CITY OF ELMHURST

209 NORTH YORK STREET
ELMHURST, ILLINOIS 60126-2759
(630) 530-3000
www.elmhurst.org

April 28 2014

TO: Mayor Morley and Members of the City Council
RE: New Single Family Home Stormwater Management Policy

The Public Works and Buildings Committee met several times and again on Monday, April 28, 2014 to discuss a new single family home stormwater management policy for redeveloped properties.

The Comprehensive Flood Plan created by Christopher Burke Engineering (CBBEL) recommended modifications to current stormwater practices required by the City to improve the performance of the stormwater collection system and to prevent flood damages. To improve the function of the storm sewer system, CBBEL recommended that the following revisions be made to the City Ordinance: specify a maximum allowable impervious percentage per lot, remove the requirement of directly connecting sump pumps and downspouts to the storm sewer, and require redevelopments with deeper basements to provide mitigation for displaced groundwater storage volume.

The purpose of the New Single Family Home Stormwater Management Policy is to provide storage volume to offset the increase in stormwater runoff volume that may result from a redeveloped property. The proposed policy will no longer allow the direct connection of sump pumps and downspouts to the storm sewer unless determined necessary to avoid structural damage to the new home or adjacent homes).

The most-widely used method of calculating stormwater runoff volume is the National Resources Conservation Service (NRCS) Runoff Curve Number (CN) method. The NRCS formula uses curve numbers based on land usage to determine additional run off from the 100 year rain event (7.58"). It is recommended that this formula be applied to the maximum allowable impervious percentage lot coverage. Applying this formula to the maximum allowable impervious lot coverage will provide stormwater management for future construction, include a factor of safety and compensate for uncertainties (unknown sump pump discharge volumes). Mitigation for displaced groundwater storage was determined not to be required as the ground water elevations are generally deeper than the proposed basement depths.

The maximum allowable impervious lot coverage shall be 60%. If the Development, Planning and Zoning Committee determine a different maximum allowable impervious lot coverage, the formula shall be adjusted to reflect the approved maximum allowable impervious lot coverage. The calculated runoff volume using the NRCS formula applied to the maximum allowable impervious lot coverage shall be provided for all new single family homes.

TO: Mayor Morley and Members of the City Council

RE: New Single Family Home Stormwater Management Policy

Each new home development shall provide the required stormwater storage in a manner that promotes stormwater infiltration into the ground while also providing volumetric storage for the additional runoff. The stormwater storage system must be designed by a licensed Civil Engineer and must be shown on the signed and sealed site plan that is submitted at the time of the building permit applications. The stormwater management system can be in the form of a french-drain, rain garden, underground storage system, rainwater harvesting system, combination thereof, or other design as approved by the City Engineer. All roof runoff and sump pump discharge shall be splashed on grade and directed to the stormwater management system via grading; where possible. The location of the stormwater management system shall be determined by the engineer.

The following are several examples of stormwater management systems that will provide approximately 400 cubic feet of stormwater volume: a permeable paver driveway or patio with the dimensions of 20 feet x 20 feet with 3 feet of stone underneath, a dry well (stone) with the dimensions of 12 feet x 12 feet x 8 feet deep, a dry well (stone) with the dimensions of 12 feet x 8.5 feet x 5 feet deep with a manufactured chamber inside, a detention area or rain garden that is 20 feet x 40 feet x an average of 6 inches deep, a concrete underground vault that is 10 feet x 10 feet x 4 feet.

In addition, the Public Works and Buildings Committee has committed to reviewing and recommending appropriate stormwater management requirements for impervious improvements to existing homes, such as additions, patios, sport courts, etc. The Committee has also committed to review a fee in lieu and/or incentive program for both new and existing homes to address individual physical site limitations and encourage additional stormwater management.

It is, therefore, the recommendation of the Public Works and Buildings Committee that new single family home stormwater management policy as outlined above, be approved.

Respectfully submitted,

PUBLIC WORKS AND BUILDINGS COMMITTEE

Jim Kennedy (recused)
Jim Kennedy, Chairman

Chris Healy (recused)
Chris Healy, Vice Chairman

Michael J. Bram (recused)
Michael J. Bram

Diane Gutenkauf (recused)
Diane Gutenkauf

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MEMORANDUM

TO: Public Works and Buildings Committee

FROM: Cori Tiberi
Asst. Director of Public Works

RE: New Single Family Home Stormwater Management Policy

DATE: April 10, 2014

The Comprehensive Flood Plan created by Christopher Burke Engineering (CBBEL) recommended modifications to current stormwater practices required by the City to improve the performance of the stormwater collection system and to prevent flood damages. To improve the function of the storm sewer system, CBBEL recommended that the following revisions be made to the City Ordinance: specify a maximum allowable impervious percentage per lot, remove the requirement of directly connecting sump pumps and downspouts to the storm sewer, and require redevelopments with deeper basements to provide mitigation for displaced groundwater storage volume.

The purpose of the New Single Family Home Stormwater Management Policy is to provide storage volume to offset the increase in stormwater runoff volume that may result from a redeveloped property. The proposed policy will no longer allow the direct connection of sump pumps and downspouts to the storm sewer (unless determined necessary to avoid structural damage to the new home or adjacent home).

The most-widely used method of calculating stormwater runoff volume is the National Resources Conservation Service (NRCS) Runoff Curve Number (CN) method. The NRCS formula uses curve numbers based on land usage to determine additional run off from the 100 year rain event (7.58"). It is recommended that this formula be applied to the maximum allowable impervious percentage lot coverage (to be determined by the Planning and Zoning Committee). Applying this formula to the maximum allowable impervious lot coverage will provide stormwater management for future construction, include a factor of safety and compensate for uncertainties (unknown sump pump discharge volumes). Mitigation for displaced groundwater storage was determined not to be required as the ground water elevations are generally deeper than the proposed basement depths.

Staff and Christopher Burke Engineering will be present on Monday, April 14, 2014 to assist with discussion and answer any additional questions.

NCRS RUNOFF FORMULA

The increase in stormwater runoff volume will be quantified for the 100-year, 24-hour storm event (rainfall depth = 7.58 inches), because it represents the maximum increase in stormwater runoff volume. The required storage volume that each property must provide is the amount of volume necessary to match the existing condition. Under proposed conditions, it is assumed that each lot will be built out to the maximum allowable impervious percentage for that lot size, which accounts for any construction (patios, decks, etc.) that may take place in the future. This procedure quantifies the required storage volume for each redeveloped property.

NRCS Runoff Equation

The most-widely used (and simplest) method of calculating stormwater runoff volume is the Natural Resources Conservation Service (NRCS) Runoff Curve Number (CN) method. The NRCS runoff equation is:

$$R = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$

Where,

R = runoff depth (in) from lot
P = rainfall depth used to calculate runoff (100-year, 24-hour depth = 7.58 in.)
S = potential maximum retention after runoff begins (in), and is calculated by:

$$S = \frac{1000}{CN} - 10$$

Where,

CN = composite runoff curve number for the lot

The composite curve number is a weighted average of the different land uses that make up each lot. For residential areas in Elmhurst, the main types of land use are: open space (grassed areas) and impervious area. By computing the CN for each lot (existing and proposed conditions) the total increase in runoff volume for the lot can be quantified. The volume of stormwater runoff, V (ft^3), from the lot area, A (ft^2) can then be calculated by the following equation:

$$V = A \times \frac{R}{12}$$

It is recommended that only three types of land use be allowed in determining the CN for a site. These land uses, and their corresponding CN values, are provided in the table below.

Land Use Description	CN Value
Open space (lawn)	74
Unconnected Impervious Area	93
Rain Garden	63

The difference between the proposed runoff volume and the existing runoff volume is the required storage volume. To simplify the procedure, a spreadsheet has been developed that only requires applicants to enter the land use areas for the existing and proposed developments. The required stormwater volume is automatically computed based on the user inputs.

It should be noted that when providing storage in a rain garden, there are two benefits: (1) the area of the rain garden reduces the CN and therefore the volume of stormwater runoff volume, and (2) it can provide a portion (or all) of the required stormwater volume.

Existing Site Information:

Pervious Area (Lawn) =	0.13	acres
Rain Garden Area =	0.00	acres
Impervious Area =	0.11	acres
Total Lot Area =	0.24	acres
Curve Number, CN =	82.71	

NRCS Runoff Equation:

Total Site Area, A (ac) =	0.24
Runoff, R (in) =	5.54
P = rainfall depth (in) =	7.58
CN =	82.71
S =	2.09
Runoff Volume Over Lot, V (ft^3) =	4,830

*User Values Are Entered in Red

Proposed Site Information:

Pervious Area (Lawn) =	0.10	acres
Rain Garden Area =	0.00	acres
Maximum Impervious Area =	0.14	acres
Maximum Impervious % =	60	
Total Lot Area =	0.24	acres
Curve Number, CN =	85.40	

NRCS Runoff Equation:

Total Site Area, A (ac) =	0.24
Runoff, R (in) =	5.86
P = rainfall depth (in) =	7.58
CN =	85.40
S =	1.71
Runoff Volume Over Lot, V (ft^3) =	5,101

*User Values Are Entered in Red

Required Stormwater Volume (ft^3) = 271

NRCS

Address	Lot Size (ft^2)	#1) NRCS Runoff Formula -Indirect Connection (ft^3): Formula = Volume equal to the increase in stormwater runoff for the 100-yr, 24-hr storm event (7.58") 50% MAX. LOT COVERAGE	#2) NRCS Runoff Formula -Indirect Connection (ft^3): Formula = Volume equal to the increase in stormwater runoff for the 100-yr, 24-hr storm event (7.58") 55% MAX. LOT COVERAGE	#3) NRCS Runoff Formula -Indirect Connection (ft^3): Formula = Volume equal to the increase in stormwater runoff for the 100-yr, 24-hr storm event (7.58") 60% MAX. LOT COVERAGE
160 Pine Street	8312	227	303	380
164 Pine Street	7813	162	233	305
167 Avon Road	8250	719	794	870
169 Avon Road	8250	158	234	310
170 Evergreen Avenue	8550	299	377	456
420 S. Fairfield Avenue	7000	84	149	213
441 Oak Street	7260	120	187	253
448 Emery Lane	7260	351	418	484
546 Howard Avenue	7800	97	169	240
565 Linden Avenue	7954	59	132	205
587 Hillcrest Avenue	8000	304	377	450
591 Hillcrest Avenue	8000	492	565	638
657 Fairfield Avenue	7280	82	149	216
739 Bryan Street	7942	167	240	312
777 Howard Avenue	7926	141	214	286
919 Chatham Avenue	9000	404	486	569
Average	***7912***	***242***	***314***	***387***

Address	Lot Size (ft^2)	#1) NRCS Runoff Formula -Indirect Connection (ft^3): Formula = Volume equal to the increase in stormwater runoff for the 100-yr, 24-hr storm event (7.58") 50% MAX. LOT COVERAGE	#2) NRCS Runoff Formula -Indirect Connection (ft^3): Formula = Volume equal to the increase in stormwater runoff for the 100-yr, 24-hr storm event (7.58") 55% MAX LOT COVERAGE	#3) NRCS Runoff Formula -Indirect Connection (ft^3): Formula = Volume equal to the increase in stormwater runoff for the 100-yr, 24-hr storm event (7.58") 60% MAX LOT COVERAGE
481 W. Second Street (vacant)	9938	897	988	1079
618 Belden Avenue (vacant)	9000	812	895	977
394 Ridgeland (vacant)	7392	667	735	803
916 Spring Road (vacant)	6650	600	661	722
171 Columbia	11050	334	435	536
199 Kenmore Avenue	11867	555	664	773
273 E. Vallette Street	11985	682	792	902
473 S. Kenilworth Avenue	17000	901	1057	1213
386 S. Kenilworth Avenue	19142	743	918	1094
Average	***11558***	***688***	***794***	***900***