# MEMORANDUM

September 18, 2012

TO: Anne Marin – City Administrator, Prospect Heights
Steve Skiber – Director of Building and Zoning, Prospect Heights
James H. Johnson, PE – Director of Public Works and City Engineer
James O'Neill – Public Works Foreman, Prospect Heights

COPY: Donald R. Dressel, PE - CBBEL
*Project Files (CBBEL Project No. 11-412)*

FROM: Erik L. Gil, PE

SUBJECT: **Lake Claire and Shires Pond Flooding Problem Area**
Project: 2011-12 Prospect Heights Flood Study
Location: East of Wheeling Road, west of Coldren Drive, south of Shawn Lane, and north of Claire Lane (but including lots along Claire Lane, Prospect Heights, Cook County, Illinois
Watershed: McDonald Creek

## INTRODUCTION

Christopher B. Burke Engineering Ltd. (CBBEL) was retained by the City of Prospect Heights (City) to perform a flood risk reduction analysis based on the flooding that occurred from the July 22-23, 2011 storm event. The primary goals of this study were to determine the extent of the flood damage, establish possible causes for the flooding and to provide potential solutions to reduce the risk of future flooding.

This memorandum documents the analysis for the Lake Claire/Shires Pond Study Area. Separate memoranda will be provided for each of the other study areas, and will be assembled in a single report at the conclusion of the study.

## JULY 22-23, 2011 EVENT PRECIPITATION

On July 23, 2011 the City received approximately 4.81 inches of rain in a 3-hour period that resulted in extensive flood damage in certain areas of the City. The City received 6.17 inches of rain in a 24-hour period from July 22$^{nd}$ to the 23$^{rd}$. The rainfall totals were based on the rainfall values obtained from the gages shown in Table 1 below, which are from both the O'Hare International Airport and the Chicago Executive Airport weather gages.



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TABLE 1
July 22-23, 2011 Rainfall Values

| Gage ID | Location | 3-hour Total (inches) | 24-hour Total (inches) |
|---|---|---|---|
| 04838 | Chicago Executive Airport | 4.71 | 6.06 |
| 94846 | O'Hare International Airport | 6.79 | 8.21 |
| | *Weighted Average =* | *4.81* | *6.17* |
| | ISWS Bulletin 70 frequency at Prospect Heights* | 100-year | 40-year |

*Note: The stated frequency is approximate.

Two durations were chosen for discussion purposes, the 3-hour duration and the 24-hour duration. The 24-hour duration is the traditional duration used for many engineering calculations and is the typical one reported by the media. The 3-hour duration was also chosen for comparison purposes for 2 reasons. The first is that most of the flooding problem drainage areas being evaluated in this flood study respond to significant short-duration rainfall events within or shortly after a 3-hour period, that is, the flood peak is typically reached shortly after this time period if rain is no longer falling, as was the case during July 23, 2011. The Des Plaines River, for example, would not respond as quickly to a significant short-duration rainfall event. The second reason is that the rainfall totals for the most severe continuous 3-hour period at the O'Hare International Airport gage exceeded the 100-year frequency as documented in the Illinois State Water Survey (ISWS) Bulletin 70 publication, the reference used by most regulatory agencies in the northeastern Illinois area for rainfall depth design values. The Chicago Executive Airport gage did not exceed the 100-year frequency value for the 3-hour event, but it was sufficiently close to be considered as the 100-year frequency. As can be observed, the two gage values at O'Hare International Airport and at Chicago Executive Airport differed by over 2 inches of rainfall for each of the reported totals. This meant that the July 22-23, 2011 event was a relatively localized storm event. For purposes of this study, a simple weighted average between the two gages was computed to estimate the rainfall totals that fell on the City, assigning a 95% weight to Chicago Executive Airport based on distance from the City as compared to the O'Hare International Airport, which was assigned a 5% weight.

The July 22nd–23rd storm event exceeded the capacity of the storm sewer systems in the older parts of town and resulted in street, backyard, and home flooding. Approximately 161 residents within the City filled out a flood questionnaire after the July 23rd storm event.

## REFERENCES AND AVAILABLE INFORMATION

- Meetings with City staff,
- Summary provided by City staff of 161 flood questionnaires submitted by City residents,
- Site visits,
- Cook County 1-foot contour aerial topography,
- City storm sewer maps,



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- United States Geological Survey (USGS) Hydrologic Atlas (HA),
- Historic Aerial Photographs,
- Federal Emergency Management Agency (FEMA) Federal Insurance Rate Maps (FIRMs)

## OVERVIEW

The Lake Claire/Shires Pond study area is located in a south-central area of the City. In reference to major roads, the study area is within the area generally bounded by Willow Road on the north, Wheeling Road on the west, McDonald Creek on the east, and Camp McDonald Road on the south with specific flooding concerns within Lake Claire and the backyards of the homes within this area. The street map of this location is shown on Figure 1.

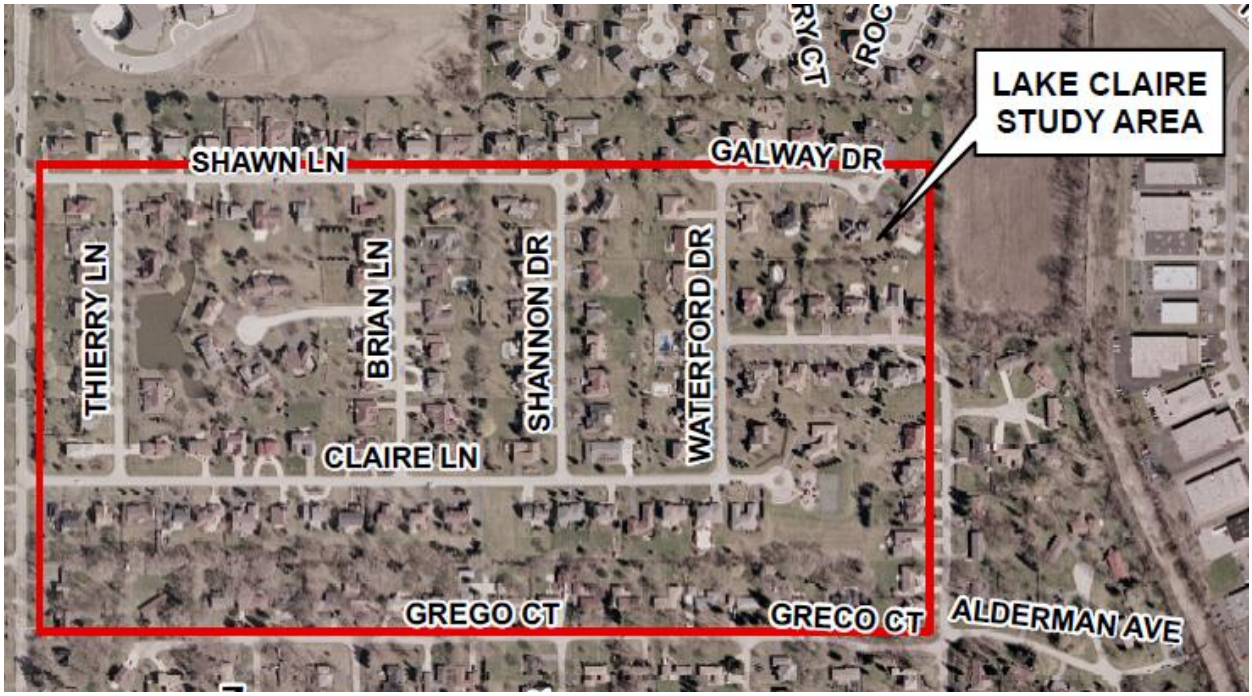


Figure 1
Lake Claire and Shires Pond Area
Location Map



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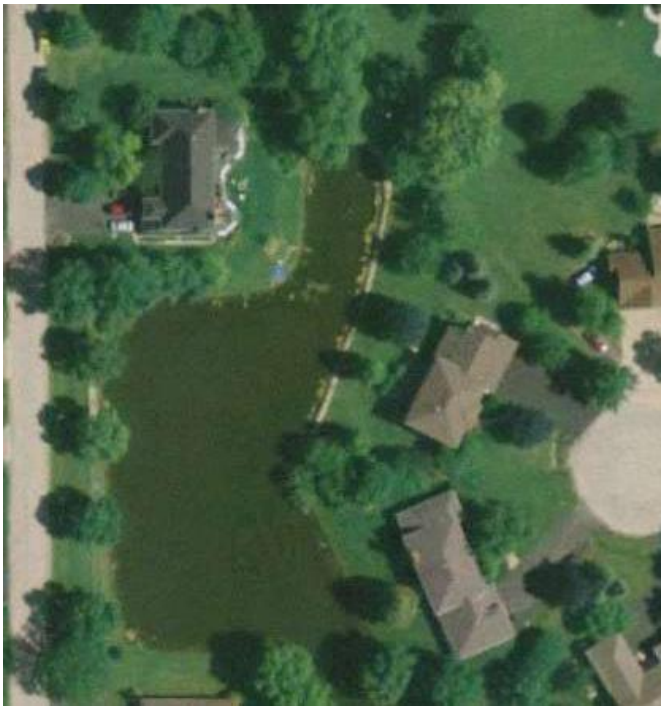
St. Alphonsis Catholic School is located to the north of Lake Claire Estates, and the corporate limits run along the north property limit of the school and then along the north property line of the eastern most lots of Shawn Lane. The topography of the area is relatively flat with little variation of elevation difference between the yard grades surrounding the homes across the two subdivisions (Lake Claire Estates and Shires Subdivision).

The Lake Claire Estates residential subdivision was built in the late 1970s. Downstream of Lake Claire Estates is the Shires of Prospect Heights residential subdivision that also has a detention facility. The two detention facilities drain into the same storm sewer system that eventually discharges into McDonald Creek near Alderman Avenue. The topographical watershed divide between McDonald Creek and Tributary B to McDonald Creek crosses the study area, however, it appears that storm sewers likely capture most of the runoff and direct it to McDonald Creek. The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Panel 206 of Cook County and Incorporated Areas, shows that the study area is not located in a regulatory floodplain with the exception of the outfall (and upstream sewer leg) which discharges into McDonald Creek. Although the floodplain of McDonald Creek does not encroach into the study area, the tailwater effects from the flooded creek impact the storm sewer conveyance that drains the area because the regulatory FEMA floodplain elevation of approximately 647 is slightly above the lowest elevation of the lake and the pond.

Photograph 1 shows an aerial view of Lake Claire.

PHOTOGRAPH 1
Lake Claire





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## EXISTING DRAINAGE PATTERN

According to Hydrologic Investigations Atlas HA-67, Floods in Arlington Heights Quadrangle, Illinois, prepared in 1963, shown as Figure 2, the study area was located at the drainage divide between McDonald Creek and Tributary B to McDonald Creek. There were no depressional areas shown. Elevations depicted on HA-67 ranged in general from 650 to 655. Based on the Cook County aerial topography, most of the yard grades immediately adjacent to the homes are in the 655 to 656 range. These elevations are above the nearest floodplain elevation from McDonald Creek.

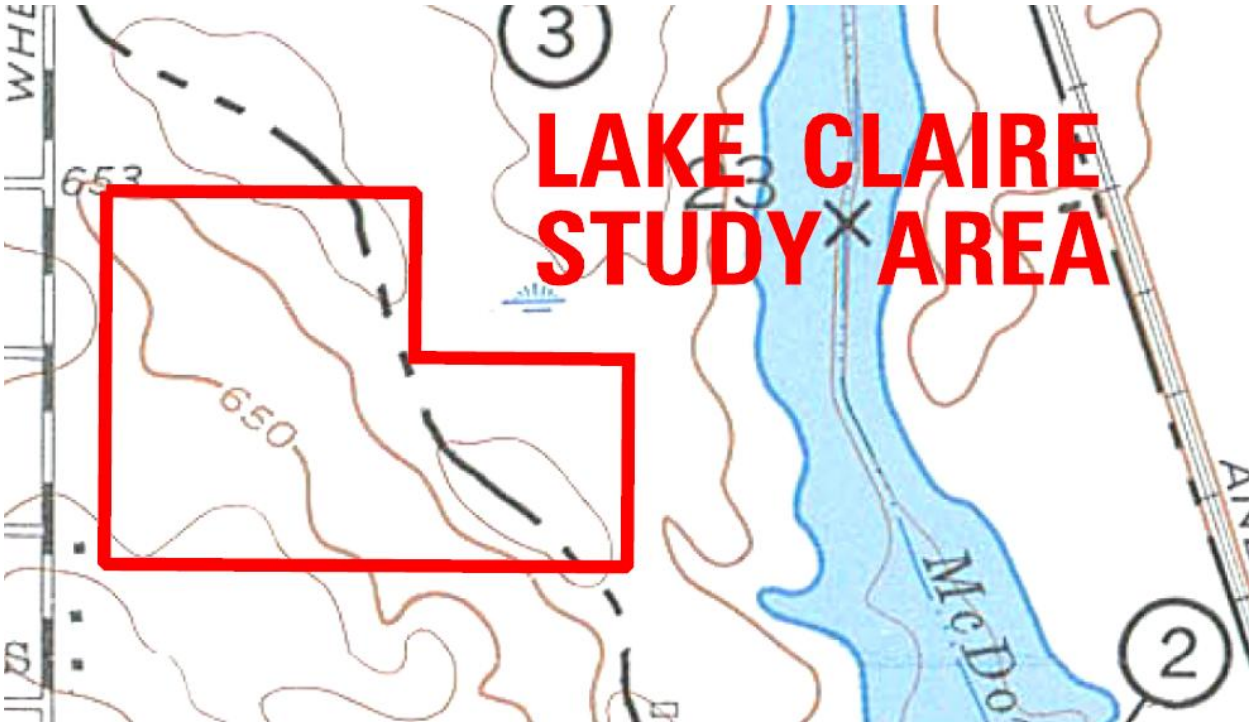


Figure 2
USGS Hydrologic Atlas

The two subdivisions were built on what could be considered a near plateau, and due to this feature, overland flow routes are not well defined through this subdivision. According to City staff, Lake Claire fills up and exceeds its design high water level (HWL) while the Shires of Prospect Heights detention facility does not fill up to its design HWL during storm events although the normal water level (NWL) and HWLs of Lake Claire and Shires Pond are very similar. Furthermore, Lake Claire has been observed to drain slowly, and to significantly



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flood the 501 Shawn Lane property. Below is a photograph of the garage doors where water enters the home. It can be observed that the owner of the property has installed braces/grooves approximately 20 inches off the concrete floor where “gates” are anchored to hold back the water. However, this arrangement is not water tight and an interior pump is still necessary. The property owner has stated that water reaches 17 inches at the garage door.

PHOTOGRAPH 2
501 Shawn Lane (north of Lake Claire)


The design NWL of Lake Claire is 646.47, and the design HWL is 649.67, with a design stormwater detention volume of 3.3 acre-feet. The Shires detention pond is a dry-bottom facility with an approximate bottom of 646 and a design HWL of 649.0. The design detention volume was not available, but according to the Cook County 1-foot aerial



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topography, the volume up to elevation 649.0 is approximately 1.56 acre-feet, about half the detention provided by Lake Claire.

If Lake Claire floods above its design HWL, it floods to the north and to the east at the southeast corner of the lake. However, the overflow route to the north is lower and it floods at least one home due to overbank flooding. According to the Cook County 1-foot aerial topography, if the lake elevations exceed those of Shawn Lane, then stormwater would reach Wheeling Road where it would then flow north towards McDonald Creek. The overland flow route to the east located at the southeast corner of the lake is approximately 1 foot higher than the north route and would likely not be accessed unless the storm were extreme. City staff has not observed such a condition to date.

The Shires Pond has not caused overbank flooding to the adjacent properties, rather, during storm events the pond does not appear to fill to the level that would be expected. The overland flow route when water exceeds the design HWL is to the south at the southeast corner of the basin. If the basin were to fill up, water would spill onto this overland flow route and proceed south along the backyards of properties on Coldren Drive. The Cook County aerial topography suggests that a couple of the properties are only about 1 foot above the low points of this route.

Table 2 summarizes the 9 flood questionnaires returned in this study area.

TABLE 2
Lake Claire/Shires Pond Study Area
Flood Questionnaire Summary

| Location | Questionnaires Submitted to the City | Basement Flooding (questionnaires reporting) | Basement Flooding Depth Reported (ranges) | Total Damage Reported* |
|---|---|---|---|---|
| Thierry Lane | 3 | 1 | None reported | $35,000 |
| Shawn Lane | 3 | 2 | 1 to 4 inches | $31,500 |
| Claire Lane | 1 | None reported | None reported | $5,000 |
| Wheeling Road | 1 | None reported | None reported | $5,000 |
| Brian Lane | 1 | None reported | None reported | $10,000 |
| **TOTAL** | **9** | **3** | | **$86,500** |

*Note: The reported damages are taken directly from the flood questionnaire.

## STORMWATER DEFICIENCIES

Based on field visits, assessment of the topography, verbal communication with Public Works staff, and the limited existing storm sewer system shown on the City atlases for this area, the following stormwater deficiencies have been identified for this area:



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1. The study area has two detention areas that were designed according to the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) requirements, which are still in effect as of the date of this memorandum. However, the flooding of Lake Claire is causing flooding to adjacent properties, which are due to the lake exceeding its HWL and the long duration which the pond takes to drain.
2. There is one storm sewer system that drains this area and connects the two ponds, and City staff indicates that surcharging of this storm sewer is not a problem and therefore appears to have sufficient capacity to convey the amount of runoff entering it during storm events that do not exceed its design capacity. Therefore, the restrictor at Lake Claire appears to be subject to clogging and/or there is a blockage somewhere in the system.
3. The clogging or blockage is not only causing flooding levels at Lake Claire to be higher than they otherwise would be, but also to drain more slowly. This slow draining negatively influences the groundwater levels around the adjacent properties, and sump pumps are likely not able to sufficiently drain their sumps.
4. No dedicated and adequate overland flow path exists to drain Lake Claire, and the overflow route to the north is not low enough to minimize flooding. The 501 Shawn Lane property, which is adjacent to the overflow route, has a below-grade driveway/garage. This condition creates an opening to flood this home.
5. The Shires Pond does not appear to be effectively storing water. This could be caused by a compromised restrictor.
6. The Shires Pond also has an overflow grated structure that is in need of repair or replacement. Photograph 3 below shows this structure.



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PHOTOGRAPH 3
Shires Pond Emergency Flow Structure (north of Lake Claire)

## APPROACH TO SOLUTIONS

This area experiences flooding mainly because Lake Claire floods beyond its HWL and drains slowly. There is no mapped floodplain or floodway within the Lake Claire/Shires Pond areas. There are no available photographs for this area during the July 23, 2011 storm event, however, during a field visit to 501 Shawn Lane flooding signs were observed.

In general, structural approaches for alleviating flooding problems can be categorized into two types: storage creation, or conveyance improvements. Typically, conveyance improvements alone may cause impacts to downstream properties, and detailed modeling would be necessary to determine the location and magnitude of these impacts, which is beyond the scope of this study.

Aside from possible public improvements, it is recommended that the City encourage all



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residents to flood-proof their homes, especially those who have experienced flooding in the past. This will reduce the risk of future flooding due to overland flow, seepage and sump pump failures. A list of simple and inexpensive flood-proofing measures has been included as Attachment 1 of this memorandum. This recommendation is in addition to any other drainage improvements on public or private property.

There are various approaches to alleviating flooding for this area:

- The storm sewer system between Lake Claire and Shires Pond should be televised to check for blockage. Since no surcharging was reported, it is anticipated that the restrictor is the likely cause of the lake not functioning properly. However, the televising will confirm this condition.
- The overland flow route to the north of Lake Claire should be surveyed to determine if minor improvements could be made to provide further protection. It is not anticipated that this approach by itself would provide sufficient conveyance to protect the below-grade garage of 501 Shawn Lane, however, it could be combined with flood proofing improvements to the property for maximum effectiveness.
- The Shires Pond drainage structures should be repaired.

## ALTERNATIVE DRAINAGE SOLUTIONS

The possible drainage solutions for the Lake Claire/Shires Pond study area were developed at a concept level based on feasibility of implementation and cost effectiveness. Based on this analysis, CBBEL identified the following alternatives to reduce the risk of flooding in this area:

1. Televise and clean the 24 inch storm sewer system that drains Lake Claire.
2. Replace the restrictor structure at Lake Claire to a structure that could reduce clogging that it currently experiences. The MWRDGC permit obtained for this development will need to be amended so that the original release rate from Lake Claire is maintained.
3. The drainage system along the bottom of the Shires Pond should also be televised. Since this system is not flooding, the televising would be done to confirm that the system was substantially constructed according to plans.
4. Replace and/or repair the emergency overflow structure at Shires Pond.
5. While these two ponds are hydraulically connected, the Shires Pond does not receive flows from Lake Claire (unless conditions were created that could cause flow from the 24 inch storm sewer to back up into Shires Pond, which are very unlikely during a typical storm event). The improvements suggested for Lake Claire may not sufficiently lower elevations to alleviate flooding at 501 Shawn Lane. It should be noted that design rainfall standards have changed since Lake Claire was permitted, and the City now uses a higher rainfall for detention design. The Shires Pond has been reported to not fill to design levels. City staff has contemplated improvements



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that could optimize the functioning of these two detention ponds. To accomplish this, detailed hydrologic/hydraulic modeling would be necessary to size the improvements. Both MWRDGC permits would need to be amended, but conceptual approvals from MWRDGC should be obtained first as the release rates that could result may not strictly meet their criteria. This alternative should only be investigated after the results of the televising suggested above are reviewed, and the first step would be to meet with MWRDGC to discuss the approach and receive a conceptual acceptance that if the models show a more optimal set-up for both ponds, that MWRDGC would permit the project. This approach would also determine what the impacts of the McDonald Creek floodplain elevations are to the storm sewer system. Because the downstream floodplain elevation is 647, which is above the NWL of both ponds, tailwater impacts are anticipated, but would need to be quantified by the modeling.



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## RECOMMENDATIONS

Based on this analysis, CBBEL presents the pros and cons of each alternative, and provides estimated costs and a recommendation.

TABLE 3
Lake Claire/Shires Pond Flooding Problem Area
Alternatives Analysis Summary

| Alternative | Description | Pros | Cons |
|---|---|---|---|
| 1 | Televise and clean the 24 inch sewer that drains Lake Claire | • Can be performed by City staff<br>• Results would determine if additional investigations are necessary | • May not address the problem at Lake Claire |
| 2 | Replace the restrictor at Lake Claire | • Would be subject to less clogging<br>• May decrease inundation times<br>• Cost-effective | • Will not eliminate flooding or level of inundation for large storm events<br>• Will require permit from MWRDGC |
| 3 | Televise the Shires Pond system with the pond limits | • Will verify that the system was constructed according to plans | • (none) |
| 4 | Replace or repair the emergency overflow structure at Shires Pond | • Will restore design conditions | • (none) |
| 5 | Perform hydrologic and hydraulic modeling to optimize the use of both ponds | • Will determine if additional improvements beyond those described above can be made to optimize the use of both ponds<br>• If optimization is possible, the Lake Claire elevations would be lowered for typical storm events | • Will require MWRGC concept approval that such improvements would be acceptable based on the modeling<br>• An additional cost to perform the study<br>• Improvements may effect better functioning for moderate storm events, but may not improve large storm events |
| 6 | (After modeling) Alternative 4 *plus* reroute 24 inch from Lake Claire into Shires Pond and modify restrictor | • Will optimize the use of both ponds | • Will require MWRDGC permit<br>• Improvements may effect better functioning for moderate storm events, but may not improve large storm events |

Table 4 below provides a summary of conceptual cost estimates associated with each of the above alternatives. The detailed conceptual cost estimates can be found under Attachment 2.



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TABLE 4
Lake Claire/Shires Pond Flooding Problem Area
Alternatives Analysis Cost Summary

| Alternative | Description | Estimated Cost |
|---|---|---|
| 1 | Televise and clean the 24 inch sewer that drains Lake Claire | $14,000 |
| 2 | Replace the restrictor at Lake Claire | $13,000 |
| 3 | Televise the Shires Pond system with the pond limits | $3,000 |
| 4 | Replace or repair the emergency overflow structure at Shires Pond | $60,000 |
| 5 | Perform hydrologic and hydraulic modeling to optimize the use of both ponds | $35,000 |
| 6 | (After modeling) Alternative 4 *plus* reroute 24 inch from Lake Claire into Shires Pond and modify restrictor | $77,000 |

Based on the above, CBBEL recommends the following:

- The City should televise both the 24 inch system and the Shires Pond drainage system within the pond limits. The results of this study would suggest further action.
- The City should replace the restrictor at Lake Claire to one that is less subject to clogging. The possibility of relocating this restrictor further downstream should be discussed with MWRDGC. This relocation may improve the functioning while substantially maintaining the existing flow rates, although the modeling recommended under Alternative 5 may be necessary to determine an optimal location.
- The City should field survey the overland flow to the north of Lake Claire. The results of this survey may suggest whether minor improvements can be made to this overland route to reduce flooding when the lake exceeds its design HWL.



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- Alternative 5 is only recommended after the televising tasks, and the City should meet with MWRDGC staff prior to authorizing any modeling to proceed to confirm their conceptual agreement. If this alternative is selected for further investigation, then the overland flow route for the Shires Pond should be field surveyed, including the adjacent homes. Although this overland flow route is not reportedly flooded during large events because the Shires Pond does not overtop, any solution should include the limitations of this overland flow route.
- Alternative 6 would only be recommended after the modeling under Alternative 5 is performed and the benefits can be quantified. Alternative 6 is recommended as a long term solution to the flooding at Lake Claire.

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# Attachment 1

Flood-proofing Techniques

# TIPS ON FLOOD PREVENTION FOR HOMEOWNERS

- Clean gutters and install gutter covers to prevent clogging.
- Redefine and clear swales throughout yard to allow an appropriate drainage way for storm water runoff.
- Raise the low entry elevation at which storm water can enter your home by berming around basement doorways or windows. A pump may be required to drain water away from inside the berm.
- Verify existing sump pump and outlet pipe have sufficient capacity for discharging during intense storm events.
- Provide a relief outlet for the sump pump outside of the house that is a safe distance from the foundation in case of surcharge, frozen outlet pipe, or other blockage.
- Install a backup source of power for sump pump in case of electrical power failure.
- Extend downspouts away from the foundation 5-10 feet.
- Repair foundation cracks throughout basement to prevent seepage.
- Raise the low-entry elevation of window wells and/or install drains in the window wells and connect them to the sump pump system.
- Install glass block windows in place of basement windows (except escape window) to prevent water inflow or infiltration.
- If a storm sewer structure is adjacent to the lot, an underdrain system could be installed to collect excess runoff, any remaining seepage or any infiltration resulting from hydrostatic pressure.
- For homes with a reverse-slope driveway, raise the sidewalk elevation to reduce the risk of standing water in the street draining down the driveway and into the garage.
- To further reduce the risk of flooding for homes with reverse slope driveways, it may be necessary to convert the lower level garage into a basement and completely fill in the reverse-slope driveway.

The recommendations provided above may not eliminate flooding or flood damage within the residence; however, if installed correctly they should effectively reduce the risk of flooding. It is should also be noted that any of the recommendations may be implemented

individually, however, many suggestions may be used in conjunction with one another to provide a greater impact in helping to reduce the risk of future flood damage.

## WEBSITE LINKS FOR FLOOD PREVENTION

Lake County Stormwater Management Commission Website
http://www.co.lake.il.us/smc/citizens/default.asp

"Repairing Your Flooded Home" by FEMA and the Red Cross
http://www.co.lake.il.us/smc/fwa/ARC_RepFloodedHome.pdf

"Drainage Around Your Home" by the National Resource Conservation Service
http://www.co.lake.il.us/smc/citizens/drainbro.pdf

"Homeowners Guide to Retrofitting: Six Ways to Protect Your Home from Flooding" by FEMA
http://www.fema.gov/rebuild/mat/rfit.shtm

"Guide to Flood Protection in Northeastern Illinois" by the Illinois Association for Floodplain and Stormwater Management
http://www.illinoisfloods.org/documents/Guide_to_Flood_Prot--March_06.pdf

**Attachment 2**
Cost Estimates

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Project # 11-412
Date: Sept. 17, 2012

Prospect Heights, Proposed Drainage Improvements
Lake Claire/Shires Pond - Alt 1

| ITEMS | UNIT | QUANTITY | UNIT PRICE | TOTAL COST |
|---|---|---|---|---|
| CLEAN AND TELEVISE STORM SEWER, 24" | FOOT | 2550 | $3.00 | $7,650.00 |

| | |
|---|---|
| SUB TOTAL = | $7,650.00 |
| CONTINGENCY (30%) = | $2,295.00 |
| CONSTRUCTION TOTAL = | $9,945.00 |
| REVIEW TAPES AND MAKE REPAIR RECOMMENDATIONS= | $4,000.00 |
| **TOTAL PROJECT COST INCLUDING ENGINEERING =** | $13,945.00 |

NOTE: THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISTION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY UTILITIES

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Prospect Heights, Proposed Drainage Improvements
Lake Claire/Shires Pond - Alt 2

| ITEMS | UNIT | QUANTITY | UNIT PRICE | TOTAL COST |
|---|---|---|---|---|
| REPLACE RESTRICTOR/STRUCTURE | EACH | 1 | $5,000.00 | $5,000.00 |
| RESTORATION | L SUM | 1 | $2,000.00 | $2,000.00 |

| | |
|---|---|
| SUB TOTAL = | $7,000.00 |
| CONTINGENCY (30%) = | $2,100.00 |
| CONSTRUCTION TOTAL = | $9,100.00 |
| DESIGN= | $4,000.00 |
| **TOTAL PROJECT COST INCLUDING ENGINEERING =** | $13,100.00 |

NOTE: THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISTION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY UTILITIES

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Prospect Heights, Proposed Drainage Improvements
Lake Claire/Shires Pond - Alt 1

| ITEMS | UNIT | QUANTITY | UNIT PRICE | TOTAL COST |
|---|---|---|---|---|
| CLEAN AND TELEVISE STORM SEWER, 6-12"" | FOOT | 350 | $4.00 | $1,400.00 |

| | |
|---|---|
| SUB TOTAL = | $1,400.00 |
| CONTINGENCY (30%) = | $420.00 |
| CONSTRUCTION TOTAL = | $1,820.00 |
| REVIEW TAPES AND MAKE REPAIR RECOMMENDATIONS= | $1,000.00 |
| **TOTAL PROJECT COST INCLUDING ENGINEERING =** | $2,820.00 |

NOTE: THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISTION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY UTILITIES

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Prospect Heights, Proposed Drainage Improvements
Lake Claire/Shires Pond - Alt 4

| ITEMS | UNIT | QUANTITY | UNIT PRICE | TOTAL COST |
|---|---|---|---|---|
| REPLACE EMERGENCY OVERFLOW | EACH | 1 | $35,000.00 | $35,000.00 |
| RESTORATION | L SUM | 1 | $5,000.00 | $5,000.00 |

| | |
|---|---|
| SUB TOTAL = | $40,000.00 |
| CONTINGENCY (30%) = | $12,000.00 |
| CONSTRUCTION TOTAL = | $52,000.00 |
| DESIGN= | $8,000.00 |
| **TOTAL PROJECT COST INCLUDING ENGINEERING =** | $60,000.00 |

NOTE: THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISTION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY UTILITIES

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Prospect Heights, Proposed Drainage Improvements
Lake Claire/Shires Pond - Alt 5

H & H Modeling = $35,000

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
Project # 11-412
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Prospect Heights, Proposed Drainage Improvements
Lake Claire/Shires Pond - Alt 6

| ITEMS | UNIT | QUANTITY | UNIT PRICE | TOTAL COST |
|---|---|---|---|---|
| REPLACE OUTLET STRUCTURE | EACH | 1 | $25,000.00 | $25,000.00 |
| NEW INLET PIPE/FES | L SUM | 1 | $7,500.00 | $7,500.00 |
| MANHOLE | EACH | 1 | $5,000.00 | $5,000.00 |
| RIPRAP | SQ YD | 25 | $100.00 | $2,500.00 |
| RESTORATION | L SUM | 1 | $3,500.00 | $3,500.00 |

| | |
|---|---|
| SUB TOTAL = | $43,500.00 |
| CONTINGENCY (30%) = | $13,050.00 |
| CONSTRUCTION TOTAL = | $56,550.00 |
| DESIGN= | $10,000.00 |
| PERMITTING= | $10,000.00 |
| **TOTAL PROJECT COST INCLUDING ENGINEERING =** | $76,550.00 |

NOTE: THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISTION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY PRIVATE UTILITIES