
Winnetka Community House
620 Lincoln – Room 101
Winnetka, Illinois 60093
Tuesday, October 11, 2011
7:30 p.m.

AGENDA

1) Call to Order.
2) Discussion: Supplemental Flood Risk Reduction Assessment: 25-, 50-, and 100-year Storm Events.....1
3) Public Comment
4) Executive Session
5) Adjournment

NOTICE

All agenda materials are available at www.villageofwinnetka.org *(click Council and then Current Agenda)*, the Reference Desk at the Winnetka Library, or in the Manager's Office at Village Hall (2nd floor).

Videos of the Regular Village Council meetings are televised on Channel 10, Mondays, Wednesdays, and Fridays at 7:00 p.m. Videos of the meeting may also be viewed on the Internet via a link on the Village's web site: www.villageofwinnetka.org.

The Village of Winnetka, in compliance with the Americans with Disabilities Act, requests that all persons with disabilities, who require certain accommodations to allow them to observe and/or participate in this meeting or have questions about the accessibility of the meeting or facilities, contact the Village ADA Coordinator – Liz Rosenthal, at 510 Green Bay Road, Winnetka, Illinois 60093, (Telephone (847) 716-3540; T.D.D. (847) 501-6041).

Agenda Report

Subject:	**Supplemental Flood Risk Reduction Assessment: 25-, 50-, and 100-year Storm Events**
Prepared By:	Steven M. Saunders, Director of Public Works/Village Engineer
Cc:	Rob Bahan, Village Manager
Date:	October 5, 2011

Background

In 2009, following an extreme rain event in September 2008, the Village of Winnetka retained Christopher B. Burke Engineering Ltd. (CBBEL) to conduct a Flood Risk Reduction Assessment of the Western Winnetka Study Area for frequent storm events. The Western Winnetka Study Areas consists of the area south of Pine Street, west of Linden Street, east of Hibbard Road and north of Winnetka or Hill Road. The design criteria requested by the Village in the 2009 Assessment was based on frequent storm events including the 2-, 5-, and 10-year design events or storm events with a 50%, 20%, or 10% chance of occurring in any given year. The results of the 2009 Assessment indicated that the storm sewer infrastructure throughout the Western Study Area had less than 5-year capacity. The recommendations from the September 2009 report were designed to provide a 10-year level of protection for the Western Study Area.

Following the 2009 Assessment, CBBEL was retained by the Village to conduct a Flood Risk Assessment of six additional flood prone areas of the Village not included in the Western Study Area for the 10-year design event. The results of the July 2011 Study indicated that the remaining portions of the Village had less than 5-year capacity with some areas less than 2-year capacity. Both the September 2009 and July 2011 reports recommended stormwater improvement projects for the various study areas based on the 10% chance storm (10-year design storm event).

July 2011 Storm Event

On the morning of July 23rd 2011, over six inches of rain fell in three hours, causing widespread flooding throughout the entire Village for the second time since the September 2008 storm event. Following the July 23 storm event, at its August 2 meeting, the Council authorized CBBEL to expand the previous Stormwater Flood Risk Assessment studies to identify potential stormwater management improvements to enhance flood protection for the 25-, 50-, and 100-year storms, for the 8 previously studied areas.

Summary of drainage areas and proposed improvements

North of Willow Study Area (pages 11 - 15, Exhibits 1A – 1C)

The improvements for this area consists of new large storm sewers throughout the study area, stormwater storage designed in conjunction with the Park District's plans and significant additional storage on Cook County Forest Preserve District (CCFPD) property

to obtain the 100-year level of protection. For the 25- and 50-year level of protection, the recommendations are similar to the 100-year design except smaller amounts of detention and smaller diameter storm sewers. The engineer's estimate of probable cost for the 25-, 50- and 100-year level of protection is $13 million, $14.8 million and $17.5 million, respectively. These cost estimates reflect providing the needed conveyance and detention improvements for the Village requirements only. They do not reflect the cost associated with providing detention needed by the Park District to satisfy regulatory requirements associated with their Skokie Playfield Master Plan improvements.

The improvements for this area consider providing significant amounts of stormwater detention – up to 102.5 acre-feet for the 100-year analysis – in open space owned by four other jurisdictions: the Winnetka Park District (Skokie Playfield); New Trier High School (Duke Childs Field); Winnetka District 36 (athletic field between Skokie and Washburn); and the Cook County Forest Preserve (parcel south and west of golf course). Because the Park District has been proceeding with a Master Plan for the Skokie Playfield, and because stormwater management has been a significant focus of this planning effort, the Park District has been in a position to work very closely with Village staff and CBBEL in identifying potential locations for stormwater detention, both above ground and below ground, on the Skokie Playfield property. Similar coordination work will need to take place with the Cook County Forest Preserve, Winnetka District 36, and New Trier High School.

Three other items of note.

- First, much of this study area lies within the 100-year regulatory floodplain of the Skokie River, and will still be subject to inundation during times of extreme flooding on the Skokie River. This means that the area will still be mapped as a Special Flood Hazard Area by FEMA, and all applicable floodplain regulations will continue to apply.
- Second, the proposed improvements have been designed to provide flood protection to structures for the rainfall event analyzed, but there would still be some street and yard flooding for the selected rainfall events, although this would be significantly reduced from the levels currently experienced.
- Finally, no land acquisition or use costs have been included in the estimates for these alternatives, simply because there is no sound way to calculate them at this time.

<u>South of Willow Study Area (pages 16 - 19, Exhibits 2A – 2C)</u>

The improvements for this area consists of a new large-diameter outlet storm sewer to drain stormwater west to the Forest Preserve Ditch, lowering and regrading of the Skokie Ditch, and significant additional storage on Cook County Forest Preserve District (CCFPD) property to obtain the 100-, 50- and 25-year level of protection. The engineer's estimate of probable cost for the 25-, 50- and 100-year level of protection is $9.7 million, $12.6 million and $17.8 million, respectively.

It should be noted that the recommended alternatives for larger storms do not include constructing the Hill Road Relief Storm Sewer proposed for the smaller events. This is because the relief sewer is designed to convey upstream offsite runoff around the area most affected by flooding. For the larger events, modeling indicated that runoff from

within the drainage area was sufficient to cause flooding within the study area, rendering the Hill Road diversion pipe ineffective for larger events.

Additionally, this alternative would result in the creation of a large stormwater detention facility adjacent to a closed landfill. Most closed landfills, including Winnetka's, undergo a physical process wherein groundwater comes into contact with decomposing refuse and picks up chemical compounds, generating a material called leachate. The proposed storm water detention facility would be located very close to the landfill and would need to be designed so as not to become a pathway for leachate to migrate away from the landfill site. This will require significant lining and water barrier protection.

The proposed stormwater detention facility would occupy the entire footprint of the Forest Preserve parcel located just east of the landfill. In order to construct a detention facility on the site, virtually all of the trees would need to be removed and the site excavated to a significant depth. This would require permission and significant involvement from the Cook County Forest Preserve District.

Crow Island Park was considered as a possible location for stormwater detention. However, the significant detention volumes required (up to 65 acre-feet for the 100-year scenario) would necessitate excavation of nearly the entire 13-+/- acre parcel consisting of the park and adjacent woods, even for underground detention, which would completely alter the character and value of the resource. As a result, this area was not included in the proposed concepts, since space exists in the Cook County Forest Preserve to locate the needed detention.

Finally, additional low-entry surveys will be needed during final engineering design to fine-tune the flood protection elevation.

<u>Underpass Study Area (pages 20 - 24, Exhibits 3A – 3C, 4A – 4C, 5A – 5C)</u>
The improvements for this area include a new storm sewer from the Winnetka Avenue underpass to the outlet at Elder Lane to Lake Michigan. The storm sewer improvements reduce flooding at the Winnetka Avenue underpass for the 25-, 50-, and 100-year design storms. The proposed storm sewer sizes decrease with each decreasing design storm. The engineer's estimate of probable cost for the 25-, 50- and 100-year level of protection is $2.9 million, $3.4 million and $4.4 million, respectively.

CBBEL examined several alternative approaches to this drainage area involving detention storage, in an attempt to reduce required conveyance and minimize construction costs. CBBEL examined placing underground flood storage beneath the Village's parking lot at Green Bay & Winnetka, beneath the New Trier Athletic Fields, and even beneath Indian Hill Park. Ultimately, because all of the available storage areas would need to be underground, the cost of providing stormwater storage exceeded the cost of providing conveyance capacity, so the recommended alternative for the Underpass Drainage Area consists of providing larger storm sewer pipes from the underpass to Lake Michigan, along with the associated water quality enhancement that will be needed to satisfy regulatory requirements.

Because the Underpass Study Area primarily experiences street flooding, as opposed to structure flooding, this could be considered a lower priority project, and the improvements could be scaled back or constructed at a later date.

Cherry Street Outlet Study Area (pages 25 - 27, Exhibits 6A – 6C)

The improvements in this area consist of new storm sewers along Sheridan Road, Oak Cherry and Ash Streets, as well as a larger outlet to Lake Michigan at Cherry Street. The storm sewer improvements eliminate flooding in the study area for the 25-, 50-, and 100-year design storms. The proposed storm sewer sizes decrease with each decreasing design storm. The engineer's estimate of probable cost for the 25-, 50- and 100-year level of protection is $1.8 million, $1.9 million and $2.0 million, respectively.

Because the Cherry Street Outlet Study Area primarily experiences street flooding, as opposed to structure flooding, this could be considered a lower priority project, and the improvements could be scaled back or constructed at a later date.

Spruce Street Outlet Study Area (pages 29 - 31, Exhibits 7A – 7C)

The two identified problem areas in the Spruce Street Outlet study area have been separated into two separate proposed improvement projects (Tower Road relief and Lloyd Park outlet) due to the proposed outlet configurations. The proposed projects can be constructed independently and are designed to eliminate flooding in the indentified problem areas for each of the design events. The engineer's estimate of probable cost of the Tower Road Relief improvements is $1.3 million for the 25-year and $1.4 million for the 50- and 100-year levels of protection. The engineer's estimate of probable cost for the new outlet to Lake Michigan at Lloyd Park is $0.5 million for the 25-, 50- and 100-year levels of protection.

Pursuant to further investigation of the ability of the existing storm sewer system in the ravine area north of Tower Road, it is feasible to separate the Tower / Tower Manor / Foxdale area from the remaining downstream area of the watershed, and to discharge this stormwater runoff to the Ravine outlet system, without significantly overburdening that system. This has the effect of removing the Tower/Tower Manor area of concern from the Spruce Street outlet area entirely. The downstream flooding in that watershed, in the area of Sheridan Road near Maple Street, can be alleviated by creating a new intermediate outlet from Sheridan Road at Lloyd Park. By separating the current outlet study area into 2 different outlet areas, and by moving a portion of the outlet area to the Ravine outlet area, significant improvements can be attained.

Greenwood Avenue Study Area (pages 32 - 36, Exhibits 8A – 8C, 9A – 9C)

The improvements for this area consist of new large storm sewers throughout the study area for the 25-, 50- and 100-year level of protection. For the 25- and 50-year level of protection, the recommendations are similar to the 100-year design except smaller diameter storm sewers. The engineer's estimate of probable cost for the 25-, 50- and 100-year level of protection is $2.2 million, $2.3 million and $2.9 million, respectively.

This is a large watershed, with significant elevation change across the drainage area. In fact, the highest point in the watershed, near Scott Avenue and Lake Street, is over 50 feet higher in elevation than areas near Tower Road and Greenwood Avenue that experience flooding. Because of the significant topographic relief in the upper areas of the watershed, runoff from the higher intensity rainfalls can be conveyed through the watershed via overland flow, generally, but not always, via the roadway system. At the flatter, lower, western end of the watershed, conveyance improvements are needed.

CBBEL evaluated 2 different options to address flooding in the lower regions of the watershed. The first option evaluated was to simply provide increased conveyance all the way into the existing wet-bottom storage reservoir to the south of Tower Road near Forest Way Drive. This alternative relies on very large conveyance pipes under Tower Road to carry the runoff volumes to the pond. The second option consisted of a combination of conveyance improvements and additional flood storage on the site of Corwin Park, near Grove Street and Edgewood Lane. While this option reduces the scope of some of the conveyance improvements needed, the cost associated with constructing underground detention at heavily-used Corwin Park exceeds the savings associated with reduced conveyance requirements.

One factor of note that will need more detailed engineering, should this recommendation be implemented, is the likelihood of significant utility conflicts along Tower Road, particularly with the Village's electrical system, and the distribution system operated by North Shore Gas.

Lake Michigan Outlet Project (pages 27 - 28, Exhibit 10)

This is not an additional study area, but rather a proposed improvement that benefits the North (including Provident Avenue) and South of Willow Road, Cherry Street Outlet and the Underpass Study areas for the 100-year design storm event. The benefits realized in each of the study areas included with this improvement are equal to the benefits realized for the recommendations in each itemized study area. This proposed improvement consists of a large storm sewer under Willow Road extending from Glendale Avenue to Lake Michigan with multiple storm sewers extending into each of the study areas to be benefitted from this improvement. A portion of the sewer is proposed to be tunneled. The engineer's estimate of probable cost is $32.5 million for tunneling through clay, and $56.9 million for tunneling through rock.

These are preliminary designs that will require further vetting in the form of soil borings, identification of utility conflicts, identification of issues associated with tunneling beneath the Union Pacific Railroad, and other such issues.

What may be problematic with this alternative is the fact that it represents a significant diversion of water from the Chicago River Watershed to the Lake Michigan Watershed. This will require approval from multiple regulatory agencies, including the Illinois EPA, the Army Corps of Engineers, the Illinois Department of Natural Resources, and the Metropolitan Water Reclamation District. This will also require interaction with the many environmental and public interest groups that focus on the health and vitality of the Great Lakes ecosystem.

That being said, there are significant advantages associated with this approach, not the least of which is that this alternative eliminates the need to seek cooperation and permission from other agencies to locate stormwater detention facilities on land not owned by the Village. In addition, CBBEL's preliminary cost estimates indicate that this alternative, which provides benefits to four of the eight study areas, is less costly than addressing each of the study areas separately, primarily because no costly detention projects are being considered with this alternative.

As conceived, the project would provide 100-year protection for all four areas, however the project could be scaled to provide different levels of protection for the Underpass and Cherry Street areas, where stormwater flooding is more associated with roadway closures than property damage.

Ravine Study Area (pages 37 - 38, Exhibits 11A – 11B)
To prevent the low point of Sheridan Road from becoming impassable for the 25-, 50-, and 100-year design storm events, CBBEL has recommended regrading the area to prevent ponding from occurring during each event. The engineer's estimate of probable cost for the 25-, 50- and 100-year level of protection is $0.5 million, respectively.

Staff has been notified that IDOT is in the process of planning drainage improvements for this area. Given that this is a state road and IDOT is evaluating improvements at this location, this project should not be considered for Village funding at this time.

Overall summary
CBBEL has now completed evaluations for storm events ranging from 10-year to 100-year, for eight separate study areas throughout Winnetka. This has yielded a variety of projects and costs associated with different flood protection levels for each study area. These project descriptions and costs can be found on page 42 of the CBBEL report, with costs ranging from the $14.1 million identified in the previous CBBEL study for 10-year protection, up to $47.0 million to provide 100-year protection via separate projects throughout all 8 study areas.

This array of projects and costs is difficult to wade through, so the following section is intended as a means of guiding the Council in its discussions.

Assuming that the goal of the Council can be stated as providing significant relief from the effects of stormwater flooding to known areas of the Village, and working from the position that the projects identified and engineered by CBBEL will provide the specified level of relief at the indicated cost, then there are three key policy questions for the Council to discuss. Obviously, these questions are interrelated, and are not presented in any specific order:

1. What level of expenditure does the Council wish to consider?
2. What level of flood protection does the Council want to provide for different areas of the Village?

3. How does the Council wish to finance the selected improvements?

To assist the Council in applying and discussing these three questions, it may be helpful to consider one possible scenario that would provide significant flood reduction benefits to each of the locations included in the study.

This scenario would consist of constructing the outfall tunnel to Lake Michigan, and associated improvements in the study areas north and south of Willow Road, to provide 100-year flood protection to these areas, which were among the most severely impacted locations during the 2008 and 2011 flood events. In addition, portions of the 10-year flood protection improvements would be constructed for the Cherry Street and Underpass study areas to provide 10-year flood protection in these areas, which are subject primarily to street flooding. Further improvements would consist of constructing the Tower Relief Sewer to provide the Tower/Foxdale/Tower Manor area with 100-year flood protection, the Spruce Street/Lloyd Park outlet to provide Sheridan Road with 10-year flood protection, and the west Tower/Greenwood improvements to provide those areas with 100-year flood protection. The engineer's estimate of probable cost for the improvements to consider under this scenario is $34 million. This scenario is visually depicted in Attachment 1.

Differing flood protection levels were chosen based on the primary type of flooding experienced in each area, and the consequences of the flood protection level being exceeded. In areas where the primary concern is overland flooding entering buildings, and the consequences of exceeding the flood protection level are flooded basements, a 100-year protection level was selected. For areas where the primary type of flooding is street or yard flooding, and the consequences of exceeding the flood protection level do not include flooding buildings, a 10-year protection level was selected.

Costs and flood protection associated with the various study areas are shown in the following table:

CONCEPTUAL PROJECT ESTIMATED COST

Project	**Study Area Benefitted**	**Protection Level**	**Estimate of Probable Cost (millions)**
New outlet tunnel to Lake Michigan and additional conveyance	North of Willow Road South of Willow Road Underpass Area Sheridan/Oak/Cherry Area	100-year 100-year 10-year 10-year	$29.2*
Spruce Street Outlet – Lloyd Park	Sheridan/Maple Area	10-year	$0.5
Tower Road Relief Sewer	Tower/Tower Manor Area	100-year	$1.4
West Tower Road Improvements	Vernon/Tower, Greenwood, Edgewood	100-year	$2.9

Sheridan Road Ravine Drainage (IDOT)	Ravines	To Be Determined	$0
		Total Cost	$34.0

* $29.2 million vs. $32.5 million reflects 10-year protection levels for Underpass and Cherry Outlet areas

For purposes of this discussion, consider the possibility of funding the $34 million as follows:

CONCEPTUAL PROJECT FINANCING

Project	**Cost (millions)**	**Financing Method**
New outlet tunnel to Lake Michigan	$29.2	Debt
Spruce Street Outlet – Lloyd Park	$0.5	Cash Reserves
Tower Road Relief Sewer	$1.4	Cash Reserves
West Tower Road Improvements	$2.9	Cash Reserves
	$4.8	Subtotal Reserves
Sheridan Road Ravine Drainage (IDOT)	$0	IDOT Funds
	$34.0	TOTAL

Attachment 2, prepared by Finance Director McKee, indicates debt service levels for various amounts to be financed. For $30 million, 20-year level debt works out to annual debt service of $2.22 million, or about $41 per parcel per month.

Recommendation:

1. Consider Stormwater Drainage Report prepared by CBBEL
2. Evaluate sample scenario and provide policy direction on:
   - What level of expenditure does the Council wish to consider?
   - What level of flood protection does the Council want to provide for different areas of the Village?
   - How does the Council wish to finance the selected improvements?

ATTACHMENT 1
CONCEPTUAL PROJECT

Village Street Map
Village of Winnetka

100-year improvements

Village of Glencoe

Schools
1. Chicago Institute of Music
2. Crow Island School
3. Hadley School for the Blind
4. Hubbard Woods School
5. New Trier High School East
6. North Shore Country Day School
7. Sacred Heart School
8. Saints Faith Hope & Charity
9. Samuel Greeley School
10. Skokie School
11. Washburn Junior High School

Municipal and Public Use Buildings
1. Village Hall
2. Police and Fire Department
3. Municipal Yards
4. Hubbard Woods Train Station
5. Winnetka Train Station
6. Indian Hill Train Station
7. Winnetka Post Office
8. Winnetka Chamber of Commerce
9. Winneka Historical Society
10. Winnetka Northfield Public Library
11. Community House
12. Winnetka Women's Club
13. Water and Electric Plant

10-year improvements

TUNNEL

Village of Northfield

100-year improvements

Village of Kenilworth

Unincorporated Cook County

Map Legend
- Village Boundary
- Roads
- Private Roads
- Recreation Area
- Public Building or School
- Water
- Railroad

Village of Winnetka
Cook County, Illinois

GIS consortium

0 750 1,500 3,000 Feet

State Plane Nad 83 Illinois East
July 26, 2011 EDV StreetMap

Village of Winnetka
Stormwater Financing Costs

10.03.2011

	Total Amount Financed	20 Year Level Debt
Debt Total	$ 10,000,000	$ 740,000
Per Parcel (4,500) *	$ 2,222	$ 164.44
Monthly		$ 13.70
Debt Total	$ 20,000,000	$ 1,480,000
Per Parcel (4,500) *	$ 4,444	$ 328.89
Monthly		$ 27.41
Debt Total	$ 30,000,000	$ 2,220,000
Per Parcel (4,500) *	$ 6,667	$ 493.33
Monthly		$ 41.11
Debt Total	$ 40,000,000	$ 2,960,000
Per Parcel (4,500) *	$ 8,889	$ 657.78
Monthly		$ 54.82
Debt Total	$ 50,000,000	$ 3,700,000
Per Parcel (4,500) *	$ 11,111	$ 822.22
Monthly		$ 68.52

* Parcels including residences, commercial, and governments at 4,500
** Based on the following present value factors, 4% interest: 0.074