

LAND USE _____
MEMORANDUM

To: Village President Austin and Board of Trustees

From: Kevin Barr, Village Manager *KS*

Date: May 17, 2018

Subject: Park Avenue Basin Study

PUBLIC SAFETY _____

PUBLIC SERVICES 6.6 5/21/18

Issue: The Park Avenue Basin Study ("Study") prepared by Burke Engineering has been completed. Staff would like to discuss this with the Village Board and determine future steps.

Analysis: As promised, the Study has been completed and the results are attached. Staff met several weeks ago with affected and concerned residents (mostly living on the 400 block of Colfax) who are aware that the Study was scheduled to be completed and presented to the Board at the May 21 Board Meeting. The primary document of the report ("Draft Summary Report – 5-14-18) is attached along with various exhibits that show details including topographical information.

The results of this study are complex and, unfortunately, provide no easy solutions to the identified storm water issues and concerns. The Executive Summary (pages 2 and 3 of the Draft Summary Report) does a good job of summarizing the studied options. The general conclusion is that all of the studied options involve substantial expense (minimum of \$531,000) and/or do "not produce a significant positive flood reduction benefit."

Given the complexity of the Study, and its importance to the residents on Colfax, staff believes a full review of the Study deserves more time than we can devote at the May 21 meeting. Therefore, in consultation with Trustee Freve as chair of the Public Services Committee ("Committee"), we believe it would be best to refer this matter to that Committee to allow for more detailed analysis and in order to develop recommendation for the full Village Board.

Don Dressel from Burke Engineering will be at the May 21 meeting and any subsequent Committee meeting to answer questions and assist with the discussion. He will make a more detailed presentation in front of the Committee.

Action Requested: Staff recommends introductory discussion and referral to the Committee for further review.



VILLAGE OF CLARENDON HILLS

**Dallas Street and Park Avenue
Stormwater Basins Study**

SUMMARY REPORT

Prepared for

Village of Clarendon Hills

May 17, 2018

Prepared by

**Christopher B. Burke Engineering, Ltd.
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CBEL Project No. 18-0093

TABLE OF CONTENTS

Table of Contents.....	i
List of Exhibits.....	i
List of Tables.....	i
Executive Summary.....	2
Background	4
Study.....	4
Study Purpose	4
Baseline Conditions.....	5
Drainage Improvement Alternatives.....	7
Alternative 1.....	8
Alternative 2.....	9
Alternative 3.....	10
Alternative 4.....	11
Alternative 5.....	12
Summary	13
Conclusions	16

LIST OF EXHIBITS

1. Location Map
2. Existing Conditions
3. Baseline Conditions – Park Avenue Stormwater Basin
4. Baseline Conditions – Park Avenue and Dallas Street Stormwater Basins
5. Proposed Conditions – Alternative 1
6. Proposed Conditions – Alternative 2
7. Proposed Conditions – Alternative 3
8. Proposed Conditions – Alternative 4
9. Proposed Conditions – Alternative 5

LIST OF TABLES

1. Baseline Conditions – Storage Basin Parameters
2. Baseline Conditions – Critical Duration Summary
3. Baseline Conditions Summary
4. Alternative 1 XP-SWMM WSE Summary

5. Alternative 2 XP-SWMM WSE Summary
6. Alternative 3 XP-SWMM WSE Summary
7. Alternative 4 XP-SWMM WSE Summary
8. Alternative 5 XP-SWMM WSE Summary
9. Alternative WSE's Summary
10. LOP Results for Surveyed Single-Family Homes/Garages North of Colfax Avenue

DRAFT

EXECUTIVE SUMMARY

The Village of Clarendon Hills (Village) hired Christopher B. Burke Engineering, Ltd. (CBBEL) to evaluate drainage improvement alternatives that would reduce the frequency when either the Dallas Street Stormwater Basin (DSSB) or Park Avenue Stormwater Basin (PASB) reach their stormwater storage capacity. The rear yards of some of the homes located north of Colfax Avenue become inundated from both overland flow when DSSB exceeds its capacity and when the PASB water surface elevation increases.

The Village requested CBBEL evaluate the effectiveness of the following five (5) drainage improvement alternatives in reducing the frequency and inundation levels in the Colfax Avenue rear yards:

- Alternative 1 – Earthen Berm constructed along the rear yard property boundary of the Colfax Avenue single-family homes located south of the PASB (Earthen berm will be located wholly on Village property).
- Alternative 2 – Lower the existing soccer field within the PASB to provide additional stormwater storage volume.
- Alternative 3 – Expand the PASB eastward into four (4) adjacent lots to provide additional stormwater storage volume.
- Alternative 4 – Deepen the DSSB to provide additional stormwater storage volume. A pump station will be required to dewater the modified DSSB.
- Alternative 5 – Expand the DSSB northward into four (4) adjacent lots (located within the Village of Westmont (Westmont)) to provide additional stormwater storage volume.

The XP-SWMM Hydrologic and hydraulic model was used to establish the Baseline Conditions DSSB and PASB water surface elevations for various critical duration storm events. The Baseline Conditions XP-SWMM was then used to simulate the five (5) drainage improvement alternatives.

The concept level cost estimates included in this report have the following assumptions:

- The estimate does not include Right of Way (ROW) or property acquisition, temporary or permanent easements, or relocating any existing utilities (Village or Private) costs.
- Prices are 2018 construction costs.
- The estimate assumes all earth excavation material is hauled off and meets CCDD requirements.
- The estimate does not include wetland mitigation costs.
- The estimate does not include costs for removing/relocating any landscaping/athletic field items, proposed underdrains, or improvements to the athletic fields.
- The estimate does include demolition costs.

The following is a summary of the drainage improvement alternative evaluation:

- Alternative 1
 - The concept level cost estimate is \$785,000.
 - The proposed berm will block the overland stormwater flow path that exists today between the Colfax Avenue single-family homes. The overland flow path allows excess flow from the DSSB to reach the PASB. The berm will result in an increase in the storm event WSEs impacting the single-family homes. In addition, the construction of the berm will reduce the available PASB stormwater storage volume by 6.1 acre-feet or 11% resulting in increased PASB WSEs.
 - ***Alternative 1 is not recommended for further study since it results in adverse drainage impacts.***
- Alternative 2
 - The concept level cost estimate is \$638,000.
 - This alternative would only slightly reduce the risk of inundation for the Colfax Avenue homes and rear yards.
 - ***This alternative is not recommended for further study unless combined with an DSSB increased stormwater storage alternative.***
- Alternative 3
 - The concept level cost is \$929,000.
 - This alternative would only slightly reduce the risk of inundation for the Colfax Avenue homes and rear yards.
 - ***This alternative is not recommended for further study since it does not produce a significant positive flood reduction benefit and requires the acquisition of private properties.***
- Alternative 4
 - The concept level cost is \$ 2,355,000.
 - This alternative would reduce the risk of inundation to the Colfax Avenue homes and rear yards.
 - ***If desired by the Village, this alternative could be furthered studied since it does provide flood reduction benefits. The further study would include potential optimization of the DSSB outflow control and to combine it with Alternative 2. This alternative will need coordination with Westmont.***
- Alternative 5
 - The concept level cost is \$531,000.
 - This alternative would only slightly reduce the risk of inundation for the Colfax Avenue homes and rear yards.
 - ***This alternative is not recommended for further study since it does not produce a significant positive flood reduction benefit and requires the acquisition of private properties located within Westmont.***

BACKGROUND

The existing DSSB is located west of Richmond Avenue and north of the extended Dallas Street within Westmont as shown on **Exhibit 1**. The grass bottom DSSB temporary stores Westmont stormwater from a ± 92 -acre drainage area. A 15-inch diameter storm sewer conveys low flow around the DSSB and discharges into the Richmond Avenue storm sewer. When the low storm sewer is at capacity, excess stormwater will be diverted in the DSSB. DSSB drains by an 18-inch gravity storm sewer into the Richmond Avenue storm sewer. The Richmond Avenue storm sewer flows south to north and eastward into the Village's PASB located east of Richmond Avenue and south of Park Avenue as shown on **Exhibit 1**. The PASB drainage area is ± 265 acres. The grass bottom PASB is dewatered into the Park Avenue 42-inch diameter storm sewer by a pump station. The PASB has an existing soccer field within the middle of the property. The Park Avenue 42-inch diameter storm sewer conveys flow eastward discharging to Flagg Creek as shown on **Exhibit 2**.

Both the DSSB and PASB have limited stormwater storage capacity. When the DSSB fills to capacity excess stormwater will flow over the concrete emergency spillway located along the eastern boundary of the DSSB. The excess stormwater will flow onto Richmond Avenue where the stormwater will proceed northward to the Richmond Avenue and Colfax Avenue intersection. At this point, the stormwater will continue to flow northward along Richmond Avenue and eastward along Colfax Avenue. The Richmond Avenue flow will continue northward and then eastward into the PASB. The Colfax Avenue flow will proceed northward along the single-family home side yards into PASB.

When PASB reaches its storage capacity, excess stormwater will spill on Park Avenue and backup into the rear yards of the single-family homes located on the northside of Colfax Avenue. In addition, when excess stormwater flow overtops the DSSB spillway it can flow between the side yards of the single-family homes located north of Colfax Avenue and pond in the front and rear yards.

STUDY

STUDY PURPOSE

The Village hired CBEL to evaluate drainage improvement alternatives that would reduce the frequency when either the DSSB or PASB reach their stormwater storage capacity. The rear yards of some of the homes located north of Colfax Avenue become inundated from both overland flow when DSSB exceeds its capacity and when the PASB water surface elevation increases.

The first step in the study was to develop a Baseline Conditions hydrologic/hydraulic model that would represent the existing conditions of the watershed tributary to DSSB and PASB. CBEL previously completed a concept level Flood Risk Reduction Assessment study for the DSSB and Hosek Park study areas. This study was summarized in an October 28, 2013 Technical Memorandum. Hosek Park which is located between Harris Avenue and Ruby Street contains a dry stormwater basin. The XP-SWMM hydrologic/hydraulic modeling from this study was

updated to reflect current conditions within the DSSB and PASB watershed. The results from this Baseline Conditions modeling was used to compare the results of the concept level proposed drainage improvement alternatives.

The second step in the study was to use the Baseline Conditions XP-SWMM model to evaluate the effectiveness of the five (5) concept level proposed drainage improvement alternatives.

The following proposed concept level drainage improvement alternatives suggested by the Village were analyzed to determine their flood reduction benefits:

- Alternative 1 – Earthen Berm constructed along the rear yard property boundary of the Colfax Avenue single-family homes located south of the PASB (Earthen berm will be located wholly on Village property).
- Alternative 2 – Lower the existing soccer field within the PASB to provide additional stormwater storage volume.
- Alternative 3 – Expand the PASB eastward into four (4) adjacent lots to provide additional stormwater storage volume.
- Alternative 4 – Deepen the DSSB to provide additional stormwater storage volume. A pump station will be required to dewater the modified DSSB.
- Alternative 5 – Expand the DSSB northward into four (4) adjacent lots (located within Westmont) to provide additional stormwater storage volume.

The scope of this present study did not include evaluation of any combined alternatives.

BASELINE CONDITIONS

The Flagg Creek open channel begins at east of Eastern Avenue and south of Harris Avenue as shown on **Exhibit 2**. The total watershed at this point is 752 acres based on DuPage County 2-foot contour topographic mapping data and the Village's storm sewer atlas. Within this watershed, there is approximately 489 acres located within the Village and approximately 263 acres located within Westmont. The watershed boundary extends from Cass Avenue to the west and to 56th Street to the south as shown on **Exhibit 2**. Drainage is generally from west to east, towards Flagg Creek.

The Baseline Conditions XP-SWMM model was updated and/or enhanced as follows:

- Storm sewer inverts, sizes, and lengths were updated as necessary based on the Village's storm sewer atlas;
- Outlet characteristics of the DSSB, PASB, Blue Lake stormwater basin, and Hosek Park stormwater basin were updated based on the field survey information;
- Elevation-storage relationships for all stormwater basins were updated using field survey data;
- Additional field survey collected within the previously identified stormwater inundation areas near the DSSB and PASB were included the XP-SWMM Modeling.

The potential overland flow paths between single-family homes north of Colfax Avenue were field surveyed along the first-floor elevations and low entry elevations of the homes as shown on **Exhibit 3**. The Baseline Conditions parameters are listed in **Table 1**.

The Baseline Conditions critical storm duration was determined by comparing the maximum Water Surface Elevations (WSEs) within the modeled stormwater basins during the 1-, 2-, 3-, 6-, 12-, and 24- hour duration 100-year storm events. The critical duration of 24-hours was determined by the results included in **Table 2**.

Table 1 – Baseline Conditions - Storage Basin Parameters

Study Location	100-Year Storm Event High Water	100-Year Stormwater Volume (acre-feet/gallons)	Spillway Elevation
DSSB	727.2	10.2/3.3 million	726.5
PASB	724.6	54.3/17.7 million	724.5

Table 2 – Baseline Conditions Critical Duration Summary

100-year Storm Event Duration (hours)	DSSB	PASB	Blue Lake Stormwater Basin	Hosek Park Stormwater Basin
1	726.2	718.9	730.4	729.6
2	727.2	721.3	730.8	730.3
3	727.2	722.1	730.9	730.5
6	727.2	723.3	730.9	730.8
12	727.2	724.2	730.9	731.2
24	727.2	724.6	730.9	731.1

The Baseline Conditions 24-hour interval, critical duration 1-, 2-, 5-, 10-, 50-. And 100-year inundation elevations are summarized in **Table 3**.

Table 3 – Baseline Conditions Summary

Storm Event (yrs)/ Rainfall Depth/ Probability Storm Occurring any one year 24-Hour Duration	DSSB	PASB	Blue Lake Stormwater Basin	Hosek Park Stormwater Basin
1/2.51"/100%	721.7	715.5	725.7	727.2
2/3.04"/50%	722.6	716.4	726.1	727.8
5/3.80"/20%	724.5	717.5	727.2	728.4
10/4.47"/10%	725.6	719.1	729.0	729.0
25/5.57"/4%	726.7	721.9	730.7	729.8
50/6.46"/2%	727.1	723.4	730.8	730.4
100/7.48"/1%	727.2	724.6	730.9	731.1

The October 14, 2017 storm event produce approximately 6.2 inches of rainfall over 24 hours. This is slightly greater than the 25-year storm event.

The various storm event elevations and inundation delineations are included on **Exhibits 3 and 4**.

Based on the collected survey information and updated Baseline SWMM Model:

- The DSSB overtopping elevation of 726.5' is achieved at slightly less than a 25-year storm event.
- The PASB overtopping elevation of 724.5' is achieved slightly before the 100-year storm event. At a PASB WSE of 717.4' feet, inundation of the rear yards of the single-family homes located north of Colfax Avenue, which is approximately a 5-year storm event.
- The lowest entry elevation of the single-family homes that were field surveyed is 721.80'. A storm event frequency of approximately 25-year could produce an PASB elevation that would allow stormwater to enter this home. The other field survey low entry elevations are between 722.17' and 722.50'. Therefore, these single-family homes could also receive stormwater from PASB between the 25- to 50-year storm event.
- The field surveyed garage floor elevations vary from 720.54' to 723.15'. The garages are at risk of being inundated by PASB between a 10- to 50-year storm event.

DRAINAGE IMPROVEMENT ALTERNATIVES

The critical duration of 24-hours was applied in modeling the 1-, 2-, 5-, 10-, 50-, and 100-year inundation elevations associated with each of the proposed drainage improvement alternatives.

ALTERNATIVE 1

Alternative 1 consists of constructing a \pm 870 linear foot (lf) earthen berm along the south side of the PASB to separate the Colfax Avenue single-family residential homes from the PASB storm inundation area. The proposed berm would be located completely on Village property with an average height of 6'-8'. The berm ties into existing ground south of the water tower to the west and at the eastern boundary of PASB on the east. The average crest elevation of the berm is 726'. The proposed berm crest elevation averages 1'-2' above the finished floor of the Colfax Avenue single family homes. A 12-inch pipe will allow the area south of the berm to drain into PASB when the PASB WSE is below 716.0'. A duck bill backflow preventer will be placed on the PASB side. This device will prevent PASB stormwater from backing into the area south of the berm.

As previously noted, for storm events greater than 25-year recurrence interval, DSSB excess stormwater will overtop the emergency weir onto Richmond Avenue. The runoff then travels east-northeast along Colfax Avenue before continuing north between the single-family homes along the north side of Colfax Avenue. Alternative 1 would prevent the overland stormwater flow stormwater from reaching the PASB until the ponded water achieves an elevation 720.1'. PASB stormwater will access the area south of berm once it reaches an WSE of 720.1'

The storm event WSEs which would pond in the area south of the proposed berm is summarized and compared to Baseline Conditions in **Table 4**. The Baseline Conditions WSEs for DSSB, Blue Lake stormwater basin and Hosek Park stormwater basin do not change from Baseline Conditions and therefore are not included in **Table 4**. The components of proposed Alternative 1 is illustrated on **Exhibit 5**.

Table 4 – Alternative 1 XP-SWMM WSE Summary

Storm Event (24-hour) (year)	Baseline Condition PASB (WSE-ft)	Alternative 1 PASB (WSE-ft)	Difference (WSE – ft)	Baseline Conditions Area South of Berm (WSE-ft)	Alternative 1 Area South of Berm (WSE-ft)	Difference (WSE – ft)
1	715.5	716.1	+0.6	715.5	718.2	+2.7
2	716.4	717.0	+0.6	716.4	718.5	+2.1
5	717.5	718.3	+0.8	717.5	719.1	+1.6
10	719.1	720.2	+1.1	719.1	720.1	+1.0
25	721.9	722.7	+0.8	721.9	722.7	+0.8
50	723.4	724.0	+0.6	723.4	724.0	+0.6
100	724.8	725.0	+0.2	724.6	725.0	+0.4

The concept level cost estimate is \$785,000.

Because the proposed berm will block the overland stormwater flow path that exists today, the storm event WSEs impacting the single-family homes located on the northside of Colfax Avenue will increase. In addition, the construction of the berm will reduce the available PASB stormwater storage volume by 6.1 acre-feet or 11% resulting in increased PASB WSEs.

Alternative 1 is not recommended for further study since it results in adverse drainage impacts.

ALTERNATIVE 2

Alternative 2 consists of lowering the existing soccer field located within the middle of the PASB. This will provide additional stormwater storage volume. The lowering of the soccer field increases the stormwater storage volume by approximately 3.5 acre-feet (6.3%). The components of Alternative 2 is illustrated on **Exhibit 6**.

CBBEL updated the Baseline Conditions XP-SWMM model to reflect the Alternative 2 improvements and simulated critical duration storm events. The Baseline Conditions WSEs for DSSB, Blue Lake stormwater basin and Hosek Park stormwater basin do not change from Baseline Conditions and therefore are not included in **Table 5**. A summary of the Alternative 2 conditions XP-SWMM results at selected locations is provided in **Table 5**.

Table 5 – Alternative 2 XP-SWMM WSE Summary

Storm Event (24-hour) (year)	Baseline Conditions PASB (WSE-ft)	Alternative 2 PASB (WSE – ft)	Difference (WSE – ft)
1	715.5	714.1	-1.4
2	716.4	715.1	-1.3
5	717.5	716.7	-0.8
10	719.1	718.2	-0.9
25	721.9	721.4	-0.5
50	723.4	723.1	-0.3
100	724.6	724.4	-0.2

The concept level cost estimate is \$638,000.

Alternative 2 produces PASB WSE reductions for the 1-, 2-, 5- and 10-year storm events. The WSE reductions are not as significant for the 25-, 50- and 100-year storm events.

The lowest entry elevation of the single-family homes located north of Colfax Avenue is 721.80'. Baseline conditions indicated that this home could have stormwater enter the home when the PASB reached a WSE associated with the 25-year storm event. Alternative 2 would keep the PASB WSE below the low entry level for the 25-year storm event. It's risk of inundation would occur prior to the 50-year storm event PASB WSE. The remaining filed survey low entry elevations are between 722.17' and 722.50'. The risk of these homes receiving stormwater are between the 25- and 50-year storm event which is a slightly reduce risk compared to Baseline Conditions.

Alternative 2 would only slightly reduce of risk of inundation for the Colfax Avenue homes.

This alternative is not recommended for further study unless combined with an DSSB increased stormwater storage alternative.

ALTERNATIVE 3

Alternative 3 consists of expanding the PASB eastward into four (4) adjacent privately-owned lots to provide additional stormwater storage volume. The expansion of the PASB increases the stormwater storage volume by approximately 6.6 acre-feet (12%). The proposed Alternative 3 is illustrated on **Exhibit 7**.

CBBEL updated the Baseline Conditions XP-SWMM model to reflect the Alternative 3 improvements and simulated critical duration storm events. The Baseline Conditions WSEs for DSSB, Blue Lake stormwater basin and Hosek Park stormwater basin do not change from Baseline Conditions and therefore are not included in **Table 6**. A summary of the Alternative 3 conditions XP-SWMM results at selected locations is provided in **Table 6**.

Table 6 – Alternative 3 XP-SWMM WSE Summary

Storm Event (24-hour) (year)	Baseline Conditions PASB (WSE – ft)	Alternative 3 PASB (WSE – ft)	Difference (WSE – ft)
1	715.5	713.8	-1.7
2	716.4	714.9	-1.5
5	717.5	716.6	-0.9
10	719.1	717.9	-1.2
25	721.9	721.1	-0.8
50	723.4	723.0	-0.4
100	724.6	724.4	-0.2

The concept level cost estimate is \$929,000.

Alternative 3 produces similar results as Alternative 2.

Alternative 2 produces PASB WSE reductions for the 1-, 2-, 5- and 10-year storm events. The WSE reductions are not as significant for the 25-, 50- and 100-year storm events.

The lowest entry elevation of the single-family homes located north of Colfax Avenue is 721.80'. Baseline conditions indicated that this home could have stormwater enter the home when the PASB reached a WSE associated with the 25-year storm event. Alternative 3 would keep the PASB WSE below the low entry level for the 25-year storm event. It's risk of inundation would occur prior to the 50-year storm event PASB WSE. The remaining filed survey low entry elevations are between 722.17' and 722.50'. The risk of these homes receiving stormwater are between the 25- and 50-year storm event which is a slightly reduce risk compared to Baseline Conditions.

Alternative 3 would only slightly reduce of risk of inundation for the Colfax Avenue homes.

This alternative is not recommended for further study since it does not produce a significant positive flood reduction benefit and requires the acquisition of private properties.

ALTERNATIVE 4

Alternative 4 includes deepening DSSB to provide additional stormwater storage volume. The deepening of the DSSB increases the stormwater storage volume at elevation 726.5' from approximately 9.4 acre-feet to 29.5 acre-feet (314%). The proposed Alternative 4 is illustrated on **Exhibit 8**. This alternative will require a pump station to be installed to allow dewatering of DSSB after a storm event.

CBEL updated the Baseline Conditions XP-SWMM model to reflect the Alternative 4 improvements and simulated critical duration storm events. The Baseline Conditions WSEs for Blue Lake stormwater basin and Hosek Park stormwater basin do not change from Baseline Conditions and therefore are not included in **Table 7**. A summary of the Alternative 4 conditions XP-SWMM results at selected locations is provided in **Table 7**.

Table 7 – Alternative 4 XP-SWMM WSE Summary

Storm Event (24-hour) (year)	Baseline Condition DSSB (WSE-ft)	Alternative 4 DSSB (WSE-ft)	Difference (WSE – ft)	Baseline Conditions PASB (WSE-ft)	Alternative 4 PASB (WSE-ft)	Difference (WSE – ft)
1	721.7	707.0	-14.7	715.5	715.4	-0.1
2	722.6	709.9	-12.1	716.4	716.2	-0.2
5	724.5	714.5	-10.0	717.5	717.3	-0.2
10	725.6	718.8	-6.8	719.1	718.2	-0.9
25	726.7	724.2	-2.5	721.9	719.6	-2.3
50	727.1	725.5	-1.6	723.4	721.9	-1.5
100	727.2	726.7	-0.5	724.6	723.6	-1.0

The concept level cost estimate is \$2,355,000.

For this conceptual analysis, the existing low flow storm sewer was not changed from Baseline Conditions. This allows DSSB to utilize the additional storm storage volume for the less frequent storm events. Therefore, the PASB WSE reductions are only significant for the 10-, 25-, 50- and 100-year storm events.

The lowest entry elevation of the single-family homes located north of Colfax Avenue is 721.80'. Baseline conditions indicated that this home could have stormwater enter the home when the PASB reached a WSE associated with the 25-year storm event. Alternative 4 would keep the PASB WSE below the low entry level close to the 50-year storm event (The 50-year storm event PASB WSE is 0.1' greater than the survey low entry elevation). The remaining field survey low entry elevations are between 722.17' and 722.50'. The risk of these homes receiving stormwater are between the 50- and 100-year storm event which is reduce risk compared to Baseline Conditions where the homes were at risk for a storm events between the 25- and 50-year.

Alternative 4 would reduce the risk of inundation to the Colfax Avenue homes.

If desired by the Village, Alternative 4 could be furthered studied since it does provide flood reduction benefits. The further study would include potential optimization of the DSSB

outflow control and to combine it with Alternative 2. This alternative will need coordination with Westmont.

ALTERNATIVE 5

Alternative 5 includes expanding the DSSB northward into four (4) adjacent lots located within the Village of Westmont to provide additional stormwater storage volume. No deepening of the existing DSSB is included with this alternative. The expansion of the DSSB only increases the storage volume at elevation 726.5' from approximately 9.4 acre-feet to 11.0 acre-feet (1.2%). The proposed Alternative 5 is illustrated on **Exhibit 9**. The Baseline Conditions WSEs for Blue Lake stormwater basin and Hosek Park stormwater basin do not change from Baseline Conditions and therefore are not included in **Table 8**.

CBBEL updated the Baseline Conditions XP-SWMM model to reflect the Alternative 5 improvements and simulated critical duration storm events. A summary of the Alternative 5 conditions XP-SWMM results at selected locations is provided in **Table 8**.

Table 8 – Alternative 5 XP-SWMM WSE Summary

Storm Event (24-hour) (year)	Baseline Condition DSSB (WSE-ft)	Alternative 5 DSSB (WSE-ft)	Difference (WSE – ft)	Baseline Conditions PASB (WSE-ft)	Alternative 5 PASB (WSE-ft)	Difference (WSE – ft)
1	721.7	721.7	0.0	715.5	715.5	0.0
2	722.6	722.3	-0.3	716.4	716.4	0.0
5	724.5	724.3	-0.2	717.5	717.5	0.0
10	725.6	725.4	-0.2	719.1	718.9	-0.2
25	726.7	726.5	-0.2	721.9	721.7	-0.2
50	727.1	727.0	-0.1	723.4	723.3	-0.1
100	727.2	727.2	-0.0	724.6	724.5	-0.1

The concept level cost estimate is \$531,000.

Alternative 5 does not provide any significant flood reduction benefits because of the minimal increase in the DSSB stormwater storage volume.

Alternative 5 would only slightly reduce of risk of inundation for the Colfax Avenue homes.

This alternative is not recommended for further study since it does not produce a significant positive flood reduction benefit and requires the acquisition of private properties in Westmont.

SUMMARY

To illustrate the effects of the investigated alternatives, the 24-hour, critical duration 1-, 2-, 5-, 10-, 25-, 50- and 100-year recurrence interval WSEs are compared at specific locations in the watershed. The summary of flood elevations is presented in **Table 9**.

Table 9 – Alternative WSEs Summary

Location	Site Conditions	1-Year	2- year	5-year	10-year	25-year	50-year	100-year
DSSB	Baseline	721.7	722.6	724.5	725.6	726.7	727.1	727.2
	Alt. 1	721.7	722.6	724.5	725.6	726.7	727.1	727.2
	Alt. 2	721.7	722.6	724.5	725.6	726.7	727.1	727.2
	Alt. 3	721.7	722.6	724.5	725.6	726.7	727.1	727.2
	Alt. 4	707.0	709.9	714.5	718.8	724.2	725.5	726.7
	Alt. 5	721.7	722.3	724.3	725.4	726.5	727.0	727.2
PASB	Baseline	715.5	716.4	717.5	719.1	721.9	723.4	724.6
	Alt. 1	716.1	717.0	718.3	720.2	722.7	724.0	725.0
	Alt. 2	714.1	715.1	716.7	718.2	721.4	723.1	724.4
	Alt. 3	713.8	714.9	716.6	717.9	721.1	723.0	724.4
	Alt. 4	715.4	716.2	717.3	718.2	719.6	721.9	723.6
	Alt. 5	715.5	716.4	717.5	718.9	721.7	723.3	724.5
South Side of Berm	Baseline	715.5	716.4	717.5	719.1	721.9	723.4	724.6
	Alt. 1	718.2	718.5	719.1	720.1	722.7	724.0	725.0

Alternative 1 blocks the overland flow path of excess stormwater leaving the DSSB and results in increase inundation elevations in the rear yards of the homes on the north side of Colfax Avenue compared to Baseline Conditions. This alternative also reduces the available stormwater storage volume within the PASB, resulting in higher WSEs in the PASB compared to Baseline Conditions.

This alternative is not recommended for further study since it results in adverse drainage impacts.

Alternative 2 results in the following approximate WSE reductions at the PASB:

- 1.4 and 1.3 feet reduction for the 1- and 2-year storm events, respectively;
- 0.8 and 0.9 feet reduction for the 5- and 10-year storm events, respectively;
- 0.5 feet reduction for the 25-year storm event;
- 0.3 and 0.2 feet reduction for the 50- and 100-year storm events, respectively.

Alternative would only slightly reduce of risk of inundation for the Colfax Avenue homes.

This alternative is not recommended for further study unless combined with an DSSB increased stormwater storage alternative.

Alternative 3 results in the following approximate WSE reductions at the PASB:

- 1.7 and 1.5 feet reduction for the 1- and 2-year storm events, respectively;
- 0.9 and 1.2 feet reduction for the 5- and 10-year storm events, respectively;
- 0.8 feet reduction for the 25-year storm event;
- 0.4 and 0.2 feet reduction for the 50- and 100-year storm events, respectively.

Alternative 3 would only slightly reduce of risk of inundation for the Colfax Avenue homes.

This alternative is not recommended for further study since is does produce a significant positive flood reduction benefit and requires the acquisition of private properties.

Alternative 4 results in the following approximate WSE reductions:

DSSB –

- 14.7 and 12.1 feet reduction for the 1- and 2-year storm events, respectively;
- 10.0 and 6.8 feet reduction for the 5- and 10-year storm events, respectively;
- 2.5 feet reduction for the 25-year storm event;
- 1.6 and 0.5 feet reduction for the 50- and 100-year storm events.

PASB –

- 0.1 feet reduction for the 1-year storm event;
- 0.2 feet reduction for the 2- and 5-year storm event;
- 0.9 feet reduction for the 10-year storm event;
- 2.3 feet reduction for the 25-year storm event;
- 1.5 and 1.0 feet reduction for the 50- and 100-year storm events, respectively.

Alternative 4 would reduce the risk of inundation to the Colfax Avenue homes.

If desired by the Village, Alternative 4 could be furthered studied since it does provide flood reduction benefits. The further study would include potential optimization of the DSSB outflow control and to combine it with Alternative 2. This alternative will need coordination with Westmont.

Alternative 5 results in the following approximate WSE reductions:

DSSB –

- No reduction for the 1-year storm event;
- 0.3 reduction for the 2-year storm event;
- 0.2 feet reduction for the 5-, 10-, and 25-year storm events, respectively;
- 0.1 feet reduction for the 50-year storm event;
- No reduction for the 100-year storm event.

PASB –

- No reductions in WSEs for 1-, 2-, and 5-year storm events;
- 0.2-foot reduction for the 10- and 25-year storm events;
- 0.1-foot reduction for the 50- and 100-year storm events.

Alternative 5 would only slightly reduce of risk of inundation for the Colfax Avenue homes.

This alternative is not recommended for further study since it does produce a significant positive flood reduction benefit and requires the acquisition of private properties within Westmont.

Level of Protection

To determine the Level of Protection (LOP) under Baseline Conditions and proposed alternatives 1-5, the resultant WSEs corresponding to the PASB for the critical duration design storms were compared to the field survey low entry elevations (LE) of the single-family homes north of Colfax Avenue. The LOP is the largest storm event that does not pose a risk of inundation to the structure. The resultant WSEs corresponding to the south side of the berm were used when determining a LOP for proposed Alternative 1. Based off current available survey data, the LE for each home corresponds to either the Finished Floor Elevation (FF), Top Window Well Elevation (TWW) or Bottom Window Sill Elevation (BWS). In addition, the Detached Garage Elevation (DG) is shown as appropriate. **Table 10** summarizes the LOP results.

Table 10
LOP Results for Surveyed Single-Family Homes/Garages North of Colfax Avenue

Address (Colfax Avenue)	Low Entry Elevation		Baseline Conditions		Proposed Alternatives									
	Type	Elevation (ft)	LOP	WSE (ft)	1		2		3		4		5	
					LOP	WSE (ft)	LOP	WSE (ft)	LOP	WSE (ft)	LOP	WSE (ft)	LOP	WSE (ft)
426	FF	724.04	50	723.4	50	724.0	50	723.1	50	723.0	<u>100</u>	<u>723.6</u>	50	723.3
428	FF	722.62	25	721.9	10	720.1	25	721.4	25	721.1	<u>50</u>	<u>721.9</u>	25	721.7
440	FF	726.15	100	724.6	100	725.0	100	724.4	100	724.4	100	723.6	100	724.5
440	DG	722.74	25	721.9	25	722.7	25	721.4	25	721.1	<u>50</u>	<u>721.9</u>	25	721.7
442	BWS	722.50	25	721.9	10	720.1	25	721.4	25	721.1	<u>50</u>	<u>721.9</u>	25	721.7
442	DG	721.49	10	719.1	10	720.1	<u>25</u>	<u>721.4</u>	<u>25</u>	<u>721.1</u>	<u>25</u>	<u>719.6</u>	10	718.9
444	BWS	722.24	25	721.9	10	720.1	25	721.4	25	721.1	<u>50</u>	<u>721.9</u>	25	721.7
444	DG	721.71	10	719.1	10	720.1	<u>25</u>	<u>721.4</u>	<u>25</u>	<u>721.1</u>	<u>25</u>	<u>719.6</u>	<u>25</u>	<u>721.7</u>
446	TWW	721.80	10	719.1	10	720.1	<u>25</u>	<u>721.4</u>	<u>25</u>	<u>721.1</u>	<u>25</u>	<u>719.6</u>	<u>25</u>	<u>721.7</u>
446	DG	722.39	25	721.9	10	720.1	25	721.4	25	721.1	<u>50</u>	<u>721.9</u>	25	721.7
450	TWS	722.67	25	721.9	10	720.1	25	721.4	25	721.1	<u>50</u>	<u>721.9</u>	25	721.7
450	DG	722.19	25	721.9	10	720.1	25	721.4	25	721.1	<u>50</u>	<u>721.9</u>	25	721.7
452	FF	724.00	50	723.4	50	724.0	50	723.1	50	723.0	<u>100</u>	<u>723.6</u>	50	723.3

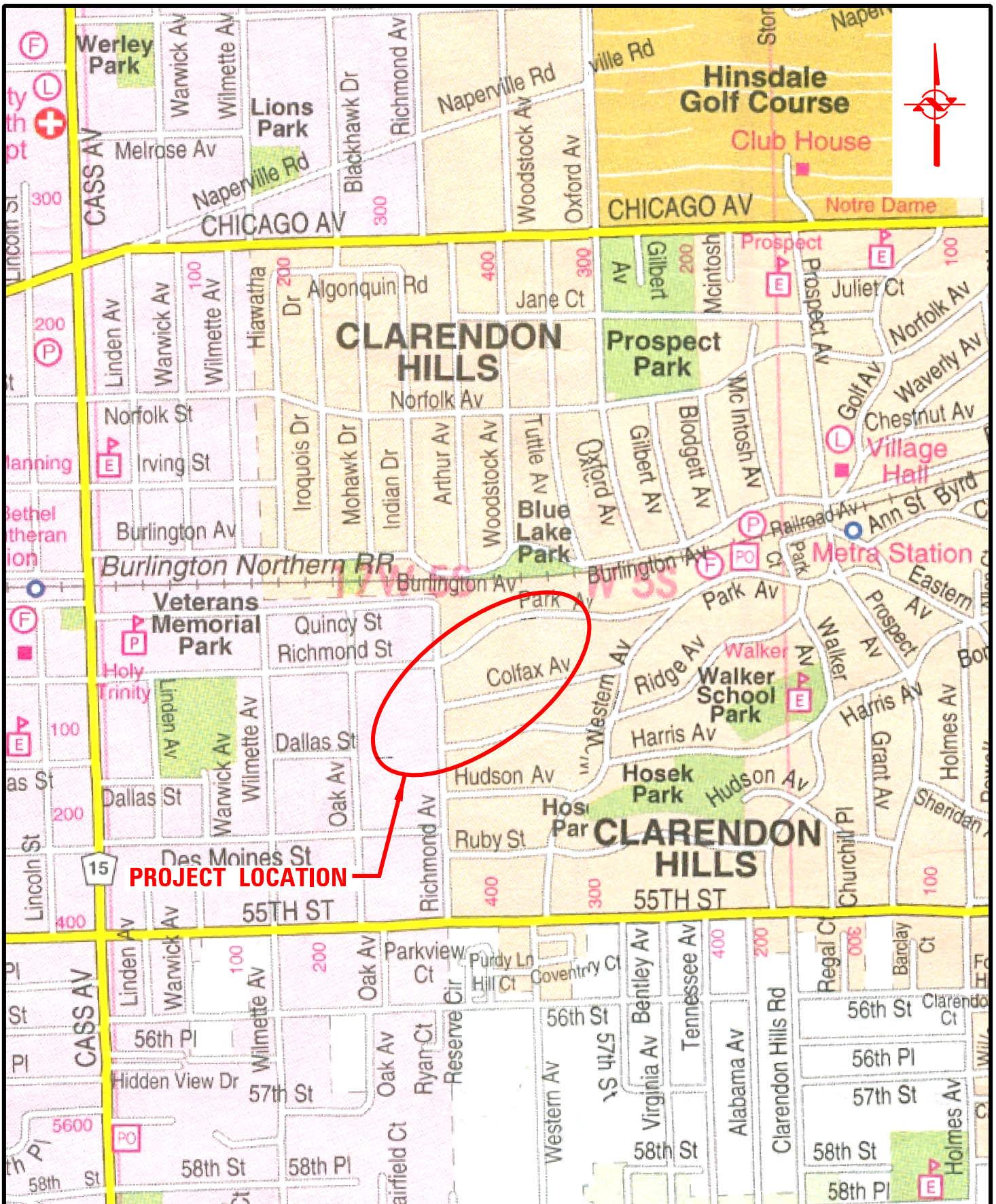
Bold, Blue Highlighted font indicates a lowering of the LOP

Bold, Yellow Highlighted Underline Italic font indicates a raising of the LOP

CONCLUSIONS

- Alternative 1 is not recommended for further study since it results in adverse drainage impacts.
- Alternative 2 would only slightly reduce the risk of inundation for the Colfax Avenue homes.
 - This alternative is not recommended for further study unless combined with an DSSB increased stormwater storage alternative.
- Alternative 3 would only slightly reduce the risk of inundation for the Colfax Avenue homes.
 - This alternative is not recommended for further study since it does not produce a significant positive flood reduction benefit and requires the acquisition of private properties.
- Alternative 4 would reduce the risk of inundation to the Colfax Avenue homes.
 - *If desired by the Village, this alternative could be furthered studied since it does provide flood reduction benefits. The further study would include potential optimization of the DSSB outflow control and to combine it with Alternative 2. This alternative will need coordination with Westmont.*
 - This alternative has the highest concept level cost estimate (\$2,355,000) of all alternatives evaluated.
- Alternative 5 would only slightly reduce of risk of inundation for the Colfax Avenue homes.
 - This alternative is not recommended for further study since it does not produce a significant positive flood reduction benefit and requires the acquisition of private properties located within the Village of Westmont.

MDC/DRD
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CLIENT:



Village of Clarendon Hills

1 North Prospect Avenue
Clarendon Hills, Illinois 60514

TITLE:

LOCATION MAP

PROJ. NO. 180093

DATE: 4/13/2018

SHEET OF

DRAWING NO.

EXHIBIT 1



CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 W. Higgins Road, Suite 600 • Rosemont, Illinois 60018 • (847) 823-0500

DSGN.	MDC	SCALE:	1000'
DWN.	EAT	MODEL:	Default
CHKD.	DRD	PLOT DATE:	4/13/2018
FILE:			



0 235 470 940 Feet
1 inch = 400 feet

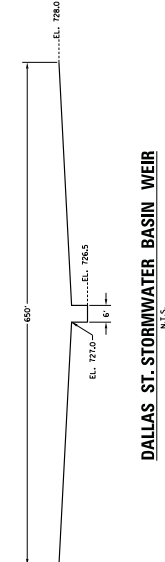
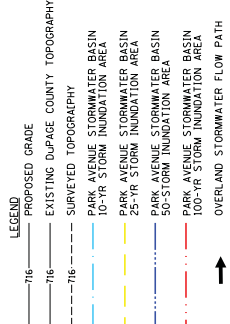


Legend

- Existing Storm Sewer
- Municipal Boundary
- Watershed Boundary

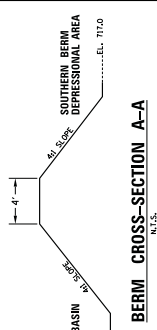
CLIENT:		VILLAGE OF CLARENDON HILLS		EXISTING CONDITION		EXHIBIT 2	
CHRISTOPHER B. BURKE ENGINEERING LTD		9575 West Higgins Road, Suite 600		TITLE:		PROJ. NO. 130121	
Rosemont, Illinois 60018		(847) 823-0500		DATE:		SHEET 0 OF 0	
				NO.		DRAWING NO.	
				DATE			
				NATURE OF REVISION			
				CHG.		SCALE	
				DESIGN		TO	
				DWG.		SHEET	
				PLOT DATE		DATE	
				FILE NAME		DRAWING NO.	
				PATH			
				180009_w02_Existing Condition			
				N:\CLARENDONHILLS\180009\GIS Exhibit\180009_w02_Existing Condition.mxd			

NOTE:
LOCATIONS OF EXISTING UTILITIES SHOWN HEREON ARE THE
COMPILATION OF FIELD LOCATIONS AND THE FOLLOWING
UTILITY ATLASES PROVIDED BY THE UTILITY
-VILLAGE OF CLARENDON HILLS- WATER ATLAS
-DWC FORMATS 12/31/2013
-VILLAGE OF CLARENDON HILLS- SEWER ATLAS



ELEVATION BENCHMARKS	
MARK	DESCRIPTION
BM 1	100-yr Storm Inundation Area
BM 2	50-yr Storm Inundation Area
BM 3	25-yr Storm Inundation Area
BM 4	10-yr Storm Inundation Area
BM 5	Park Avenue Stormwater Basin
BM 6	Park Avenue Stormwater Basin
BM 7	Park Avenue Stormwater Basin
BM 8	Park Avenue Stormwater Basin
BM 9	Park Avenue Stormwater Basin
BM 10	Park Avenue Stormwater Basin
BM 11	Park Avenue Stormwater Basin
BM 12	Park Avenue Stormwater Basin
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BM 99	Park Avenue Stormwater Basin
BM 100	Park Avenue Stormwater Basin

NOTES:
 1. ALL ELEVATIONS ARE IN FEET UNLESS OTHERWISE NOTED.
 2. ALL ELEVATIONS ARE BASED ON THE DATUM OF 1985.
 3. ALL ELEVATIONS ARE BASED ON THE DATUM OF 1985.
 4. ALL ELEVATIONS ARE BASED ON THE DATUM OF 1985.
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 10. ALL ELEVATIONS ARE BASED ON THE DATUM OF 1985.



- LEGEND
- 716 PROPOSED GRADE
 - 716 EXISTING DUPAGE COUNTY TOPOGRAPHY
 - 716 SURVEYED TOPOGRAPHY
 - PARK AVENUE STORMWATER BASIN
 - 10-yr STORM INUNDATION AREA
 - PARK AVENUE STORMWATER BASIN
 - 25-yr STORM INUNDATION AREA
 - PARK AVENUE STORMWATER BASIN
 - 50-yr STORM INUNDATION AREA
 - PARK AVENUE STORMWATER BASIN
 - 100-yr STORM INUNDATION AREA
 - OVERLAND STORMWATER FLOW PATH

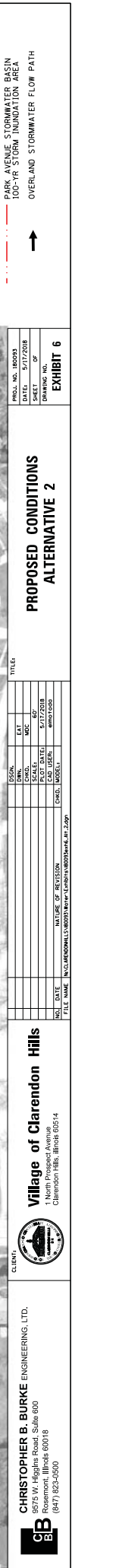
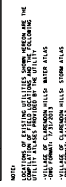
CHRISTOPHER B. BURKE ENGINEERING, LTD.
 9575 W. Higgins Road, Suite 600
 Rosemont, Illinois 60018
 (847) 823-0500

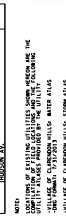
Village of Clarendon Hills
 1 North Prospect Avenue
 Clarendon Hills, Illinois 60514

**PROPOSED CONDITIONS
ALTERNATIVE 1**

PROJ. NO. 100003
 DATE 5/17/2018
 SHEET 5
 DRAWING NO. EXHIBIT 5

NO.	DATE	FILE NAME	NATURE OF REVISION	CHG.	MODEL	DATE	BY	CHK.	APP.
1	5/17/2018	100003	100-yr STORM INUNDATION AREA			5/17/2018	5/17/2018	5/17/2018	5/17/2018





CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600
Chicago, Illinois 60616
(847) 827-4500

Village of Clarendon Hills
1 North Prospect Avenue
Clarendon Hills, Illinois 60514
(847) 923-4500

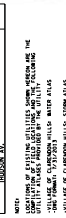
CLIENT: **Village of Clarendon Hills**
1 North Prospect Avenue
Clarendon Hills, Illinois 60514

TITLE: **PROPOSED CONDITIONS
ALTERNATIVE 3**

PROJECT NO.	00093	DATE:	5/17/2018	SHEET NO. OF	10
PROJECT NAME	CLARENDON HILLS				
PROJECT NO.	EXHIBIT 7				

DESIGN	LAT
CHDS	WDC
DATE	5/17/2018
FILE NAME	CHDS_1001

CHDS	PROJECT
DATE	DATE OF REVISION
FILE NAME	WDC_1001

[illegible]

