



**Buffalo Grove Downtown
Development
Buffalo Grove, Illinois**

Prepared for

Village of Buffalo Grove
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EXECUTIVE SUMMARY

This report summarizes the preliminary buildable area analysis for the proposed Buffalo Grove Downtown Development project in the Village of Buffalo Grove (Village). The development consists of converting the existing 125-acre Buffalo Grove Golf Course (Golf Course) to a commercial and residential downtown district. Buffalo Creek and Farrington Ditch drain through the Golf Course as shown on Figure 1-1.



Figure 1-1 Buffalo Grove Golf Course

There is floodplain, floodway, wetlands and Waters of the U.S. associated with these watercourses. The primary focus of the study was to complete a hydraulic study and permitting analysis of the watercourse relocations to determine the potential future buildable area associated with the downtown development given the stormwater management, floodplain/floodway and waterway constraints.

Based on discussions with the Village and meetings with the various regulatory agencies, three alternatives were developed to relocate Farrington Ditch as part of the development. Alternatives 1 and 3 included relocating Farrington Ditch along the east side of the proposed development and Alternative 2 consisted of relocating Farrington Ditch along the west side of the development. Alternatives 1 and 2 were analyzed in detail while Alternative 3 was explored at a conceptual level only. Under Alternatives 1 and 2, consideration was also given to a minor

relocation of Buffalo Creek. A floodway, floodplain and stormwater detention analysis was completed to develop an estimate of potential future buildable area for Alternatives 1 and 2. A preliminary geotechnical investigation also allowed for earthwork quantities to be developed and an engineer's estimate of probable cost prepared for mass grading of the site.

All three alternatives would require significant permitting through numerous regulatory agencies including the U.S. Army Corps of Engineers (COE), the Federal Emergency Management Agency (FEMA), Lake County Stormwater Management Commission (SMC), Metropolitan Water Reclamation District of Greater Chicago (MWRD), North Cook Soil and Water Conservation District (NCSWCD) and the Illinois Environmental Protection Agency (IEPA).

The results of the analysis indicate that Alternative 1 (east alignment of Farrington Ditch) would provide 58.5 acres of buildable area (minus area set aside for stormwater detention), while Alternative 2 (west alignment of Farrington Ditch) would provide 53 acres of buildable area (minus area set aside for stormwater detention). Included in this buildable area is acreage that must be set aside for stormwater detention which has been shown schematically on the attached exhibits. The stormwater detention can be located on the site to fit the development plan and portions may be placed below ground at a higher cost to maximize the buildable area. The remainder of the site would include floodway and floodplain compensatory storage, waterways and small amounts of open space. The engineer's estimate of probable cost for earthwork for Alternatives 1 and 2 are \$21 million and \$20 million, respectively. An estimate of cost for earthwork was not prepared for Alternative 3 as this alternative was not analyzed in detail. Alternative 1 also has the added benefit of re-directing Farrington Ditch away from the flood-prone area south of Lake Cook Road, but this alternative would require easements or property acquisition from the Park District. Under any alternative, we do not recommend relocation of Buffalo Creek as it would significantly increase the regulatory requirements for the entire project. Table 1-1 summarizes the studied alternatives projects and the engineer's estimate of probable cost to implement the proposed improvements.

Alternative ID ¹	Project Features	Cost
Alternative 1	<ul style="list-style-type: none"> • Relocate Farrington Ditch along east side of site • Allows for 66.5 acres of buildable area <ul style="list-style-type: none"> ○ Area set aside for stormwater detention = 8 acres ○ Buildable area minus stormwater detention = 58.5 acres • Requires 29 acre-feet of stormwater detention storage • Requires 84 acre-feet of compensatory storage • Requires work on Park District Property south of Lake Cook Road • Provides additional flood reduction benefit by relocating confluence of Farrington Ditch and Buffalo Creek 	\$21 million
Alternative 2	<ul style="list-style-type: none"> • Relocate Farrington Ditch along east side of site • Allows for 59 acres of buildable area <ul style="list-style-type: none"> ○ Area set aside for stormwater detention = 6 acres ○ Buildable area minus stormwater detention = 53 acres • Requires 25 acre-feet of stormwater detention storage • Requires 83 acre-feet of compensatory storage 	\$20 million

¹ Alternative 3 is not included as it was not analyzed in detail.

Table 1-1 Proposed Alternative Summary

CHAPTER 1 PROJECT OVERVIEW

1.1 INTRODUCTION

The Village of Buffalo Grove is interested in developing a portion of the Village owned Buffalo Grove Golf Course into a commercial and residential district as depicted in the Master Plan Designs prepared by CRM Properties Group, dated August 2012. The project site is located north of Lake Cook Road and east of Buffalo Grove Road in the Village of Buffalo Grove, as shown on Exhibit 1. Because the existing site has two watercourses within its property boundaries, these watercourses will need to be accommodated into the site plan in accordance with Illinois Department of Natural Resources – Office of Water Resources (IDNR-OWR) Part 3708 Rules, where applicable, LCSMC Watershed Development Ordinance (WDO), the Clean Water Act (CWA) and the Cook County Watershed Management Ordinance (WMO). The purpose of this report is to summarize the concept level alternatives that were analyzed to accommodate the waterways into the development. CBBEL and the Village met with IDNR-OWR, LCSMC and the COE to discuss the permitting requirements of the various alternatives. Meeting minutes are included in Appendix 7.

Existing site conditions are described in Chapter 3, EXISTING CONDITIONS ANALYSIS. Creek location alternatives along with estimates of construction cost are provided for each study area in Chapter 4, PROPOSED CONDITIONS HYDRAULIC ANALYSIS.

1.2 PURPOSE AND SCOPE

The purpose of this study is to analyze the feasibility of relocating, at a minimum, one watercourse within the proposed project site and determining the potential maximum buildable area based on permitting requirements and site constraints. Considerations included compensatory storage for floodplain fill, floodway conveyance, stormwater detention and water quality treatment and wetlands/Waters of the U.S impacts.

The scope of services included the following tasks:

- Field Reconnaissance and Resource Review;
- Development of Creek Relocation Alternatives;
- Conceptual Buildable Space Analysis and Cost Estimate;
- Meetings with Regulatory Agencies;
- Waters of the United States, Wetland and Buffer Permitting Summary
- Preliminary Soil Borings
- Summary Report

1.3 ORGANIZATION OF THIS DOCUMENT

This report is divided into five chapters. A brief summary of the contents of each chapter is presented below:

- Chapter 1, PROJECT OVERVIEW, presents the purpose and scope of the project and a description of the project location.
- Chapter 2, DATA COLLECTION, summarizes information gathered from the Village, the Counties and other sources.
- Chapter 3, EXISTING CONDITIONS ANALYSIS, provides a summary of the hydrologic and hydraulic modeling for the existing condition and a wetland summary.
- Chapter 4, PROPOSED CONDITIONS HYDRAULIC ANALYSIS, provides a summary of the hydrologic and hydraulic modeling for the proposed condition.
- Chapter 5, EARTHWORK ANALYSIS AND COST ESTIMATE, provides a summary of the earthwork quantities and associated costs for the buildable area alternatives.
- Chapter 6, CONCLUSIONS , summarizes the findings of the CBBEL study and provides a list of recommended improvements to reduce the risk of future flooding based on the study results.

CHAPTER 2 DATA COLLECTION

Data that was used in this study was collected from a variety of sources. Each data source is listed in Table 2-1 below, along with the data provided by each source:

Source	Data Provided
Lake County	<ul style="list-style-type: none"> 1-foot contour aerial topographic mapping
Cook County	<ul style="list-style-type: none"> 1-foot contour aerial topographic mapping
Illinois State Water Survey	<ul style="list-style-type: none"> FIS Hydraulic Model for Farrington Ditch
CBBEL/IDNR-OWR	<ul style="list-style-type: none"> FIS Hydraulic Model for Buffalo Creek
Testing Service Corporation	<ul style="list-style-type: none"> Report of Soils Exploration
CRM Properties Group, Ltd.	<ul style="list-style-type: none"> Master Plan Designs
CBBEL	<ul style="list-style-type: none"> Site visits

Table 2-1 Data Sources

CHAPTER 3**EXISTING CONDITIONS ANALYSIS**

This chapter presents the existing site conditions, including the floodplain and floodway analyses and the wetland delineation summary. The area surrounding the project site consists of commercial development to the southwest, residential to the east, west, south and north. The project site is located in both Lake and Cook Counties. A detailed description of the hydraulic modeling used for this analysis and wetlands are provided.

3.1 EXISTING CONDITIONS HYDRAULIC MODELING**3.1.1 BUFFALO CREEK**

The major watercourse through the Buffalo Grove Golf Course (site) is Buffalo Creek (creek), which traverses the site from northwest to southeast. According to the FEMA Flood Insurance Study (FIS), the creek has approximately 18.4 square miles of tributary area at Lake Cook Road, which is downstream of the confluence with Farrington Ditch within the site. The creek drains through the site in an open channel. The site consists of both regulatory floodplain and floodway associated with the creek, as shown on Exhibit 2. After exiting the site, the creek flows south through a bridge under Lake Cook Road. The residences located along the south side of the creek, south of Lake Cook Road have experienced repetitive flooding and are located within the regulatory floodway. The creek continues to flow downstream in an easterly direction, downstream of Raupp Boulevard and then continues to flow southeast through the Village of Wheeling until its confluence with the Des Plaines River.

Between 2001 and 2005 the hydrologic modeling and hydraulic modeling was updated and reviewed and approved by IDNR-OWR and a Letter of Map Revision was approved in 2007 for Buffalo Creek through the Village of Wheeling. While the FEMA Flood Insurance Rate Map (FIRM) still shows the old floodplain and floodway delineation through the Village associated with the previous FIS, the hydraulic modeling used in this study is based on the revised hydrologic and hydraulic study and is considered the best available data.

3.1.2 FARRINGTON DITCH

The secondary watercourse traversing through the site is Farrington Ditch (ditch). According to the FIS, Farrington Ditch has 0.6 square miles of drainage area at Old Checker Road and has approximately 0.8 square miles of drainage area at the confluence with Buffalo Creek. The ditch enters the site from the north under Old Checker Road and continues in a southwardly direction through a pond and a series of closed conduit before its confluence with Buffalo Creek on the site. The FIS study for Farrington Ditch is a WSP-2 hydraulic model using the elevation in Buffalo Creek as the starting water surface elevation. This model, originally in NGVD 29 datum, was duplicated in HEC-RAS and converted to NAVD 88 to be consistent with the Lake and Cook County topography and to be on the same datum as the Buffalo Creek HEC-RAS hydraulic model. This duplicated reach was appended to the Buffalo Creek HEC-RAS to create a contiguous model for establishing a baseline conditions for floodplain and floodway analysis. Because the updated Buffalo Creek model has different water surface profiles for the

10-, 50-, 100-, and 500-year storm events than the previous study, the FIS profile of Farrington Ditch was changed. These changes in water surface elevations on-site are summarized in Table 3-1.

Cross-section ID (FIS/HEC-RAS)	Storm Event	FIS WSEL (NAVD 88)	Updated WSEL (NAVD 88)	Difference (ft)
TWB02/0.20	10-year	675.94	676.23	0.29
	50-year	677.24	678.56	1.32
	100-year	677.74	679.46	1.72
	500-year	679.24	681.24	2.0
FD1/0.33	10-year	676.72	676.61	-0.11
	50-year	677.35	678.57	1.22
	100-year	677.79	679.47	1.68
	500-year	679.25	681.24	1.99
TWB03/0.35	10-year	676.72	676.61	-0.11
	50-year	677.35	678.57	1.22
	100-year	677.79	679.47	1.68
	500-year	679.25	681.24	1.99

Table 3-1 Farrington Ditch Duplicate Model Results

3.1.3 REGULATORY FLOODPLAIN AND FLOODWAY

The project site contains floodplain and floodway associated with both Farrington Ditch and Buffalo Creek, as shown on Figure 3-1 and Exhibit 2. As part of the four analyzed alternatives, the existing conditions floodplain and floodway volume located within the buildable area footprint was quantified. Buffalo Creek floodplain volume is the volume outside of the floodway boundary on the left overbank, within the buildable area footprint only. These volumes are summarized in Table 3-2.



Figure 3-1 Existing Floodplain and Floodway through Site

Watercourse	NWL to 10-year Floodplain Volume (acre-feet)	10- to 100-year Floodplain Volume (acre-feet)	NWL to 100-year Floodway Volume (acre-feet)
Overall	8.7	61.3	48.4

Table 3-2 Existing Site Floodplain and Floodway Storage Volumes

3.2 WETLANDS AND WATERS OF THE U.S.

Buffalo Creek

Buffalo Creek is considered to be a jurisdictional Waters of the U.S. A wetland fringe is located along portions of the channel that would also be regulated by the COE.

Farrington Ditch

Farrington Ditch, a tributary to Buffalo Creek, is underlain by field tile and only has surface flow when the pipe capacity is exceeded. The ditch is also likely a jurisdictional Waters of the U.S.

Open Water Golf Course Ponds

Four man-made open water ponds were flagged at the time of the field reconnaissance. For the purposes of this document it was assumed that these ponds will be found to be COE jurisdictional, but there is a possibility the ponds will be considered to be non-jurisdictional by the COE.

Any identified wetlands found to be isolated and not federally regulated, will be regulated as Isolated Waters by SMC under the WDO and, if in Cook County, as Isolated Wetlands by the MWRD under the WMO.

In our opinion, both Buffalo Creek and Farrington Ditch have a direct hydrologic connection to a navigable Waters of the U.S. and will be regulated by the COE under Section 404 of the Clean Water Act. In our opinion, the four constructed as golf course ponds and as stormwater management facilities may be exempt from federal regulation by the COE under Section 404 of the Clean Water Act, by the MWRD under the WMO and by Lake County under the WMO. To determine final jurisdiction, requests should be prepared and submitted to the COE, SMC and MWRD.

Federal Regulations

The following is a summary of a pre-application meeting permitting requirements discussed with the USACE:

- The Corps indicated that the daylighting and relocation of Farrington Ditch could be permitted under Regional Permits 1 and 5. The Corps indicated that daylighting of Farrington Ditch would provide an environmental benefit. Information above and beyond the typical required USACE application materials should include:
 - Historical aerials
 - Historical creek maps
 - Utility atlases of golf course
- Any relocation of Buffalo Creek would cause the entire project to be processed as an Individual Permit. An individual permit would require the following:
 - Extensive alternative site analysis – both from an alternative locations evaluation and alternative onsite design evaluations.
 - IEPA water quality certification and anti-degradation review
 - Public Notices - USACE and IEPA separately
 - Public hearings may be required by agencies

Assuming there is no relocation of Buffalo Creek, the following permitting requirements would be applicable.

In addition to the discussions summarized in the minutes from a meeting with the COE are included in Appendix 8, and assuming there is no relocation of Buffalo Creek, the following permitting requirements would be applicable:

Regional Permit 1 (RP1) of the Chicago District Regional Permit Program authorizes residential, commercial and institutional developments that necessitate jurisdictional wetland or Waters of the U.S. impacts (cumulative wetland impacts < 1.0 acre). The RP1 authorization would cover impacts to the ponds, if regulated, and minor impacts to Buffalo Creek (not relocation).

Several special conditions exist under RP1. If cumulative wetland impacts exceed 1.0 acre or if the project cannot meet the special conditions of RP1, authorization under the Individual Permit Program will be required, which can be a lengthy process (average review time of one year). To assist with land planning, a description of several special conditions is listed below:

Upland Buffers

RP1 requires an upland buffer of native plants to be established adjacent to all created, restored, enhanced or preserved Waters of the U.S., including wetlands, rivers, streams, creeks, ponds and lakes, etc. The following summarizes buffer requirements:

- 1) For any area determined to be a high-quality aquatic resource (HQAR), the buffer shall be 100 feet wide;
- 2) For a linear body of water (e.g., river, stream, creek, etc.), the buffer shall be a minimum of 50 feet from the Ordinary High Water Mark (OHWM) on both sides of the linear waterbody;
- 3) For any Waters of the U.S., including wetlands, over 0.25 acre and up to 0.50 acre in size, the buffer shall be a minimum of 30 feet wide; and
- 4) For any Waters of the U.S., including wetlands, over 0.50 acre in size, the buffer shall be a minimum of 50 feet wide.

RP1 states that the District may allow buffer widths below the above-required minimums but it shall be incumbent on the applicant to demonstrate that no practicable alternatives are available that would not impact the required buffer widths.

RP1 does not allow lot lines to be located within the buffer area or within preserved wetlands or Waters of the U.S.; however, RP1 does allow stormwater retention/detention facilities and pervious nature trails to be located within a minimum distance of 50 percent of the required buffer, provided the remaining buffer area adjacent to the jurisdictional wetland or Waters of the U.S. consists of native vegetation only or other appropriate vegetation approved by the District. The trail must be set back a minimum of 10 percent of the required buffer.

Deed Restrictions/Conservation Easements

RP1 requires that all remaining, preserved, enhanced or restored Waters of the U.S., wetlands, and adjacent buffers be permanently preserved and protected either through a deed restriction or conservation easement. A draft deed restriction or conservation easement shall be provided with notification.

Best Management Practices (BMP)

RP1 requires BMPs to be designed as part of the site plan to minimize overall impacts to aquatic resources. RP1 allows BMPs to be located in upland buffers adjacent to wetlands and Waters of the U.S. A written narrative must be provided along with a maintenance and monitoring plan for the selected BMPs.

On-Line Detention/Compensatory Storage

RP1 prohibits on-line stormwater management facilities to be constructed in any linear body of water such as a river, or perennial, intermittent or ephemeral stream or creek, unless there is substantial evidence that the project will provide a benefit to the aquatic system. In our experience, the COE has been using discretionary authority to review all on-line stormwater facilities (located within both intermittent and perennial waterways) under the Individual Permit process, which involves a very stringent review with a public comment period that is a lengthy and difficult process.

In addition to meeting the general and special conditions of RP1, wetland mitigation is required for projects that impact more than 0.10-acre of wetland or Waters of the U.S., generally at a 1.5:1 replacement ratio.

Regional Permit 5 (RP5) authorizes the restoration, creation and enhancement of wetlands and riparian areas, and the restoration and enhancement of rivers, creeks and streams, and open water areas on any public or private land. The RP5 permit would cover the daylighting and relocation of Farrington Ditch.

Lake County Wetland Regulations

A Watershed Development Permit is required for any development that impacts a Waters of the U.S., an isolated Waters of Lake County or wetland buffer areas. Permit categories have been established based on the amount of wetland impact necessitated by the proposed development.

Permit categories are as follows:

- (A) Category-I: IWLC impacts less than or equal to 1 acre and does not impact high quality aquatic resources (HQAR);
- (B) Category-II: IWLC impacts greater than 1 acre and less than 2 acres and does not impact high quality aquatic resources;
- (C) Category-III: IWLC impacts greater than 2 acres or impacts high quality aquatic resources; and,
- (D) Category-IV: IWLC impacts for the restoration, creation and enhancement of wetlands provided that there are net gains in aquatic resource function.

Areas of IWLC impact greater than 0.10 acre will require wetland mitigation. Permits processed under Category-I, II or III will require wetland mitigation at a minimum 1.5:1 replacement ratio. Impacts to IWLC classified as high quality aquatic resources will require wetland mitigation at a minimum 3:1 replacement ratio. Impacts to forested IWLC will require wetland mitigation at a minimum 6:1 replacement ratio.

The following buffer setbacks are also required:

- For all water bodies or wetlands with a total surface area greater than one third (1/3) acre but less than one (1) acre, a minimum buffer width of thirty (30) feet shall be established.
- For all water bodies or wetlands with a total surface area greater than one (1)

- acre but less than two and one half (2½) acres, a minimum buffer width of forty (40) feet shall be established.
- For all water bodies or wetlands with a total surface area greater than two and one half (2½) acres, a minimum buffer width of fifty (50) feet shall be established.
 - For all high quality aquatic resources, a minimum buffer width of one hundred (100) feet shall be established.

Cook County Wetland Regulations

Although we believe that the open water pond located within the Cook County portion of the study area may be exempt from federal and local wetland regulations, wetland portions of Buffalo Creek and the Farrington Ditch that will be impacted in Cook County will require approval from the MWRD under the Cook County Watershed Management Ordinance.

The existing site conditions, including the delineated wetlands and Waters of the U.S. are shown on Exhibit 3. The wetland report is included in Appendix 2.

3.3 EXISTING SOIL CONDITIONS

As part of the study, Testing Services Corporation was hired to drill 29 soil borings within the site for a preliminary soils exploration. A complete soils exploration report is included in Appendix 1.

3.4 SUMMARY OF EXISTING CONDITIONS

The project site contains floodplain, floodway, wetlands and Waters of the U.S. as shown on Exhibit 3. The hydraulic profile associated with Farrington Ditch through the site was modified based on more detailed modeling associated with Buffalo Creek. Any proposed changes to the site will need to meet the regulatory requirements of IDNR-OWR, SMC, COE and MWRD.

CHAPTER 4**PROPOSED CONDITIONS HYDRAULIC ANALYSIS**

The existing conditions analysis was used as the baseline model for proposed alternatives that were evaluated. The project site must be elevated to the Flood Protection Elevation (FPE), which is 2.5 feet above the flood elevation in accordance with the Village of Buffalo Grove requirements. Elevating the site and relocating the creeks will require impacts to regulatory floodplain, floodway, wetlands and Waters of the U.S. Each of the proposed alternatives has been designed in accordance with the LCSMC WDO and IDNR-OWR Part 3708 Rules for construction within a regulatory floodway, where applicable. Although IDNR-OWR will not be the review agency for the relocation of Farrington Ditch, each relocation scenario has been designed to maintain existing floodway storage volume and to not increase flood elevations at the upstream property boundary. The LCSMC WDO requirements for wetlands and floodplain were used in determining the project impacts and mitigation requirements. The following summarizes Alternatives 1A and 1B, Alternatives 2A and 2B, and Alternative 3.

4.1 FARRINGTON DITCH RELOCATION – ALTERNATIVE 1 (EAST ALIGNMENT)**4.1.1 ALTERNATIVE 1A**

Alternative 1A consists of relocating Farrington Ditch to the east side of the development adjacent to the residential neighborhood located between Buffalo Grove Road and the golf course. Under this scenario, the Old Checker Road crossing will remain in its current location and the ditch would flow easterly along the north side of the site before paralleling the residential neighborhood, while flowing south. The existing pipe network that the ditch flows through under existing conditions will be removed and the ditch will be reinstated as an open channel. This alignment also requires the relocation of the confluence of Buffalo Creek and Farrington Ditch. The proposed creek will be conveyed under Lake Cook Road via a new box culvert where it will daylight into an open channel prior to joining Buffalo Creek on the downstream side of Raupp Boulevard. A detailed hydraulic model of this alignment was prepared to determine the floodway width in accordance with the LCSMC WDO. There will be a 5 foot wide low flow channel that is 1.5 feet deep, with 2:1 side slopes. The average main channel width of the new ditch is 51 feet at the bottom with 4:1 side slopes tying into existing grades on the east, adjacent to the neighborhood and to the FPE on the west, within the site. A typical cross-section is included in Appendix 3.

The relocation of the ditch will provide a flow reduction in Buffalo Creek immediately downstream of the Lake Cook Road providing flood reduction benefits to the homes on St. Mary's Parkway that are adjacent to the creek. This alternative provides approximately 66.5 acres of buildable area (includes 8 acres of above-ground stormwater detention). The proposed exhibit showing the creek relocation, buildable area boundary, compensatory and detention storage is included as Exhibit 4. These areas are located schematically on the exhibit and the exact locations will be developed during the land planning process.

Floodplain and Floodway

This relocation of Farrington Ditch will require compensatory storage to be provided at a 1:1 ratio for floodway fill and at a 1.2:1 ratio incrementally for floodplain fill. It is assumed that the relocated ditch will provide floodway storage and the golf course area will be used to provide the remaining floodplain storage. Because the flood fringe volume associated with Farrington Ditch is due to backwater from Buffalo Creek, the storage volume associated with the flood fringe is proposed to be provided along Buffalo Creek in accordance with meetings with regulatory agencies. The details of the floodplain fill and compensatory storage placement will occur during preliminary engineering and are shown conceptually on Exhibit 4.

The Buildable Area Exhibit showing the area associated with this required storage volume is also shown on Exhibit 4. Tables 4-1 and 4-2 summarize the floodway and floodplain fill and compensatory storage requirements, respectively, which are also included in Appendix 3.

Existing Floodway Volume (acre-feet)	Compensatory Storage Volume Required (acre-feet)	Compensatory Storage Volume Provided (acre-feet)
Farrington Ditch		
48.4	48.4	48.5
Buffalo Creek		
0.0	0.0	0.0

Table 4-1 Summary of Floodway Fill and Compensatory Storage Calculations for Alternative 1A

Floodplain Fill		Compensatory Storage Required		Compensatory Storage Provided	
NWL to 10- year Volume (acre-feet)	10- to 100- year Volume (acre-feet)	NWL to 10- year Volume (acre-feet)	10- to 100- year Volume (acre-feet)	NWL to 10- year Volume (acre- feet)	10- to 100- year Volume (acre-feet)
Overall					
8.7	61.3	10.4	73.6	24.1	74.8

Table 4-2 Summary of Floodplain Fill and Compensatory Storage Calculations for Alternative 1A

Stormwater Management

In accordance with the WDO, stormwater detention and water quality treatment will be required for the proposed development. The water quality treatment will include Runoff Volume Reduction (RVR) measures and hydrocarbon removal technologies such as permeable pavers, depressed islands, bioswales, etc. The stormwater detention volume was calculated for a commercial development based on a zero release rate given the close proximity to the adjacent floodplains. It was assumed that all stormwater storage will be provided above ground within the buildable area of the site. If portions of the stormwater detention are placed below ground at a higher cost, the footprint of the stormwater detention within the buildable area can be reduced. Table 4-3 provides a summary of the stormwater detention requirements for Alternative 1A.

Buildable Area (acres)	Detention Storage Volume Required (acre-feet)	Detention Storage Volume Provided (acre-feet)
66.5	28.9	29.0

Table 4-3 Summary of Detention Storage Requirements for Alternative 1A

Assuming 5 feet of bounce between the NWL and HWL of the detention basin, the stormwater detention footprint is approximately 8 acres. The proposed stormwater management calculations are included in Appendix 5.

4.1.2 ALTERNATIVE 1B

An additional alternative was evaluated that considered the relocation of Buffalo Creek. It was assumed that at the western location of the Alternative 1A “buildable area”, Buffalo Creek could be relocated to flow directly south to Lake Cook Road where it would parallel this roadway prior to discharging under Lake Cook Road via the existing bridge structure. After the meeting with the COE, this option was not pursued further as it would require the entire project to be processed as an Individual Permit by the COE.

4.2 FARRINGTON DITCH RELOCATION – ALTERNATIVE 2 (WEST ALIGNMENT)

4.2.1 ALTERNATIVE 2A

Alternative 2A consists of relocating Farrington Ditch to the west side of the development. Under this scenario, the Old Checker Road crossing will remain in its current location and the ditch would flow westerly along the north side of the site and then south along the western side of the development. The existing pipe network that the ditch flows through under existing conditions will be removed and the ditch will be reinstated as an open channel. This alternative provides approximately 59 acres of buildable area (including 6 acres for stormwater detention). Compensatory storage for floodplain fill is proposed to be provided on the western side of the site.

Due to the limited fall on Farrington Ditch between the Old Checker Road crossing and the confluence with Buffalo Creek, the existing location of the confluence cannot be changed and therefore Buffalo Creek and Farrington Ditch will parallel each other (with the channel elevation of Buffalo Creek higher than Farrington Ditch) from the western boundary of the buildable area limit to the existing confluence, located north of Lake Cook Road. There will be a 5 foot wide low flow channel that is 1.5 feet deep, with 2:1 side slopes. The average main channel width of the new ditch is 61 feet at the bottom with 4:1 side slopes tying into existing grades on the west, adjacent to the golf course and to the FPE on the east, within the site. A typical cross-section is included in Appendix 4.

A detailed hydraulic model of this alignment was prepared to determine the floodway width in accordance with the LCSMC WDO. Under this scenario, the existing bridge crossing under Lake Cook Road will be utilized; therefore, the reconstruction of a portion of Lake Cook Road is not required; however, because of the relatively flat slope associated with the relocation of Farrington Ditch, the width of the relocated channel is wider than Alternative 1. Because the flood fringe volume associated with Farrington Ditch is due to backwater from Buffalo Creek, the storage volume associated with the flood fringe is proposed to be provided along Buffalo Creek in accordance with meetings with regulatory agencies. The details of the floodplain fill and compensatory storage placement will occur during preliminary engineering and are shown conceptually on Exhibit 5.

The Buildable Area Exhibit showing the area associated with this required storage volume is also shown on Exhibit 5. Tables 4-4 and 4-5 summarize the floodway and floodplain fill and compensatory storage requirements, respectively, which are also included in Appendix 4.

Existing Floodway Volume (acre-feet)	Compensatory Storage Volume Required (acre-feet)	Compensatory Storage Volume Provided (acre-feet)
<i>Farrington Ditch</i>		
48.4	48.4	49.3
<i>Buffalo Creek</i>		
0.0	0.0	0.0

Table 4-4 Summary of Floodway Fill and Compensatory Storage Calculations for Alternative 2A

Floodplain Fill		Compensatory Storage Required		Compensatory Storage Provided	
NWL to 10-year Volume (acre-feet)	10- to 100-year Volume (acre-feet)	NWL to 10-year Volume (acre-feet)	10- to 100-year Volume (acre-feet)	NWL to 10-year Volume (acre-feet)	10- to 100-year Volume (acre-feet)
<i>Overall</i>					
8.2	60.7	9.8	72.8	44.0	74.7

Table 4-5 Summary of Floodplain Fill and Compensatory Storage Calculations for Alternative 2A

Stormwater Management

Similarly to Alternatives 1A and 1B, stormwater detention and water quality treatment will be required for the proposed development. The water quality treatment will include Runoff Volume Reduction (RVR) measures and hydrocarbon removal technologies such as permeable pavers, depressed islands, bioswales, etc. The stormwater detention volume was calculated for a commercial development based on a zero release rate given the close proximity to the adjacent floodplains. It was assumed that all stormwater storage will be provided above ground within the buildable area of the site. If portions of the stormwater detention are placed below ground at a higher cost, the footprint of the stormwater detention within the buildable area can be reduced. Table 4-6 provides a summary of the stormwater detention requirements for Alternative 2A.

Buildable Area (acres)	Detention Storage Volume Required (acre-feet)	Detention Storage Volume Provided (acre-feet)
59	24.6	25.0

Table 4-6 Summary of Detention Storage Requirements for Alternative 2A

Assuming 5 feet of bounce between the NWL and HWL of the detention basin, the stormwater detention footprint is approximately 6 acres. The proposed stormwater management calculations are included in Appendix 5.

4.2.2 ALTERNATIVE 2B

Similarly to Alternative 1B, an additional alternative was evaluated considering the relocation of Buffalo Creek. It was assumed that at the western location of the Alternative 2A “buildable area”, Buffalo Creek could be relocated to flow directly south to Lake Cook Road where it would parallel this roadway prior to discharging under Lake Cook Road via the existing bridge structure. Because of the grades associated with relocated Farrington Ditch, the two waterways will still need to continue to parallel until the location of the existing confluence.

After the meeting with the COE, this option was not pursued further as it would require the entire project to be processed as an Individual Permit by the COE.

4.3 FARRINGTON DITCH RELOCATION – ALTERNATIVE 3 (EAST ALIGNMENT 2)

4.3.1 ALTERNATIVE 3

Alternative 3 consists of relocating Farrington Ditch to the east side of the development adjacent to the residential neighborhood located between Buffalo Grove Road and the golf course. Under this scenario, the Old Checker Road crossing will remain in its current location and the ditch would flow easterly along the north side of the site before paralleling the residential neighborhood, while flowing south. The existing pipe network that the ditch flows through under existing conditions will be removed and the ditch will be reinstated as an open channel. Similarly to Alternative 1, this alignment also requires the relocation of the confluence of Buffalo Creek and Farrington Ditch; however, the relocated confluence will remain on the north side of Lake-Cook Road. A detailed hydraulic model of this alignment was not prepared.

Under this scenario, the existing bridge crossing under Lake Cook Road will be utilized; therefore, the reconstruction of a portion of Lake Cook Road is not required; however, because the confluence will remain on the north side of Lake Cook Road (similar to Alternative 2), it is assumed that the hydraulics associated with this alternative will be similar to Alternative 2.

Floodplain and Floodway

This relocation of Farrington Ditch will require compensatory storage to be provided at a 1:1 ratio for floodway fill and at a 1.2:1 ratio incrementally for floodplain fill. It is assumed that the relocated ditch will provide floodway storage and the golf course area will be used to provide the remaining floodplain storage. Because the flood fringe volume associated with Farrington Ditch is due to backwater from Buffalo Creek, the storage volume associated with the flood fringe is proposed to be provided along Buffalo Creek in accordance with meetings with regulatory agencies.

The Buildable Area Exhibit showing the area associated with this required storage volume is included as Exhibit 6. Because a detailed hydraulic model of this alternative was not prepared, floodplain and floodway calculations were not performed for this alternative.

CHAPTER 5**EARTHWORK ANALYSIS AND COST ESTIMATE****5.1 EARTHWORK ANALYSIS**

A preliminary earthwork analysis was completed by Spaceco, Inc. for Alternatives 1 and 2 using the “Paydirt” program to estimate the volume of earthwork required to raise the buildable area to a finished grade to the FPE and provide the required compensatory storage. The soils on site were evaluated using the soil investigations report included in Appendix 1. Topsoil depths and unsuitable structural fill soil depths were determined as outlined in the soil investigations report. The existing topography was compared to the topsoil/unsuitable depths to determine the amount of excavated non-structural soil volume. The subgrade elevation was then estimated for the stormwater and build-able areas to determine the structural soil cut and fill volumes. The results of the earthwork analysis and the graphical representation of each alternative are included in Appendix 6.

5.2 COST ESTIMATE

One of the purposes of this analysis was to determine the range of costs of earthwork required to raise the site above the floodplain elevation for the two alternatives previously discussed. The current analysis included only the mass grading required to bring the site subgrade to elevation 682 (2.5 feet above the FPE) and excavate the required compensatory storage and detention storage volumes. Allowances were included in the estimate for major items that required more detailed design to determine costs. It did not include the following items that would be in addition to the required earthwork:

- Wetland Mitigation
- Site Features such as sewers, pavement, retaining walls, etc.
- Landscaping and site finishes
- RVR measures

Based on analyses above, the preliminary cost estimates have been computed only for Alternatives 1 and 2, and are included in Appendix 7. The estimate is meant to provide a range of earthwork costs at a planning level for the Buffalo Grove Downtown Development site.

The earthwork cost estimate should be used for planning and budgeting purposes only. It is recommended that an earthwork contractor be consulted to determine haul routes and distances, other soil moving strategies, soil challenges, and provide a preliminary bid. A major challenge of the development is the amount of structural fill required to raise the existing buildable area above the flood protection elevation verses the amount of non-structural fill that will need to be removed from the buildable areas. In the cost analysis, it was assumed an amount of the structural material can be borrowed or over-excavated from below the compensatory storage area, then non-structural fill can be used to fill the areas back in. If sufficient barrow material is not available, because of soil conditions and groundwater conditions, then additional structural material may need to be imported to the site. The faster

import material is needed, the cost per cubic cost will be higher. If other construction projects can use this site as a fill site, costs could be much lower, but it may take a much longer time to obtain the necessary quantity of material.

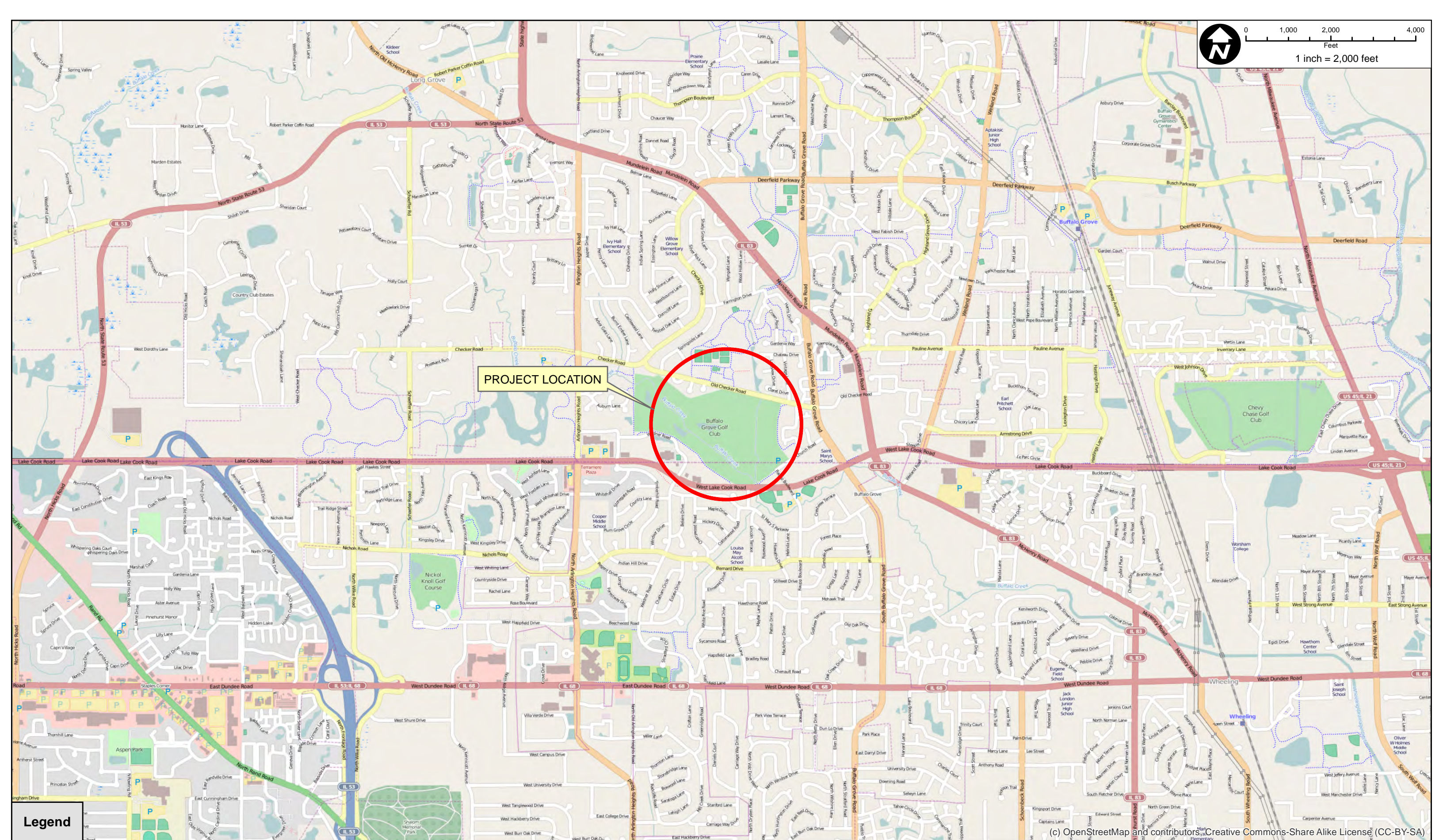
CHAPTER 6**CONCLUSIONS****6.1 CONCLUSIONS**

The alternatives presented in the report summarize the buildable area analysis for the Buffalo Grove Downtown Redevelopment. A hydraulic analysis was used to determine the floodplain and floodway impacts and a hydrologic analysis was used to determine the required stormwater storage volume based on the Alternatives 1 and 2. A complete hydraulic and buildable area analysis was not completed for Alternative 3. The computed buildable area is based on the FPE required by the Village and the stormwater management facilities have been sized according to the applicable stormwater management ordinances. The compensatory storage areas and detention storage areas shown on Exhibits 4-6 do not depict the required locations of the facilities, but rather a graphical representation of the area required. It is assumed the exact layout of the stormwater management facilities will be determined when the site plan is developed. Under all three alternatives we do not recommend relocation of Buffalo Creek, as it would result in increased permitting requirements for the entire site. In our opinion, the alternatives presented in this report would be permissible by the regulatory agencies. It is anticipated once site survey, refinement of the layout and preliminary engineering are completed, the permitting will take 18-24 months.

N:\BuffaloGrove\130035\Admin\August 2014\R1 August 2014 Final.docx



0 1,000 2,000 4,000
Feet
1 inch = 2,000 feet



PROJECT LOCATION

Legend

(Legend content is not explicitly detailed in the provided image)

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

CLIENT:
VILLAGE OF BUFFALO GROVE

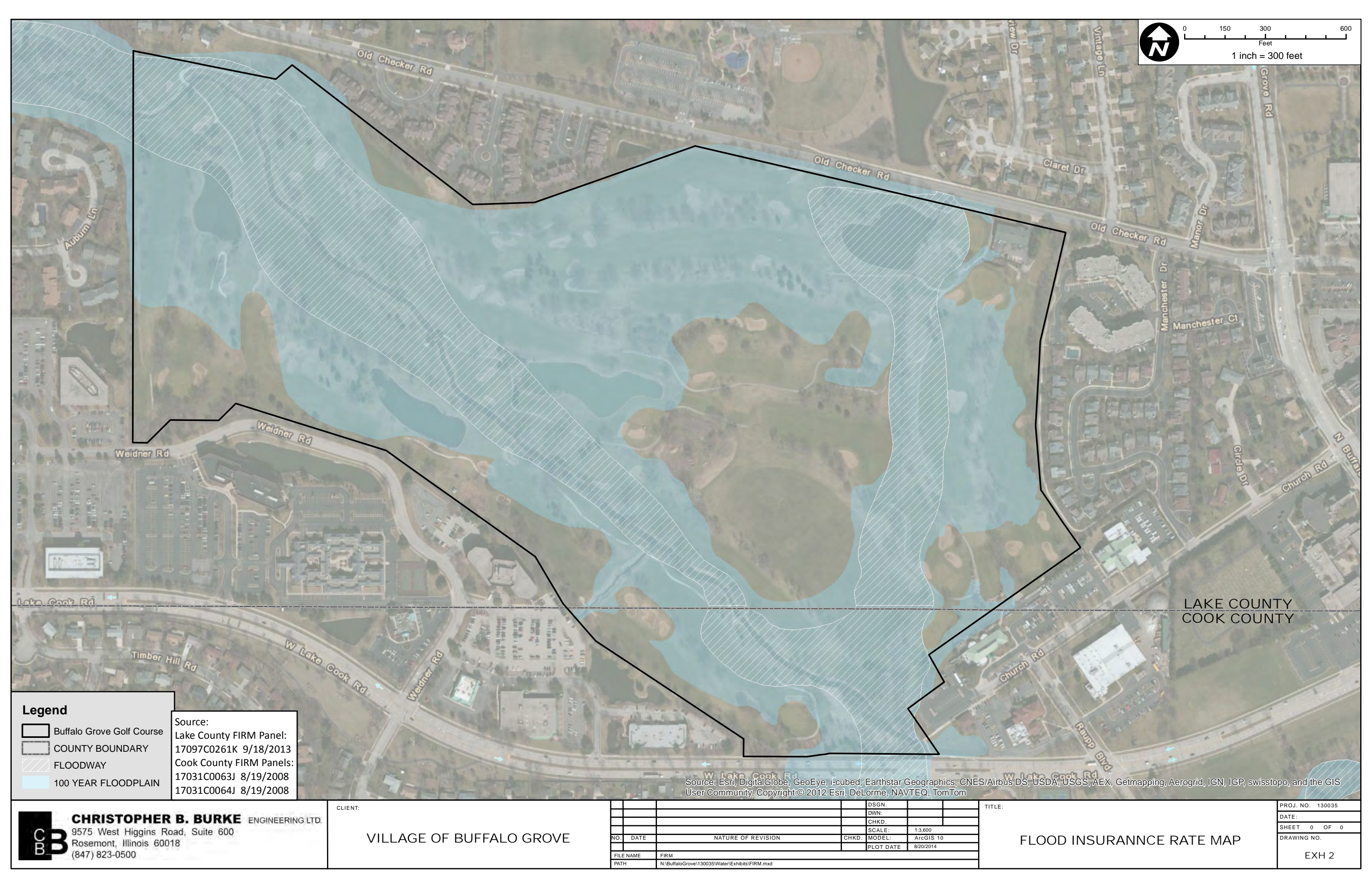
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PROJ. NO.	130035
DATE:	
SHEET	0 OF 0
DRAWING NO.	
	EXH 1

(c) OpenStreetMap and contributors, Creative Commons-Share Alike License (CC-BY-SA)



0 150 300 600
Feet
1 inch = 300 feet



LAKE COUNTY
COOK COUNTY

Legend

- Buffalo Grove Golf Course
- COUNTY BOUNDARY
- FLOODWAY
- 100 YEAR FLOODPLAIN

Source:
Lake County FIRM Panel:
17097C0261K 9/18/2013
Cook County FIRM Panels:
17031C0063J 8/19/2008
17031C0064J 8/19/2008

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Copyright:© 2012 Esri, DeLorme, NAVTEQ, TomTom

CB **CHRISTOPHER B. BURKE** ENGINEERING LTD.
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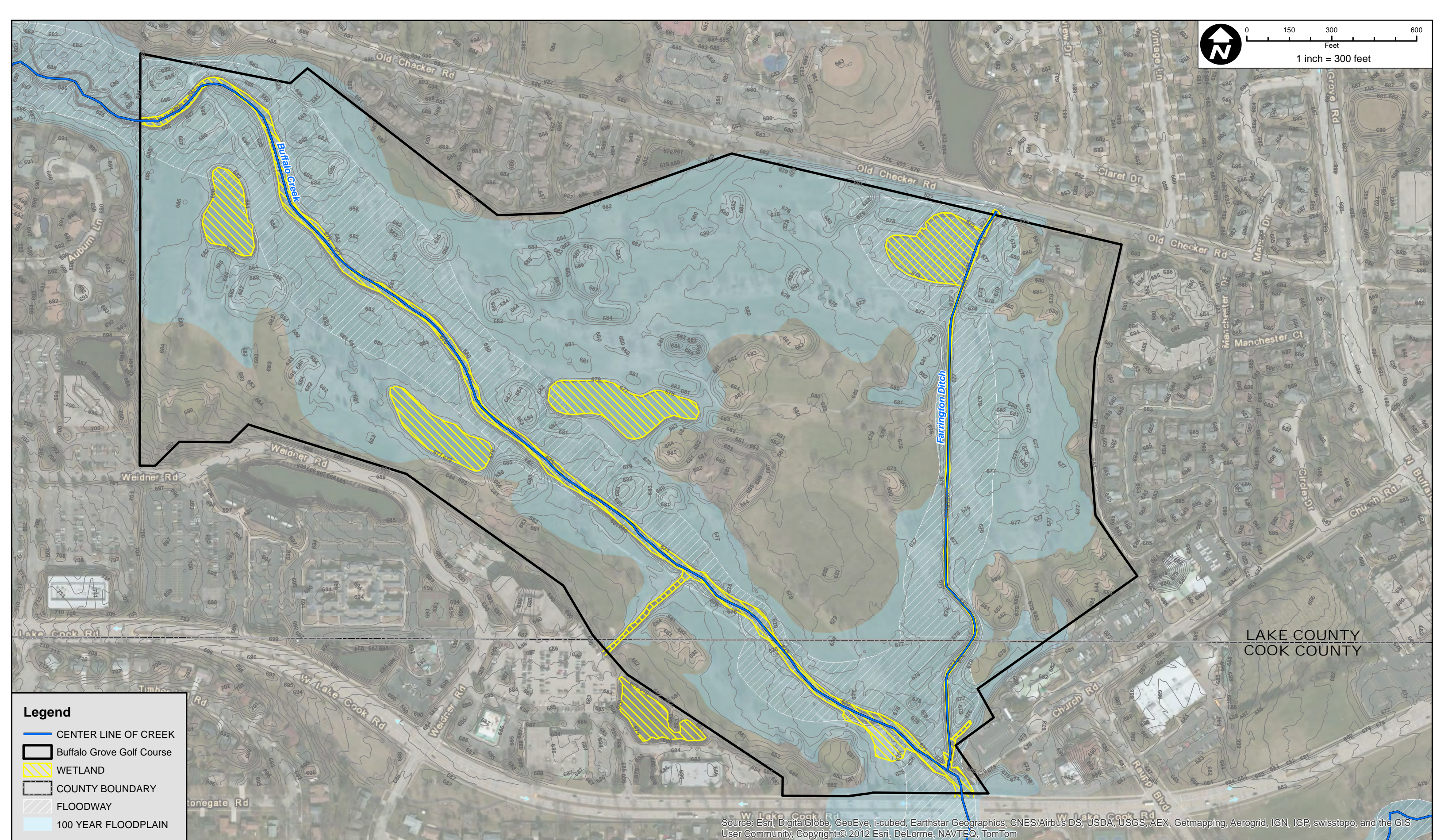
PROJ. NO. 130035
DATE:
SHEET 0 OF 0
DRAWING NO.
EXH 2



0 150 300 600

Feet

1 inch = 300 feet



Legend

- CENTER LINE OF CREEK
- Buffalo Grove Golf Course
- WETLAND
- COUNTY BOUNDARY
- FLOODWAY
- 100 YEAR FLOODPLAIN

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Copyright:© 2012 Esri, DeLorme, NAVTEQ, TomTom

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CLIENT:
VILLAGE OF BUFFALO GROVE

NO.	DATE	NATURE OF REVISION	CHKD.	MODEL:	ArcGIS 10
FILE NAME	Existing Conditions				
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TITLE:
EXISTING CONDITIONS

PROJ. NO. 130035
 DATE:
 SHEET 0 OF 0
 DRAWING NO.
EXH 3



LEGEND

- BUILDABLE AREA = 59 AC (INCLUDING DETENTION)
- COMPENSATORY STORAGE
- EXISTING PONDS
- EXISTING CREEK
- REROUTED CHANNEL
- OPEN SPACE
- EXISTING FLOODWAY

N

SCALE 1" = 150'

0 150 300

NET BUILDABLE AREA EXHIBIT - WEST

BUFFALO GROVE REDEVELOPMENT
BUFFALO GROVE, IL

CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

9575 W. Higgins Road, Suite 700,
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FILENAME: 7696-BAE-1
DATE: 08/2014
JOB NO. 7696
SHEET EXHIBIT 5



LEGEND

- BUILDABLE AREA = 57.4 AC (INCLUDING DETENTION)
- COMPENSATORY STORAGE
- EXISTING PONDS
- EXISTING CREEK
- REROUTED CHANNEL
- OPEN SPACE
- EXISTING FLOODWAY

N

SCALE 1" = 150'

0 150 300

NET BUILDABLE AREA EXHIBIT - EAST

BUFFALO GROVE REDEVELOPMENT
BUFFALO GROVE, IL

CONSULTING ENGINEERS
SITE DEVELOPMENT ENGINEERS
LAND SURVEYORS

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FILENAME: 7696-BAE-1
DATE: 08/2014
JOB NO. 7696
SHEET EXHIBIT 6

***Appendix 1
Geotechnical Report***



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Geotechnical & Environmental Engineering



Construction Materials Engineering & Testing



Laboratory Testing of Soils, Concrete & Asphalt



Geo-Environmental Drilling & Sampling

Report Of Soils Exploration

Proposed Downtown Development

Buffalo Grove Golf Club

Lake Cook Road, Buffalo Grove, Illinois

**Christopher B.
Burke
Engineering, Ltd.**

GEOTECHNICAL GROUP

CAROL STREAM

April 24, 2014

L - 81,358

PRELIMINARY SOILS EXPLORATION
PROPOSED DOWNTOWN DEVELOPMENT
BUFFALO GROVE GOLF CLUB
LAKE COOK ROAD
BUFFALO GROVE, ILLINOIS

PREPARED FOR:
CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. HIGGINS ROAD, SUITE 600
ROSEMONT, ILLINOIS

PREPARED BY:
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457 EAST GUNDERSEN DRIVE
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June 3, 2014

L - 81,358

PRELIMINARY SOILS EXPLORATION
PROPOSED DOWNTOWN DEVELOPMENT
BUFFALO GROVE GOLF CLUB
LAKE COOK ROAD
BUFFALO GROVE, ILLINOIS

1.0 INTRODUCTION

This report presents results of the preliminary soils exploration performed for the proposed Downtown Development in Buffalo Grove, Illinois. These geotechnical engineering services are being provided in accordance with TSC Proposal No. 51,023B dated February 19, 2014 and the attached General Conditions, incorporated herein by reference.

A mixed-use development is being proposed to create a central business (downtown) district in the Village of Buffalo Grove. It encompasses the eastern half of the Buffalo Grove Golf Club as well as the adjoining Village Campus. These properties lie north of Lake Cook Road near its intersection with Raupp Boulevard.

The 65-acre mixed-use development is to potentially contain a new municipal campus, retail stores with upper-story residences as well as condominium buildings. Public gathering places, cultural amenities and ancillary site improvements are also planned. However, no specific building plans or grading information are currently available.

The golf club currently encompasses approximately 130 acres. Buffalo Creek and a tributary bisect the property, along which several ponds are located. The site is otherwise fairly open with trees bordering most of the fairways. It is understood that compensatory storage for the proposed development will



likely have to be provided on the western half of the golf course, with the bottom of associated basins to be at around Elevation 676.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

Twenty-nine (29) soil borings were performed on the golf course as part of our preliminary soils exploration. Boring locations were selected by CBBEL and staked in the field by TSC, having to be offset in a few cases due to utility conflicts. Please note that no borings were drilled on greens or tee boxes for obvious reasons, typically falling around them or along the sides of the fairways.

Borings 1 - 13 lie south of Buffalo Creek, Borings 14 - 25 north of the creek and west of its tributary which bisects the eastern end of the site, and Borings 26 - 29 east of the tributary. A Boring Location Plan is included in the Appendix showing the drilling layout. Ground surface elevations at the borings locations were acquired by TSC using a Trimble R10 GNSS receiver, being adjusted slightly to match benchmarks located on the property as well as rounded to the nearest 0.5 foot.

The majority of the borings were extended to 15 feet below existing grade, with Borings 1, 3, 5, 13, 18, 19, 21 and 26 (8 total) made 25 feet deep. They were drilled and samples tested in accordance with currently recommended American Society for Testing and Materials specifications. Soil sampling was performed at 2½-foot intervals to a depth of at least 15 feet and at no greater than 5-foot intervals thereafter. The samples were taken in conjunction with the Standard Penetration Test, for which driving resistance to a 2" split-spoon sampler (N value in blows per foot) provides an indication of the relative density of granular materials and consistency of cohesive soils.

Water level readings were taken during and following completion of drilling operations. Bentonite chips were then used to seal the boreholes from their bottom up to the 3-foot level. The upper 3 feet was then backfilled with the soil cuttings coming from the same zone, being separated out and held on the side. The remaining cuttings (from below 3 feet) were placed in the nursery area on the golf course.

Soil samples were examined in the laboratory to verify field descriptions and to classify them in accordance with the Unified Soil Classification System. Laboratory testing included moisture content determinations for all cohesive and intermediate (silt or loamy) soil types. An estimate of unconfined

compressive strength was obtained for all cohesive materials using a calibrated pocket penetrometer, with actual measurements of unconfined compressive strength performed on representative samples of inorganic native clays. Dry unit weight tests were also run on specimens of clay fill.

Reference is made to the boring logs in the Appendix which indicate subsurface stratigraphy and soil descriptions, results of field and laboratory tests, as well as water level observations. Definitions of descriptive terminology are also included. While strata changes are shown as a definite line on the boring logs, the actual transition between soil layers will probably be more gradual.

3.0 DISCUSSION OF TEST DATA

Surficial topsoil was present at the majority of the boring locations, in at least some if not most cases representing respread materials. While often being on the order of 12 inches thick, the topsoil layer was 2 to 3 feet deep at almost half of the borings. The deeper clayey topsoil materials presumably represent partial fill in many cases. They exhibited moisture contents which were typically in the range of 24 to 36 percent.

Primarily silty clay fill materials extended approximately 2 to 6 feet below existing grade at Borings 1, 3, 7, 26 and 27 (5 total). Fill is also likely to be present at green and tee box locations (not drilled as part of this preliminary soils exploration), which are typically elevated in elevation. Samples of the fill from the borings were variable in consistency, exhibiting moisture contents and dry unit weights ranging from 14 to 26 percent and 98 to 122 pounds per cubic foot (pcf), respectively.

Organic clay/topsoil was found underlying existing fill at B-3, extending to about 5½ feet in depth and exhibiting a very high moisture content of 52 percent. Relatively soft and/or very moist silty clay soils also underlie fill and topsoil materials at Borings 4, 15, 21 and 27 as well as a stiffer clay crust in B-14, extending up to 6 feet in depth. The soft clays had unconfined compressive strengths ranging from 0.2 to 0.9 tons per square foot (tsf) at moisture contents of 25 to 33 percent.

Tough to hard native silty clay soils otherwise predominated, along with very silty clay and sandy clay layers extending to the bottom of the majority of the borings. These cohesive materials had unconfined



compressive strengths typically ranging from 1.5 to 6.0 tsf, occasionally being both higher and lower. Moisture contents normally varied from 12 to 24 percent, sometimes being higher in the upper 3 feet.

Loose to firm silt, sand and gravel deposits also occurred as interbedded layers. They were present in the upper 6 feet at about one-quarter of the borings, occurring below about 8 to 13 feet in depth at one-half of them. These intermediate and granular materials had SPT N-values typically ranging from 6 to 36 blows per foot (bpf).

Free water was initially encountered at 1 to 10 feet below existing grade in the majority of the borings. The water levels in the boreholes at the end of drilling had risen in many cases, typically to within 1 to 5 feet of ground surface prior to backfilling. Only Borings 7, 12 and 17 were noted as "dry" both during and following completion of drilling operations. It should be noted that fluctuations in the groundwater table can be expected due to variations in precipitation (short-term and seasonal) as well as rises or drops in creek or other nearby surface water features.

4.0 ANALYSIS AND RECOMMENDATIONS

4.1 Bearing Table

Summarized in the following table is the shallowest depth/elevation at which in-situ native soils considered capable (or marginally capable) of supporting a net allowable bearing pressure of at least 3000 pounds per square foot (psf) were encountered at each of the borings. Ground surface elevations and depths of surficial topsoil (T = relatively deep; possible partial fill) and/or existing clay fill (F) are also indicated. Added notes relate to the presence of marginal bearing soils for fill placement and/or foundation support (M), relatively soft clay soils requiring undercuts as part of mass-grading (U), and wet sand and gravel deposits encountered within 6 feet of ground surface (W); these conditions are discussed in greater detail in the text which follows.

The recommended bearing stress of 3000 psf is typical and generally satisfactory for up to 3-story buildings construction, which should cover the majority of the proposed development. Mid-rise condominium building and parking structures having heavier column loads would ideally employ a higher bearing pressure or utilize piles/caisson foundations. In any event, foundation



recommendations will have to be reviewed when specific building plans and grading information are available, to likely have to be modified in at least some cases.

Boring No.	Ground Surface Elevation*	Depth of Existing Fill and/or Topsoil (Feet)*	3000 PSF Native Bearing	
			Depth (Feet)*	Elevation*
1	684.5	5.5 F	5.5	679.0
2	684.0	1.0	1.0 W	683.0
3	690.0	3.0 F	5.5 U	684.5
4	682.0	1.0	3.0 UMW	679.0
5	681.5	1.0	3.0 U	678.5
6	681.5	3.0 T	3.0	678.5
7	680.0	3.0 F	3.0	677.0
8	682.0	1.2	1.5	680.5
9	681.5	2.0 T	2.0	679.5
10	680.0	1.2	1.5 M	678.5
11	675.5	3.0 T	3.0	672.5
12	680.0	1.0	1.0	679.0
13	675.5	1.2	1.5 M	674.0
14	683.5	1.2	8.0 U	675.5
15	681.5	3.0 T	6.0 UM	675.5
16	681.0	2.5 T	2.5	678.5
17	681.0	1.1	1.0	680.0
18	678.5	3.0 T	3.0	675.5
19	682.5	1.2	1.5 MW	681.0
20	679.5	3.0 T	3.0	676.5
21	678.0	2.0 T	5.0 UMW	673.0
22	680.0	1.5	2.0 MW	678.0
23	678.0	3.0 T	3.0 MW	675.0



24	681.0	1.0	1.0 M	680.0
25	677.0	3.0 T	3.0	674.0
26	676.5	5.5 F	5.5	671.0
27	678.5	3.0 F	5.5 U	673.0
28	677.0	3.0 T	3.0 MW	674.0
29	680.5	2.5 T	5.5 U	675.0

- * Ground surface elevations and the depth/elevation of 3000 psf native bearing soils have been rounded to the nearest 0.5 foot.
- F Primarily clay fill present to depth indicated.
- T Relatively thick topsoil layer - possible partial fill..
- M Marginal bearing soils for fill placement and/or foundation support.
- U Undercut depth associated with removal and replacement of relatively soft clay soils (feet).
- W Wet sand and gravel deposits encountered within 6 feet of ground surface.

4.2 Building Foundations

Primarily clay fill and/or a relatively thick topsoil layer (possible partial fill) were present at over half of the boring locations. These materials extended approximately 2 to 6 feet in depth, presumably having been placed in connection with the original development of the site as a golf course. The fill was variable inconsistency, along with the clayey topsoil materials often exhibiting relatively high moisture contents on the order of 30 percent or higher. It is assumed that additional fill materials are present under greens and tee boxes although no borings were drilled in these areas.

Existing fill materials at the site represent "uncontrolled" fill. As such they are unsuitable for foundation support, also providing a marginal to deficient base for slab-on-grade construction. The fill and topsoil materials will presumably have to be removed and replaced/recompacted from under



future building areas. In this regard, the depth of 3000 psf bearing indicated in the above table may be used in estimating associated undercut depths.

Relatively soft and very moist silty clay soils were found underlying existing fill and clayey topsoil materials at Borings 3 - 5 , 14, 15, 21, 27 and 29 (8 total). These are concentrated on the western portion and far eastern end of the site. It is assumed that the soft clays will also be removed and replaced as part of building pad construction, with total undercut depth typically being in the range of 2 to 6 feet but reaching up to 8 feet deep at B-14. If left in-place, consolidation of these compressible soil types could lead to settlement and cracking of floor slabs and foundations constructed thereupon.

At about one-third of the boring locations, the soils found directly underlying a shallow topsoil layer are considered suitable (or marginally suitable) for support of 3000 psf bearing. These are indicated by bearing depths ranging from 1.0 to 2.0 feet in the above table. Uppermost bearing soils typically consist of native silty clays exhibiting unconfined compressive strengths in the range of 2.0 tsf or greater, 1.0 to 2.0 tsf and/or having relatively high moisture contents exceeding 25 percent in the case of marginal bearing soils.

In these areas of satisfactory bearing and assuming that undercutting is performed as outlined above, footings may also be constructed on engineered fill that is placed as part of mass-grading. Assuming that new/replacement fill is placed and compacted to the 95 percent criterion, footings constructed on the engineered fill may also be sized for 3000 psf bearing. However, in areas underlain by low to marginal strength and/or relatively high moisture content soils, as well as anywhere that the height of new fill is to exceed 8 feet, it is recommended that settlement considerations related to fill placement be further evaluated when grading information is available.

Marginal bearing soils were otherwise encountered at relatively shallow depths in one-third of the borings. They primarily consists of silty clay soils having unconfined compressive strengths of 1.0 to 2.0 tsf and/or moisture contents exceeding 25 percent. Moisture sensitive soil types, i.e. loose silt and sand deposits, were also encountered at shallow depths in a few of the borings. These latter materials can experience a loss of stability when subjected to rainfall or groundwater seepage, also being easily disturbed due to excavation operations or construction traffic.

Relatively low strength or unstable soils exposed at footing grade should be removed and replaced with structural backfill. These types of materials were also found underlying a stiffer crust in a few of

the borings, to possibly be exposed in deeper foundation excavations. Undercuts of between 1 and 2 feet are generally required based on field observations. Foundation overexcavations are then typically backfilled and footings constructed at design elevations in accordance with the following recommended procedures.

The base of foundation overexcavations should exceed footing dimensions by at least 12 inches along each side, 6 inches for every foot of overdig where the undercut exceeds 2.0 feet in depth. Replacement materials should consist of crushed stone or crushed gravel between ¼ to 3 inches in size and containing no fines; IDOT gradations CA-1 and CA-7 meet these criteria. This "structural" fill should be spread in 12-inch layers loose thickness, each lift to be densified using vibratory compaction equipment or by tamping with a backhoe bucket. Footings constructed on the crushed stone or crushed gravel backfill may also be proportioned for 3000 psf bearing.

In order to preclude disproportionately small footing sizes, it is recommended that all continuous wall footings be made at least 20 inches wide, trench footings at least 12 inches wide and isolated foundations at least 2.5 feet square, regardless of calculated dimensions. For frost considerations, all exterior footings should be constructed at least 3.5 feet below outside finished grade and 4.0 feet for foundations located outside of heated building limits. Interior footings may be constructed at higher elevations as long as they are protected against frost heave in the event of winter construction. Consideration should be given to reinforcing foundation walls (two #5 rebars top and bottom) where footing undercuts exceed 2 feet in depth or total fill heights are 8 feet or greater.

4.3 Mass-Grading

It is recommended that building pad and pavement areas be cleared of vegetation prior to mass-grading. Stripping operations should also include the removal of all surficial topsoil and other decomposable plant matter as well as existing fill materials. The building pad and pavement areas should then be proof-rolled using a loaded dump truck or other approved piece of heavy construction equipment, in order to detect the presence of unsuitable soil types. All soft or unstable materials determined by proof-rolling should be reworked and recompact or, if that does not substantially improve subgrade stability, removed and replaced

Undercutting of existing fill materials, relatively thick topsoil and/or soft clay soils is indicated at about two-thirds of the boring locations. These unsuitable soil types extended 2 to 6 feet below existing grade in most cases, up to 8 feet deep at B-14. Undercutting of unsuitable soil types will require that



building pads be enlarged to permit the horizontal distribution of footing loads. It is recommended that the base of the undercut, or zone of stripping where only topsoil is to be removed, extend a minimum of 5 feet outside the outer edge of the structure plus an additional 0.5 feet for every foot of fill to be placed.

Marginal subgrade stability and/or water problems are common conditions in deep undercuts, often meaning that clay fill cannot be initially compacted. Where it occurs it is recommended that coarse aggregate be placed in the bottom of the excavation until a stable base for compaction of clay fill is achieved, a 12 to 24-inch "bridging lift" typically being required. The coarse aggregate may consist of crushed stone or gravel between about ¼ to 4 inches in size and containing no fines; IDOT gradations CA-1, CA-5 and CA-7 meet these criteria.

Marginal subgrade stability, represented by clay soil types having unconfined compressive strengths of 1.0 to 2.0 tsf and/or moisture contents exceeding 25 percent, was otherwise encountered at one-third of the boring locations. These materials will likely need to be reduced in moisture content and recompacted in order to provide a stable base. Lime stabilization can achieve similar results and has the advantage of allowing work to proceed under adverse weather conditions. In any event, the need for subgrade reworking or additional undercutting should be evaluated on the basis of proof-rolling.

Silt and sand deposits were present in the upper 6 feet of about one-quarter of the borings. The traffic of heavy construction equipment frequently causes these intermediate and fine-grained granular materials to experience a short-term decrease in stability, specially in the presence of shallow groundwater. The associated soft and spongy condition of exposed soils is commonly referred to as "pumping" in this area.

It is recommended that heavy construction equipment be detoured around any areas where pumping conditions are found to be developing. Depending upon grading requirements and specific site conditions, solutions to a persistent pumping problem may include removal or the unstable soils, placement of a bridging lift of granular backfill, use of geotextile stabilization fabric or geogrid products in conjunction with the granular fill, construction of trench drains (to lower the groundwater table) or a combination thereof.



New fill should otherwise consist of or inorganic silty clays of medium plasticity or approved granular materials. It is recommended that compaction for building pad and pavement areas be to a minimum of 95 and 90 percent of maximum dry density, respectively, as determined by the Modified Proctor test (ASTM D 1557). The upper 2 feet of roadway subgrade is also often compacted to the 95 percent criterion, to create a more stable base for final proof-rolling as well as paving. The fill should be placed in approximate 9 inch lifts loose measure for cohesive soils and up to 12 inches for granular materials, each lift to be compacted to the specified density prior to the placement of additional fill.

Moisture control is important in the compaction of most soil types, and it is recommended that the water content of new fill be within about 1 percentage point on the low side and 3 percentage points on the high side of optimum moisture as established by its laboratory compaction curve. If the soil is compacted too dry, it will have an apparent stability which will be lost if it later becomes saturated. If the soil is too wet, the Contractor will not be able to achieve proper compaction.

In regard to use of on-site borrow, shallow silty clay soils were sometimes relatively moist - having water contents exceeding 20 percent. It is estimated that their use as engineered fill or a stabilized subgrade will require that the in-situ moisture be reduced by about 4 to 8 + percentage points. This reduction in moisture content is typically achieved by spreading the material in a single lift and aerating with a continuous discing operation. For obvious reasons it will work best in hot, dry and windy weather. Lime stabilization can also be used and has the advantage of working in less ideal weather conditions.

Silt and sand deposits were also encountered at shallow depths in about one-quarter of the borings. As previously discussed for footings, these intermediate materials are moisture sensitive, i.e. can experience a loss of stability when subjected to groundwater seepage or rainfall. They also prone to instability under the traffic of heavy construction equipment. While none of these properties makes them unsuitable as engineered fill, they do point to difficulties in handling and compaction of them.

4.4 Compensatory Storage

It is understood that the compensatory storage for the proposed development will likely have to be provided on the western half of the golf course. The bottom of associated basins is estimated to be around Elevation 676. Existing grades are typically in the range of Elevations 680 to 684, reaching up



to Elevation 690 at B-3 in the far southwest corner. On this basis cuts in the range of 4 to 8 feet are anticipated in most cases.

Tough to hard silty clay soils predominated at and above Elevation 676 in the majority of the borings drilled on the western half of the golf course. These cohesive materials are expected to be stable on the 3H:1V to 5H:1V slopes typically used for basin excavations in this area. The only major exception was very soft organic clay/topsoil encountered underlying existing clay fill in the upper 6 feet of B-3 (far southwest corner of site). These materials are expected to slough significantly if left exposed on excavation sides slopes, along with relatively thick clayey topsoil encountered in several of the other borings (to lesser degree).

Loose to firm silty sand and gravel layers were encountered in the upper 6 feet of Borings 2 and 4 (i.e. above Elevation 676). Dense sand and gravel was also present right at Elevation 676 in B-1, along with interbedded silt and sand lenses overlying medium to fine sand in B-15. Groundwater seepage can be expected from these layers, both at the time of excavation as well as long-term. In this regard, free water was encountered at elevations in the range of 678 to 682 at the referenced borings.

4.5 Groundwater Management

Free water was initially encountered at 1 to 10 feet below existing grade in the majority of the borings. The water levels in the boreholes at the end of drilling had risen in many cases, typically to within 1 to 5 feet of ground surface prior to backfilling. The water levels at the end of drilling typically correlated to elevations in the range of 676 to 682.

Serious groundwater problems are not anticipated where cohesive silt types predominate. However, the accumulation of run-off water or seepage at the base of excavations is still expected to occur during foundation construction and site work, the latter to often be associated with interbedded or deeper sand layers. The Contractor should therefore be prepared to implement dewatering procedures, as a minimum to include pumping from strategically placed sumps.

Wet sand and gravel deposits were encountered within 6 feet of ground surface at Borings 2, 4, 19, 21 - 23 and 28 (7 total), concentrated in and around the northeast corner of the site. Groundwater should be further evaluated in these areas taken into account building and site grading (including stormwater detention) plans as well as utilities installations. In this regard, where granular soils types

are present basements should ideally be located 2 to 3 feet above the projected groundwater table. Constructing the basements in upper cohesive (i.e. less permeable) materials would also be a safe measure. In any event, consideration should be given to installing groundwater monitoring wells (piezometers) and/or excavating test pits to better evaluate existing groundwater conditions in critical areas.

All basement and below grade structures should otherwise be provided with perimeter drain tile tied into sump pit with automatic pumping system. This is a standard requirement in the project area, the effectiveness of which will be dependent on groundwater at the site being controllable. If problems are encountered in connection with continuous or high rates of groundwater seepage, the design engineer and geotechnical consultant should be notified so that the condition can be further evaluated.

In addition to the question of basements, the presence of wet to saturated sand and gravel deposits will also present problems to utility construction. If pipes are to be installed more than a couple feet, into wet sand and gravel materials, pre-construction dewatering is likely to be required. This may consist of well points which employ continuous pumping while trenches are open.

5.0 CLOSURE

This preliminary report has been prepared without benefit of final building plans or grading information. It is therefore suggested that Testing Service Corporation review these plans when available, to check the accuracy of this report as it may be affected, to verify the correct interpretation of recommendations contained herein and to modify the findings accordingly. Close-out borings are likely to be recommended at that time. Consideration should also be given to installing groundwater monitoring wells and/or excavated test pits to better evaluate existing groundwater conditions.

The analysis and recommendations submitted in this report are based upon the data obtained from the twenty-nine (29) soil borings performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur between these borings, the nature and extent of which may not become evident until during the course of construction. If variations are then identified, recommendations contained in this report should be re-evaluated after performing on-site observations.



We are available to review this report with you at your convenience.

A handwritten signature in black ink, appearing to read "M. Machalinski".

Michael V. Machalinski
Vice President
Registered Professional Engineer
Illinois No. 062-038559



A handwritten signature in blue ink, appearing to read "T. Peceniak".

Timothy R. Peceniak
Geotechnical Engineer

MVM:nf

Enc.



TESTING SERVICE CORPORATION

GENERAL CONDITIONS

Geotechnical and Construction Services

1. PARTIES AND SCOPE OF WORK: If Client is ordering the services on behalf of another, Client represents and warrants that Client is the duly authorized agent of said party for the purpose of ordering and directing said services, and in such case the term "Client" shall also include the principal for whom the services are being performed. Prices quoted and charged by TSC for its services are predicated on the conditions and the allocations of risks and obligations expressed in these General Conditions. Unless otherwise stated in writing, Client assumes sole responsibility for determining whether the quantity and the nature of the services ordered by Client are adequate and sufficient for Client's intended purpose. Unless otherwise expressly assumed in writing, TSC's services are provided exclusively for client. TSC shall have no duty or obligation other than those duties and obligations expressly set forth in this Agreement. TSC shall have no duty to any third party. Client shall communicate these General Conditions to each and every party to whom the Client transmits any report prepared by TSC. Ordering services from TSC shall constitute acceptance of TSC's proposal and these General Conditions.

2. SCHEDULING OF SERVICES: The services set forth in this Agreement will be accomplished in a timely and workmanlike manner. If TSC is required to delay any part of its services to accommodate the requests or requirements of Client, regulatory agencies, or third parties, or due to any cause beyond its reasonable control, Client agrees to pay such additional charges, if any, as may be applicable.

3. ACCESS TO SITE: TSC shall take reasonable measures and precautions to minimize damage to the site and any improvements located thereon as a result of its services or the use of its equipment; however, TSC has not included in its fee the cost of restoration of damage which may occur. If Client desires or requires TSC to restore the site to its former condition, TSC will, upon written request, perform such additional work as is necessary to do so and Client agrees to pay to TSC the cost thereof plus TSC's normal markup for overhead and profit.

4. CLIENT'S DUTY TO NOTIFY ENGINEER: Client represents and warrants that Client has advised TSC of any known or suspected hazardous materials, utility lines and underground structures at any site at which TSC is to perform services under this agreement.

5. DISCOVERY OF POLLUTANTS: TSC's services shall not include investigation for hazardous materials as defined by the Resource Conservation Recovery Act, 42 U.S.C. § 6901, et. seq., as amended ("RCRA") or by any state or Federal statute or regulation. In the event that hazardous materials are discovered and identified by TSC, TSC's sole duty shall be to notify Client.

6. MONITORING: If this Agreement includes testing construction materials or observing any aspect of construction of improvements, Client's construction personnel will verify that the pad is properly located and sized to meet Client's projected building loads. Client shall cause all tests and inspections of the site, materials and work to be timely and properly performed in accordance with the plans, specifications, contract documents, and TSC's recommendations. No claims for loss, damage or injury shall be brought against TSC unless all tests and inspections have been so performed and unless TSC's recommendations have been followed.

TSC's services shall not include determining or implementing the means, methods, techniques or procedures of work done by the contractor(s) being monitored or whose work is being tested. TSC's services shall not include the authority to accept or reject work or to in any manner supervise the work of any contractor. TSC's services or failure to perform same shall not in any way operate or excuse any contractor from the performance of its work in accordance

with its contract. "Contractor" as used herein shall include subcontractors, suppliers, architects, engineers and construction managers.

Information obtained from borings, observations and analyses of sample materials shall be reported in formats considered appropriate by TSC unless directed otherwise by Client. Such information is considered evidence, but any inference or conclusion based thereon is, necessarily, an opinion also based on engineering judgment and shall not be construed as a representation of fact. Subsurface conditions may not be uniform throughout an entire site and ground water levels may fluctuate due to climatic and other variations. Construction materials may vary from the samples taken. Unless otherwise agreed in writing, the procedures employed by TSC are not designed to detect intentional concealment or misrepresentation of facts by others.

7. DOCUMENTS AND SAMPLES: Client is granted an exclusive license to use findings and reports prepared and issued by TSC and any sub-consultants pursuant to this Agreement for the purpose set forth in TSC's proposal provided that TSC has received payment in full for its services. TSC and, if applicable, its sub-consultant, retain all copyright and ownership interests in the reports, boring logs, maps, field data, field notes, laboratory test data and similar documents, and the ownership and freedom to use all data generated by it for any purpose. Unless otherwise agreed in writing, test specimens or samples will be disposed immediately upon completion of the test. All drilling samples or specimens will be disposed sixty (60) days after submission of TSC's report.

8. TERMINATION: TSC's obligation to provide services may be terminated by either party upon (7) seven days prior written notice. In the event of termination of TSC's services, TSC shall be compensated by Client for all services performed up to and including the termination date, including reimbursable expenses. The terms and conditions of these General Conditions shall survive the termination of TSC's obligation to provide services.

9. PAYMENT: Client shall be invoiced periodically for services performed. Client agrees to pay each invoice within thirty (30) days of its receipt. Client further agrees to pay interest on all amounts invoiced and not paid or objected to in writing for valid cause within sixty (60) days at the rate of twelve (12%) per annum (or the maximum interest rate permitted by applicable law, whichever is the lesser) until paid and TSC's costs of collection of such accounts, including court costs and reasonable attorney's fees.

10. WARRANTY: TSC's professional services will be performed, its findings obtained and its reports prepared in accordance with these General Conditions and with generally accepted principles and practices. In performing its professional services, TSC will use that degree of care and skill ordinarily exercised under similar circumstances by members of its profession. In performing physical work in pursuit of its professional services, TSC will use that degree of care and skill ordinarily used under similar circumstances. This warranty is in lieu of all other warranties or representations, either express or implied. Statements made in TSC reports are opinions based upon engineering judgment and are not to be construed as representations of fact.

Should TSC or any of its employees be found to have been negligent in performing professional services or to have made and breached any express or implied warranty, representation or contract, Client, all parties claiming through Client and all parties claiming to have in any way relied upon TSC's services or work agree that the maximum aggregate amount of damages for which TSC, its officers, employees and agents shall be liable is limited to \$50,000 or the total amount of the fee paid to TSC for its services performed with respect to the project, whichever amount is greater.

In the event Client is unwilling or unable to limit the damages for which TSC may be liable in accordance with the provisions set forth in the preceding paragraph, upon written request of Client received within five days of Client's acceptance of TSC's proposal together with payment of an additional fee in the amount of 5% of TSC's estimated cost for its services (to be adjusted to 5% of the amount actually billed by TSC for its services on the project at time of completion), the limit on damages shall be increased to \$500,000 or the amount of TSC's fee, whichever is the greater. This charge is not to be construed as being a charge for insurance of any type, but is increased consideration for the exposure to an award of greater damages.

11. INDEMNITY: Subject to the provisions set forth herein, TSC and Client hereby agree to indemnify and hold harmless each other and their respective shareholders, directors, officers, partners, employees, agents, subsidiaries and division (and each of their heirs, successors, and assigns) from any and all claims, demands, liabilities, suits, causes of action, judgments, costs and expenses, including reasonable attorneys' fees, arising, or allegedly arising, from personal injury, including death, property damage, including loss of use thereof, due in any manner to the negligence of either of them or their agents or employees or independent contractors. In the event both TSC and Client are found to be negligent or at fault, then any liability shall be apportioned between them pursuant to their pro rata share of negligence or fault. TSC and Client further agree that their liability to any third party shall, to the extent permitted by law, be several and not joint. The liability of TSC under this provision shall not exceed the policy limits of insurance carried by TSC. Neither TSC nor Client shall be bound under this indemnity agreement to liability determined in a proceeding in which it did not participate represented by its own independent counsel. The indemnities provided hereunder shall not terminate upon the termination or expiration of this Agreement, but may be modified to the extent of any waiver of subrogation agreed to by TSC and paid for by Client.

12. SUBPOENAS: TSC's employees shall not be retained as expert witnesses except by separate, written agreement. Client agrees to pay TSC pursuant to TSC's then current fee schedule for any TSC employee(s) subpoenaed by any party as an occurrence witness as a result of TSC's services.

13. OTHER AGREEMENTS: TSC shall not be bound by any provision or agreement (i) requiring or providing for arbitration of disputes or controversies arising out of this Agreement or its performance, (ii) wherein TSC waives any rights to a mechanics lien or surety bond claim; (iii) that conditions TSC's right to receive payment for its services upon payment to Client by any third party or (iv) that requires TSC to indemnify any party beyond its own negligence. These General Conditions are notice, where required, that TSC shall file a lien whenever necessary to collect past due amounts. This Agreement contains the entire understanding between the parties. Unless expressly accepted by TSC in writing prior to delivery of TSC's services, Client shall not add any conditions or impose conditions which are in conflict with those contained herein, and no such additional or conflicting terms shall be binding upon TSC. The unenforceability or invalidity of any provision or provisions shall not render any other provision or provisions unenforceable or invalid. This Agreement shall be construed and enforced in accordance with the laws of the State of Illinois. In the event of a dispute arising out of or relating to the performance of this Agreement, the breach thereof or TSC's services, the parties agree to try in good faith to settle the dispute by mediation under the Construction Industry Mediation Rules of the American Arbitration Association as a condition precedent to filing any demand for arbitration, or any petition or complaint with any court. Paragraph headings are for convenience only and shall not be construed as limiting the meaning of the provisions contained in these General Conditions.

APPENDIX

UNIFIED CLASSIFICATION CHART

LEGEND FOR BORING LOGS

BORING LOGS

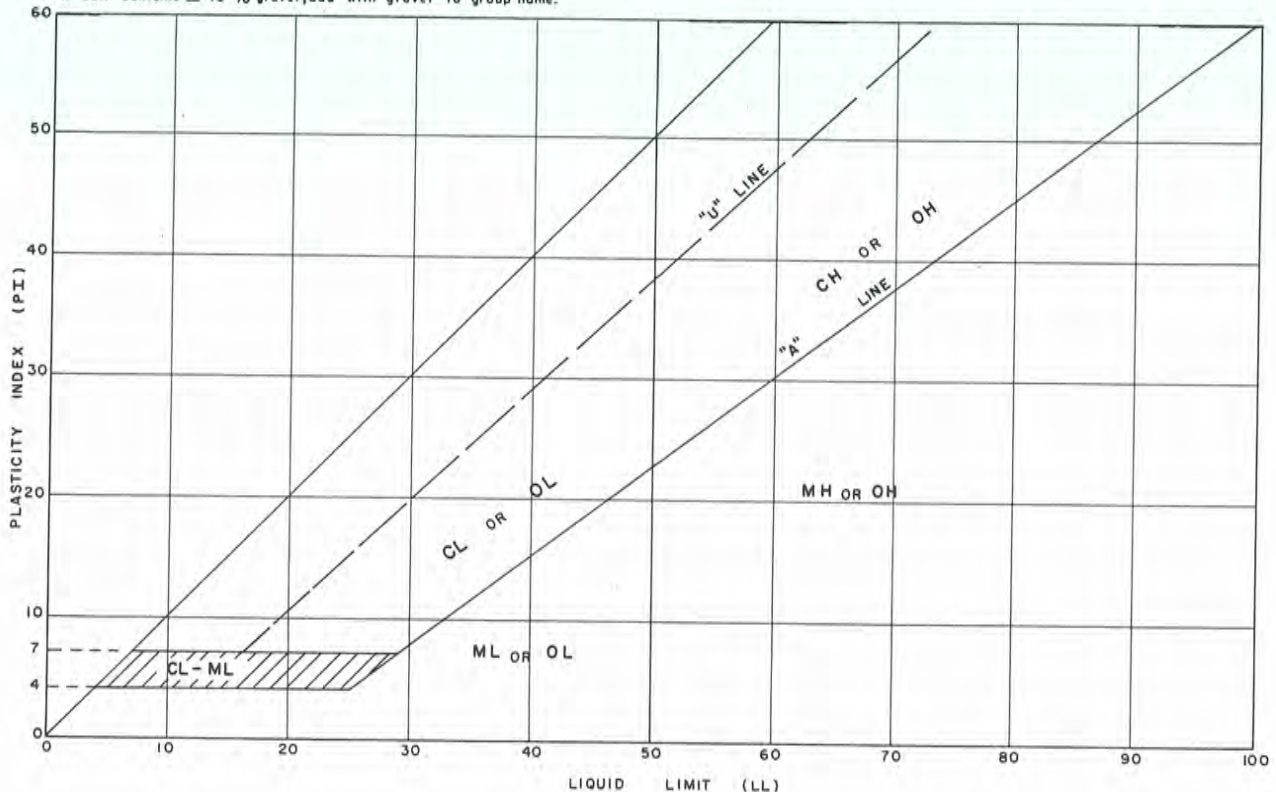
BORING LOCATION PLAN

**TESTING SERVICE CORPORATION
UNIFIED CLASSIFICATION CHART**

CRITERIA FOR ASSIGNING GROUP SYMBOLS AND GROUP NAMES USING LABORATORY TESTS ^a				SOIL CLASSIFICATION	
				GROUP SYMBOL	GROUP NAME ^b
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	GRAVELS More than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS Less than 5% fines ^c	$C_u \geq 4$ and $1 \leq C_c \leq 3$ ^e	GW	Well graded gravel ^f
			$C_u < 4$ and/or $1 > C_c > 3$ ^e	GP	Poorly graded gravel ^f
		GRAVELS WITH FINES More than 12% fines ^c	Fines classify as ML or MH	GM	Silty gravel ^{f,g,h}
			Fines classify as CL or CH	GC	Clayey gravel ^{f,g,h}
	SANDS 50% or more of coarse fraction passes No. 4 sieve	CLEAN SANDS Less than 5% fines ^d	$C_u \geq 6$ and $1 \leq C_c \leq 3$ ^e	SW	Well-graded sand ⁱ
			$C_u < 6$ and/or $1 > C_c > 3$ ^e	SP	Poorly graded sand ⁱ
		SANDS WITH FINES More than 12% fines ^d	Fines classify as ML or MH	SM	Silty sand ^{g,h,f}
			Fines classify as CL or CH	SC	Clayey sand ^{g,h,f}
FINE-GRAINED SOILS 50% or more passed the No. 200 sieve	SILTS & CLAYS Liquid limit less than 50%	Inorganic	$PI \geq 7$ and plots on or above "A" line ^j	CL	Lean clay ^{k,l,m}
			$PI < 4$ or plots below "A" line ^j	ML	Silt ^{k,l,m}
		Organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} \leq 0.75$	OL	Organic clay ^{k,l,m,n} Organic silt ^{k,l,m,o}
	SILTS & CLAYS Liquid limit 50% or more	Inorganic	PI plots on or above "A" line	CH	Fat clay ^{k,l,m}
			PI plots below "A" line	MH	Elastic silt ^{k,l,m}
		Organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OH	Organic clay ^{k,l,m,p} Organic silt ^{k,l,m,q}
Highly organic soils	Primarily organic matter, dark in color, and organic odor			PT	Peat

- a. Based on the material passing the 3-in (75-mm) sieve.
 b. If field sample contained cobbles and/or boulders, add "with cobbles and/or boulders" to group name.
 c. Gravels with 5 to 12% fines require dual symbols
 GW-GM well graded gravel with silt
 GW-GC well graded gravel with clay
 GP-GM poorly graded gravel with silt
 GP-GC poorly graded gravel with clay
 d. Sands with 5% to 12% fines require dual symbols
 SW-SM well graded sand with silt
 SW-SC well graded sand with clay
 SP-SM poorly graded sand with silt
 SP-SC poorly graded sand with clay
 e.
 $C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
 f. If soil contains $\geq 15\%$ sand, add "with sand" to group name.
 g. If fines classify as CL-ML, use dual symbol GC-GM, SC-SM.
 h. If fines are organic, add "with organic fines" to group name.
 i. If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

- j. If Atterberg Limits plot in hatched area, soil is a CL-ML, silty clay.
 k. If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel" whichever is predominant.
 l. If soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
 m. If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
 n. $PI \geq 4$ and plots on or above "A" line.
 o. $PI \geq 4$ or plots below "A" line.
 p. PI plots on or above "A" line.
 q. PI plots below "A" line.



TESTING SERVICE CORPORATION

LEGEND FOR BORING LOGS



FILL



TOPSOIL



PEAT



GRAVEL



SAND



SILT



CLAY



DOLOMITE

SAMPLE TYPE:

SS = Split Spoon
 ST = Thin-Walled Tube
 A = Auger

FIELD AND LABORATORY TEST DATA:

N = Standard Penetration Resistance in Blows per Foot
 Wc = In-Situ Water Content
 Qu = Unconfined Compressive Strength in Tons per Square Foot
 * Pocket Penetrometer Measurement; Maximum Reading = 4.5 tsf
 γ_D = Dry Unit Weight in Pounds per Cubic Foot

WATER LEVELS:

▽ While Drilling
 ▽ End of Boring
 ▼ 24 Hours

SOIL DESCRIPTION:

MATERIAL

BOULDER
 COBBLE
 Coarse GRAVEL
 Small GRAVEL
 Coarse SAND
 Medium SAND
 Fine SAND
 SILT and CLAY

PARTICLE SIZE RANGE

Over 12 inches
 12 inches to 3 inches
 3 inches to ¾ inch
 ¾ inch to No. 4 Sieve
 No. 4 Sieve to No. 10 Sieve
 No. 10 Sieve to No. 40 Sieve
 No. 40 Sieve to No. 200 Sieve
 Passing No. 200 Sieve

COHESIVE SOILS

CONSISTENCY

Very Soft	Less than 0.3
Soft	0.3 to 0.6
Stiff	0.6 to 1.0
Tough	1.0 to 2.0
Very Tough	2.0 to 4.0
Hard	4.0 and over

Qu

COHESIONLESS SOILS

RELATIVE DENSITY

Very Loose	0 - 4
Loose	4 - 10
Firm	10 - 30
Dense	30 - 50
Very Dense	50 and over

N

MODIFYING TERM

Trace
 Little
 Some

PERCENT BY WEIGHT

1 - 10
 10 - 20
 20 - 35

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**



CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **1** DATE STARTED **4-2-14** DATE COMPLETED **4-2-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **684.5**
 END OF BORING **659.5**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **3.0'**
 ▽ AT END OF BORING **2.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										
2.5		1	SS	4	23.8				682.0	FILL - Dark brown to black clayey TOPSOIL, very moist (OL)
5.5		2	SS	5	25.8	0.5*			679.0	FILL - Dark brown and gray silty CLAY, little sand and gravel, trace organic, very moist (CL)
8.0		3	SS	16	15.6	4.00 4.25*			676.5	Very tough to hard brown and gray silty CLAY, little sand and gravel, moist (CL)
10.0		4	SS	41					674.5	Dense gray SAND and GRAVEL, occasional Cobbles and Boulders, trace silt, saturated (GP-GM)
13.0		5	SS	22	15.2	4.5+*			671.5	Hard gray silty CLAY, little sand and gravel, moist (CL)
17.0		6	SS	10	28.3	1.23 0.75*			667.5	Stiff to tough gray silty CLAY, trace to little sand, occasional gravel, very moist (CL)
22.0		7	SS	10	19.6	1.0*			662.5	Stiff to tough gray silty CLAY, little sand and gravel, moist (CL)
25.0		8	SS	24	15.6	4.5+*				Hard gray silty CLAY, little sand and gravel, moist (CL)

TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

End of Boring at 25.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **2** DATE STARTED **4-2-14** DATE COMPLETED **4-2-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **684.0**
 END OF BORING **669.0**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **3.0'**
 ▽ AT END OF BORING **3.0'**
 ▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0									683.0	Black clayey TOPSOIL (OL)
1.0		1	SS	8	24.6	2.0*			681.0	Tough to very tough brown silty CLAY, little sand, trace gravel, moist (CL)
3.0		2	SS	11	16.5				678.5	Firm brown silty SAND and GRAVEL, wet (SM/GM)
5.5		3	SS	16	17.2	4.07 4.0*			676.0	Very tough to hard brown silty CLAY, little sand and gravel, moist (CL)
8.0		4	SS	20	17.1	4.0*			671.0	Very tough to hard gray silty CLAY, little sand and gravel, moist (CL)
10		5	SS	12	18.0	3.0*				
13.0		6	SS	11	11.9	2.0*				Tough to very tough gray sandy CLAY, trace to little gravel, moist (CL-ML)
15										End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **3** DATE STARTED **4-2-14** DATE COMPLETED **4-2-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **690.0**
 END OF BORING **665.0**

WATER LEVEL OBSERVATIONS
 WHILE DRILLING **22.0'**
 AT END OF BORING **5.0'**
 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										FILL - Black clayey TOPSOIL (OL)
1.0		1	SS	11	15.9	2.5*	114		689.0	FILL - Brown silty CLAY, little sand and gravel, moist (CL)
3.0									687.0	
5.5		2	SS	13	52.8	<0.25*			684.5	Black ORGANIC CLAY/TOPSOIL, very moist (OH)
		3	SS	9	22.6	2.02 1.75*				Very tough to tough brown and gray silty CLAY, little sand, trace gravel, trace organic, moist to very moist (CL)
		4	SS	13	23.7	1.5*				
10.5									679.5	
		5	SS	16	20.5	3.5*				Very tough brown silty CLAY, little sand and gravel, moist (CL)
		6	SS	26	14.6	4.00 4.5*				
13.0									677.0	
		7	SS	12	19.3	2.25*				Hard to very tough gray silty CLAY, little sand and gravel, occasional Cobbles, moist (CL)
20										
		8	SS	14						
22.0									668.0	Firm gray SAND and GRAVEL, saturated (SP/GP)
25										

TSC 81358.GPJ TSC_ALL.GDT 4/24/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

End of Boring at 25.0'

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**



CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **4** DATE STARTED **4-4-14** DATE COMPLETED **4-4-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **682.0**
 END OF BORING **667.0**

WATER LEVEL OBSERVATIONS
 ▼ WHILE DRILLING **5.0'**
 ▼ AT END OF BORING **2.0'**
 ▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										Black clayey TOPSOIL (OL)
1.0										▼ Stiff brown and gray silty CLAY, trace sand, trace organic, very moist (CL/CH)
3.0										
5.0										▼ Loose brown and gray silty SAND, little gravel, very moist to wet (SM)
5.5										
		1	SS	7	33.4	0.91 0.75*				
		2	SS	6	13.7					
		3	SS	17	16.2	3.5*				
		4	SS	19	16.4	4.00 4.25*				
		5	SS	23	17.1	4.5+*				
		6	SS	18	17.3	2.5*				
15										End of Boring at 15.0'
										* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
20										
25										

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **5** DATE STARTED **4-4-14** DATE COMPLETED **4-4-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **681.5**
 END OF BORING **656.5**

WATER LEVEL OBSERVATIONS
 ▼ WHILE DRILLING **3.0'**
 ▼ AT END OF BORING **2.0'**
 ▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										Black clayey TOPSOIL (OL)
1.0		1	SS	5	18.2	0.83 1.0*			680.5	▼ Stiff to tough brown and gray silty CLAY, little to some sand, trace gravel, trace organic, very moist (CL)
3.0		2	SS	13	16.4	4.5+*			678.5	▼
5		3	SS	21	15.5	4.46 4.5+*				Hard brown and gray silty CLAY, little sand and gravel, occasional Cobbles and Boulders, moist (CL)
8.0		4	SS	19					673.5	
10		5	SS	20						Firm gray SAND and GRAVEL, saturated (SP/GP)
13.0		6	SS	22	15.9	5.12 4.5+*			668.5	
15		7	SS	26	13.3	3.75*				Hard to very tough gray silty CLAY, little to some sand and gravel, moist (CL)
20		8	SS	28	21.6	4.0*				* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
22.0									659.5	
25										Very tough to hard gray silty CLAY, little sand, occasional silt seams, moist (CL)

TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

End of Boring at 25.0'

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

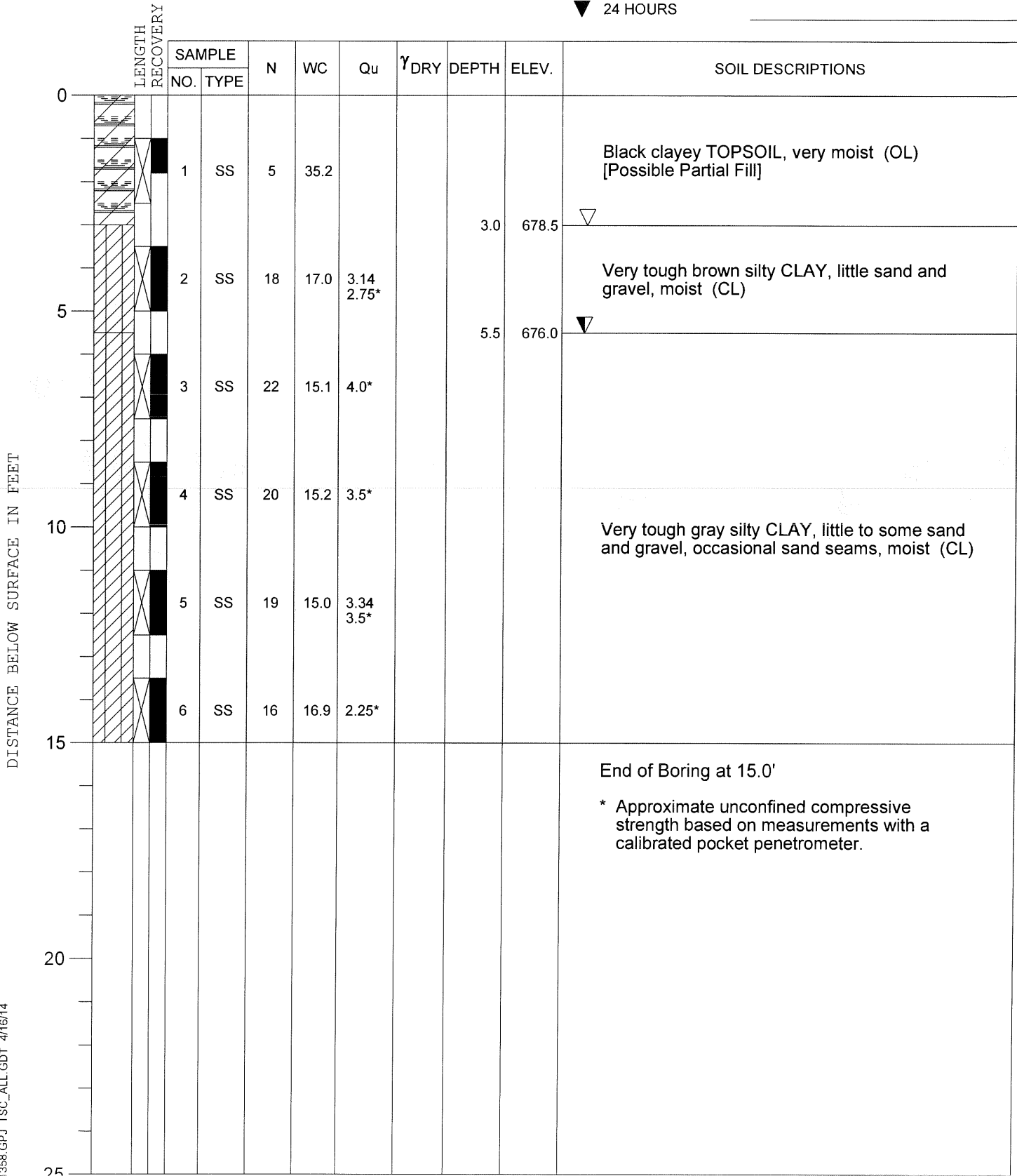


CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **6** DATE STARTED **4-4-14** DATE COMPLETED **4-4-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **681.5**
 END OF BORING **666.5**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **5.5'**
 ▽ AT END OF BORING **3.0'**
 ▽ 24 HOURS



TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**



CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **7** DATE STARTED **4-4-14** DATE COMPLETED **4-4-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **680.0**
 END OF BORING **665.0**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **Dry**
 ▽ AT END OF BORING **Dry**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										FILL - Black clayey TOPSOIL (OL)
1.0		1	SS	9	18.7	2.5*	110		679.0	FILL - Brown and black silty CLAY, little sand and gravel, trace organic, moist (CL)
3.0		2	SS	12	18.3	4.0*			677.0	Very tough to hard brown and gray silty CLAY, little sand and gravel, moist (CL)
5.5		3	SS	19	17.8	3.41 3.75*			674.5	Very tough gray silty CLAY, little sand and gravel, occasional sand seams, moist (CL)
8.0		4	SS	100/5"	15.7	4.0*			672.0	Very tough to hard gray silty CLAY, little to some sand and gravel, occasional Cobbles and Boulders, moist (CL)
15.0		5	SS	29	15.5	2.88 3.0*				End of Boring at 15.0'
		6	SS	30	14.4	4.5*				* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **8** DATE STARTED **4-4-14** DATE COMPLETED **4-4-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **682.0**
 END OF BORING **667.0**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **10.5'**
 ▽ AT END OF BORING **4.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										Black clayey TOPSOIL (OL)
1.2		1	SS	9	17.1	4.5+*			680.8	Hard brown and gray silty CLAY, little sand and gravel, moist (CL)
3.0		2	SS	18	16.7	4.5+*			679.0	
5		3	SS	22	16.1	5.57 4.5+*				Hard to very tough gray silty CLAY, little sand and gravel, moist (CL)
10		4	SS	21	17.6	2.0*				
10.5		5	SS	29	14.3	3.0*			671.5	Very tough gray sandy CLAY, trace to little gravel, occasional sand seams, moist (CL-ML)
13.0		6	SS	30					669.0	
15										Firm to dense gray SAND and GRAVEL, saturated (GP)
15.0										End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **314**

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**



CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **9** DATE STARTED **4-4-14** DATE COMPLETED **4-4-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **681.5**
 END OF BORING **666.5**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **10.5'**
 ▽ AT END OF BORING **3.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										Black clayey TOPSOIL, very moist (OL)
		1	SS	8	26.8			2.0	679.5	▽
5		2	SS	13	17.8	4.00 4.25*				Very tough to hard brown and gray silty CLAY, little sand and gravel, moist (CL)
		3	SS	18	17.4	4.5+*		8.0	673.5	
		4	SS	19	19.7	2.5*				Very tough gray silty CLAY, little sand and gravel, moist (CL)
10		5	SS	23	8.7			10.5	671.0	▽
		6	SS	22				13.0	668.5	
15										End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**



CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **10** DATE STARTED **4-1-14** DATE COMPLETED **4-1-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **680.0**
 END OF BORING **665.0**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **3.0'**
 ▽ AT END OF BORING **3.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										Black clayey TOPSOIL (OL)
1.2		1	SS	5	21.4	1.5*			678.8	
3.0									677.0	▽
5		2	SS	6	19.9	2.35 2.75*				
8.0		3	SS	20	19.5	4.5*				
10		4	SS	17	18.0	3.0*				
15		5	SS	11	19.0	1.92 1.75				
		6	SS	0	16.2	3.75*				
										End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **314**

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**



CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **11** DATE STARTED **4-2-14** DATE COMPLETED **4-2-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **675.5**
 END OF BORING **660.5**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **8.0'**
 ▽ AT END OF BORING **Dry**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										
		1	SS	4	28.8			3.0	672.5	Black clayey TOPSOIL, very moist (OL) [Possible Partial Fill]
5		2	SS	16	14.9	4.5+*				Hard brown and gray silty CLAY, little to some sand and gravel, moist (CL)
		3	SS	14	14.3	4.20 4.5*		8.0	667.5	
10		4	SS	21	12.0	2.0*		10.5	665.0	Tough to very tough gray sandy CLAY, trace to little gravel, occasional sand seams, moist (CL-ML)
		5	SS	8	17.3	1.29 1.5*				Tough gray silty CLAY, little sand and gravel, moist to very moist (CL)
15		6	SS	18	18.5	3.75*		13.0	662.5	Very tough gray silty CLAY, little sand and gravel, moist (CL)
20										End of Boring at 15.0'
25										* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **12** DATE STARTED **4-1-14** DATE COMPLETED **4-1-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **680.0**
 END OF BORING **665.0**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **Dry**
 ▽ AT END OF BORING **Dry**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										Black clayey TOPSOIL (OL)
1.0		1	SS	11	22.4	4.5*			679.0	Hard brown and gray silty CLAY, little sand, trace gravel, moist (CL)
3.0		2	SS	20	14.3	6.07 4.5+*			677.0	
5		3	SS	23	15.9	4.5+*				Hard brown silty CLAY, little sand and gravel, moist (CL)
8.0		4	SS	14	17.4	2.0*			672.0	
10		5	SS	16	16.7	2.25 2.5*				Tough to very tough gray silty CLAY, little to some sand and gravel, moist (CL)
15		6	SS	11	15.0	2.25*				
15.0		End of Boring at 15.0'								
20										
25										

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

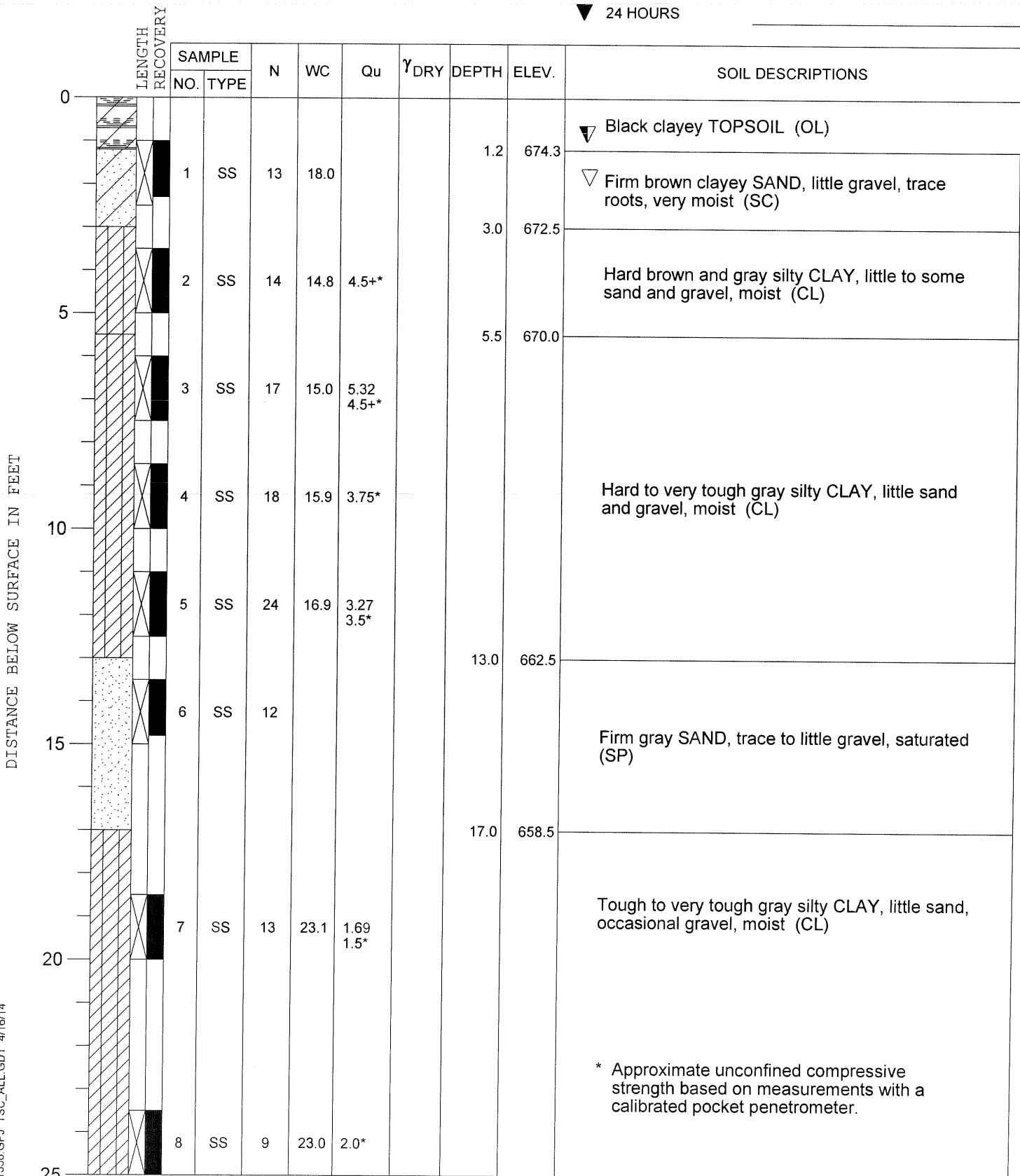
CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **13** DATE STARTED **4-2-14** DATE COMPLETED **4-2-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **675.5**
 END OF BORING **650.5**

WATER LEVEL OBSERVATIONS
 ▼ WHILE DRILLING **1.0'**
 ▼ AT END OF BORING **2.0'**
 ▼ 24 HOURS



TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

End of Boring at 25.0'

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

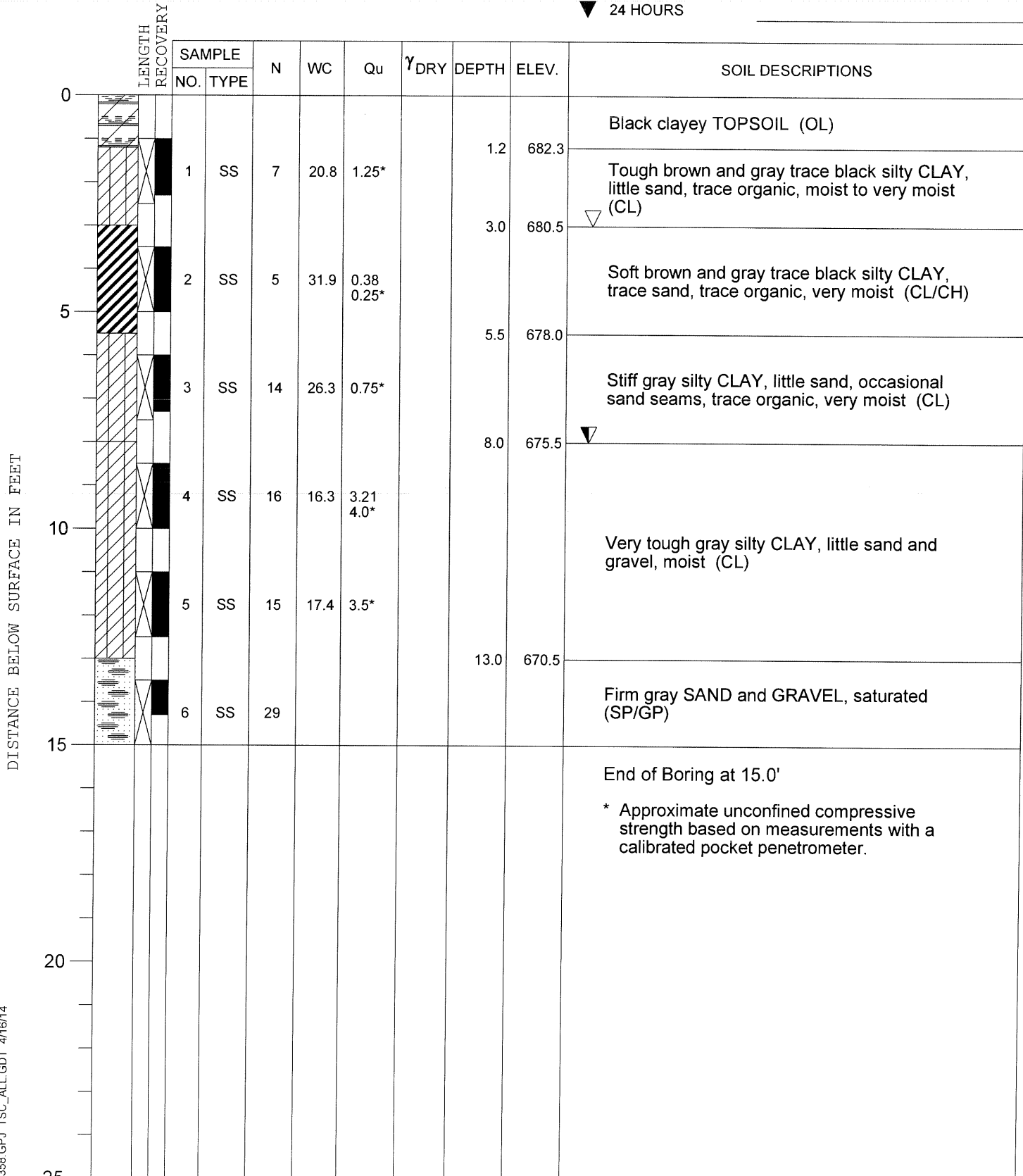
CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **14** DATE STARTED **4-1-14** DATE COMPLETED **4-1-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **683.5**
 END OF BORING **668.5**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **8.0'**
 ▽ AT END OF BORING **3.0'**
 ▽ 24 HOURS



TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**



CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **15** DATE STARTED **4-1-14** DATE COMPLETED **4-1-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **681.5**
 END OF BORING **666.5**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **8.0'**
 ▽ AT END OF BORING **3.0'**
 ▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										
		1	SS	5	27.4			3.0	678.5	Black clayey TOPSOIL, very moist (OL) [Possible Partial Fill]
		2	SS	2	25.5	0.21 0.25*		5.5	676.0	Very soft brown and gray silty CLAY, little sand, trace organic, very moist (CL)
		3	SS	13	16.3			8.0	673.5	Firm gray SILT and SAND lenses, moist to very moist (ML/SP)
		4	SS	13				10.5	671.0	Firm gray medium to fine SAND, trace gravel, saturated (SP)
		5	SS	14	18.5	2.5*				Very tough to tough gray silty CLAY, little to some sand and gravel, moist to very moist (CL)
		6	SS	10	13.9	1.49 1.5*				
15		End of Boring at 15.0'								
		* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.								
20										
25										

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **314**

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**



CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **16** DATE STARTED **3-31-14** DATE COMPLETED **3-31-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **681.0**
 END OF BORING **666.0**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **8.0'**
 ▽ AT END OF BORING **3.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										Black clayey TOPSOIL, moist (OL) [Possible Partial Fill]
2.5		1	SS	10	29.8				678.5	▽
5		2	SS	12	15.6	2.5*				Very tough brown and gray silty CLAY, little to some sand and gravel, moist (CL)
8.0		3	SS	13	15.5	2.42 2.0*			673.0	▽
10		4	SS	22	17.6	3.5*				Very tough gray silty CLAY, little sand and gravel, moist (CL)
13.0		5	SS	17	17.6	3.74 3.0*			668.0	
15		6	SS	36						Dense gray SAND and GRAVEL, occasional Cobbles and Boulders, saturated (SP/GP)
15.0										End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **314**

TSC 81358.GPJ TSC_ALL.GDT 4/16/14

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **17** DATE STARTED **3-31-14** DATE COMPLETED **3-31-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **681.0**
 END OF BORING **666.0**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **Dry**
 ▽ AT END OF BORING **Dry**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS	
		NO.	TYPE								
0										Black clayey TOPSOIL (OL)	
1.1		1	SS	10	21.8	2.0*			679.9	Tough to very tough brown silty CLAY, little sand, occasional gravel, trace organic seams, moist (CL)	
5.5		2	SS	9	19.7	2.0*			675.5		
		3	SS	17	14.7	4.5+*				Hard to very tough brown and gray silty CLAY, little sand and gravel, moist (CL)	
10		4	SS	18	15.1	4.26 4.5*					
		5	SS	20	16.1	4.0*				Tough gray silty CLAY, little sand and gravel, moist (CL)	
13.0		6	SS	22	18.3	1.75*			668.0		
15.0		End of Boring at 15.0'									* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
20											
25											

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **314**

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **18** DATE STARTED **3-31-14** DATE COMPLETED **3-31-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **678.5**
 END OF BORING **653.5**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **8.0'**
 ▽ AT END OF BORING **2.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										
3.0		1	SS	12	34.0				675.5	Black clayey TOPSOIL, very moist (OL) ▽ [Possible Partial Fill]
5.0		2	SS	9	17.4	2.28 2.0*				Very tough brown and gray silty CLAY, little sand and gravel, moist (CL)
		3	SS	16	16.9	4.0*				
8.0									670.5	▽
10.0		4	SS	29						Firm to dense gray SAND and GRAVEL, saturated (SP/GP)
		5	SS	30	10.3					
		6	SS	24						
18.0		7	SS	21	14.6	4.5+*			660.5	Hard gray silty CLAY, little sand and gravel, moist (CL)
22.0									656.5	
24.0		A 8 B	SS	31	14.3 21.1	4.5+*			654.5	Dense gray silty SAND, trace to little gravel, wet (SM)
25.0										Hard gray silty CLAY, little sand, moist (CL)

TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

End of Boring at 25.0'

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **19** DATE STARTED **4-1-14** DATE COMPLETED **4-1-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **682.5**
 END OF BORING **657.5**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **5.0'**
 ▽ AT END OF BORING **2.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										Black clayey TOPSOIL (OL)
		1	SS	9	28.8	1.75*		1.2	681.3	▽ Tough brown silty CLAY, trace to little sand, occasional gravel, moist (CL)
		2	SS	22	11.7			3.0	679.5	Firm brown silty SAND, little gravel, moist to wet (SM)
5		3	SS	14	17.3	4.0*		5.0	677.5	▽ Very tough to hard brown silty CLAY, little sand and gravel, occasional Cobbles and Boulders, moist (CL)
		4	SS	30	19.3	2.55 2.75*		8.0	674.5	Very tough gray silty CLAY, little sand and gravel, occasional Cobbles and Boulders, moist (CL)
10		5	SS	16	19.9	1.75*		10.0	672.5	Tough gray silty CLAY, little sand, trace gravel, moist to very moist (CL)
		6	SS	12	21.1	1.5*				
15		7	SS	9	20.7	1.62 1.5*				
		8	SS	11	19.2	1.5*				
20										
25										

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **314**

End of Boring at 25.0'

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **20** DATE STARTED **3-31-14** DATE COMPLETED **3-31-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **679.5**
 END OF BORING **664.5**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **3.0'**
 ▽ AT END OF BORING **4.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0		1	SS	8	29.7					Black clayey TOPSOIL, moist (OL) [Possible Partial Fill]
3.0								3.0	676.5	▽
5		2	SS	12	15.7	2.94 3.75*				▽ Very tough brown silty CLAY, little to some sand and gravel, moist (CL)
5.5								5.5	674.0	
		3	SS	23	14.5	4.5+*				
		4	SS	17	14.9	2.75*				
10		5	SS	18	14.4	4.66 4.25*				Hard to very tough gray silty CLAY, little to some sand and gravel, moist (CL)
		6	SS	16	15.5	2.5*				
15		End of Boring at 15.0'								
		* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.								
20										
25										

TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

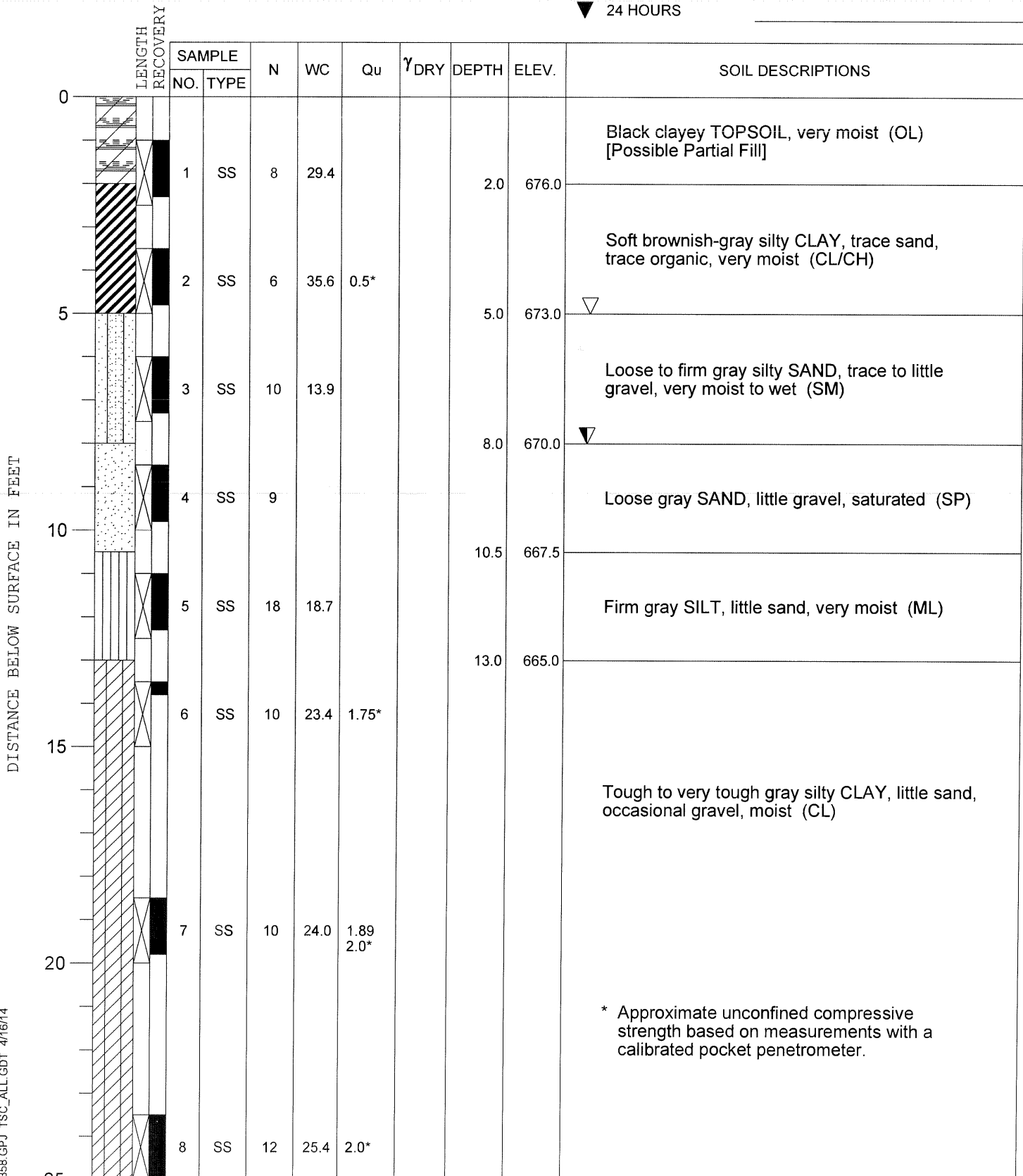


CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **21** DATE STARTED **3-31-14** DATE COMPLETED **3-31-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **678.0**
 END OF BORING **653.0**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **8.0'**
 ▽ AT END OF BORING **5.0'**
 ▽ 24 HOURS



TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

End of Boring at 25.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**



CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **22** DATE STARTED **3-31-14** DATE COMPLETED **3-31-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **680.0**
 END OF BORING **665.0**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **3.0'**
 ▽ AT END OF BORING **2.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS	
		NO.	TYPE								
0										Black clayey TOPSOIL, moist (OL)	
1.5		A	SS	10	30.9				678.5	▽ Tough dark brown, silty CLAY, trace sand, trace organic, moist (CL/CH)	
3.0		B			28.3	1.75*			677.0	▽	
5.0		2	SS	28	23.3				675.0	Firm brown silty SAND and GRAVEL, occasional Cobbles and Boulders, very moist to wet (SM/GM)	
8.0		3	SS	12	13.5	2.5*			672.0	Very tough brown silty CLAY, little to some sand and gravel, moist (CL)	
10.0		4	SS	16	15.5	3.0*				Very tough to tough gray silty CLAY, little to some sand and gravel, moist (CL)	
11.5		5	SS	13	17.3	1.49 1.75*					
13.0		6	SS	18	16.0	2.0*					
15.0		End of Boring at 15.0'									* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
20.0											
25.0											

TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **23** DATE STARTED **3-28-14** DATE COMPLETED **3-28-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **678.0**
 END OF BORING **663.0**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **5.5'**
 ▽ AT END OF BORING **2.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										
3.0		1	SS	7	37.2				675.0	Black clayey TOPSOIL, very moist (OL) ▽ [Possible Partial Fill]
5.5		2	SS	6	11.2				672.5	Loose gray silty SAND and GRAVEL, very moist to wet (SM/GM) ▽
8.0		3	SS	10	17.8				670.0	Loose to firm gray SILT, little sand, occasional gravel, very moist (ML)
13.0		4	SS	12	16.3	1.75 2.0*			665.0	Tough gray silty CLAY, little sand and gravel, moist (CL)
		5	SS	8	16.0	1.75*				
		6	SS	14	20.5	2.25*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
15.0										End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **24** DATE STARTED **3-28-14** DATE COMPLETED **3-28-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **681.0**
 END OF BORING **666.0**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **10.5'**
 ▽ AT END OF BORING **5.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										Dark brown clayey TOPSOIL (OL)
1.0		1	SS	11	25.9	3.0*			680.0	Very tough brown silty CLAY, trace to little sand, trace roots, moist (CL/CH)
3.0									678.0	
5.5		2	SS	11	12.3	1.69 2.0*			675.5	▽ Tough brown sandy CLAY, trace to little gravel, moist (CL-ML)
8.0		3	SS	14	17.4	4.25*			673.0	Hard brown and gray silty CLAY, little sand and gravel, moist (CL)
10.5		4	SS	10	16.3	3.0*			670.5	▽ Very tough gray silty CLAY, little sand and gravel, moist (CL)
		5	SS	14						Firm gray medium to fine SAND, trace gravel, trace silt, saturated (SP-SM)
		6	SS	12						
15.0		End of Boring at 15.0'								

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 81358.GPJ TSC_ALL.GDT 4/24/14

DRILL RIG NO. **314**

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**



CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **25** DATE STARTED **3-28-14** DATE COMPLETED **3-28-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **677.0**
 END OF BORING **662.0**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **5.5'**
 ▽ AT END OF BORING **2.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										
3.0		1	SS	5	33.4				674.0	▽ Black clayey TOPSOIL, very moist (OL) [Possible Partial Fill]
5.0		2	SS	12	15.8	3.54 3.25*				▽ Very tough brown and gray silty CLAY, little to some sand and gravel, moist (CL)
8.0		3	SS	20	14.8	4.0*			669.0	
10.0		4	SS	17	16.0	3.5*				Very tough gray silty CLAY, little to some sand and gravel, moist (CL)
13.0		5	SS	19	16.4	3.19 3.0*			664.0	
15.0		6	SS	14						Firm gray medium to fine SAND, trace silt, saturated (SP-SM)
15.0										End of Boring at 15.0' * Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

TSC 81358.GPJ TSC_ALL.GDT 4/24/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **26** DATE STARTED **3-28-14** DATE COMPLETED **3-28-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **676.5**
 END OF BORING **651.5**

WATER LEVEL OBSERVATIONS
 ▼ WHILE DRILLING **5.5'**
 ▼ AT END OF BORING **8.0'**
 ▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										
2.5		1	SS	10	24.6	3.5*	98		674.0	FILL - Dark brown silty CLAY and black clayey TOPSOIL, little sand, trace gravel, moist (CL/OL)
5.5		2	SS	6	23.3	1.0*	102		671.0	FILL - Brown silty CLAY, little sand and gravel, very moist (CL)
13.0		3	SS	17	16.1	3.74 3.5*				
16.5		4	SS	16	15.9	2.75*				Very tough gray silty CLAY, little to some sand and gravel, moist (CL)
20.0		5	SS	12	16.4	2.25*				
21.5		6	SS	11	21.8	2.48 2.75*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
22.0		7	SS	12	11.8	2.5*				Very tough gray sandy CLAY, trace to little gravel, moist (CL-ML)
25.0		8	SS	18	19.9	3.41 3.75*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)

TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

End of Boring at 25.0'

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **27** DATE STARTED **4-1-14** DATE COMPLETED **4-1-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **678.5**
 END OF BORING **663.5**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **5.5'**
 ▽ AT END OF BORING **3.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										FILL - Black clayey TOPSOIL (OL)
1.0		1	SS	11	14.1	4.0*	122		677.5	FILL - Brown and gray silty CLAY, little to some sand and gravel, moist (CL)
3.0									675.5	▽
5.0		2	SS	6	26.9	0.70 0.5*				Soft to stiff brown and gray silty CLAY, little sand, occasional gravel, trace organic, very moist (CL)
5.5									673.0	▽
8.0		3	SS	11	17.1	2.15 2.25				Very tough brown and gray silty CLAY, little sand and gravel, moist (CL)
10.0		4	SS	15	14.2	4.5+*				
12.0		5	SS	18	15.2	3.25*				Hard to very tough gray silty CLAY, little to some sand and gravel, moist (CL)
14.0		6	SS	17	16.1	3.0*				
15.0		End of Boring at 15.0'								
* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.										

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

DRILL RIG NO. **314**

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

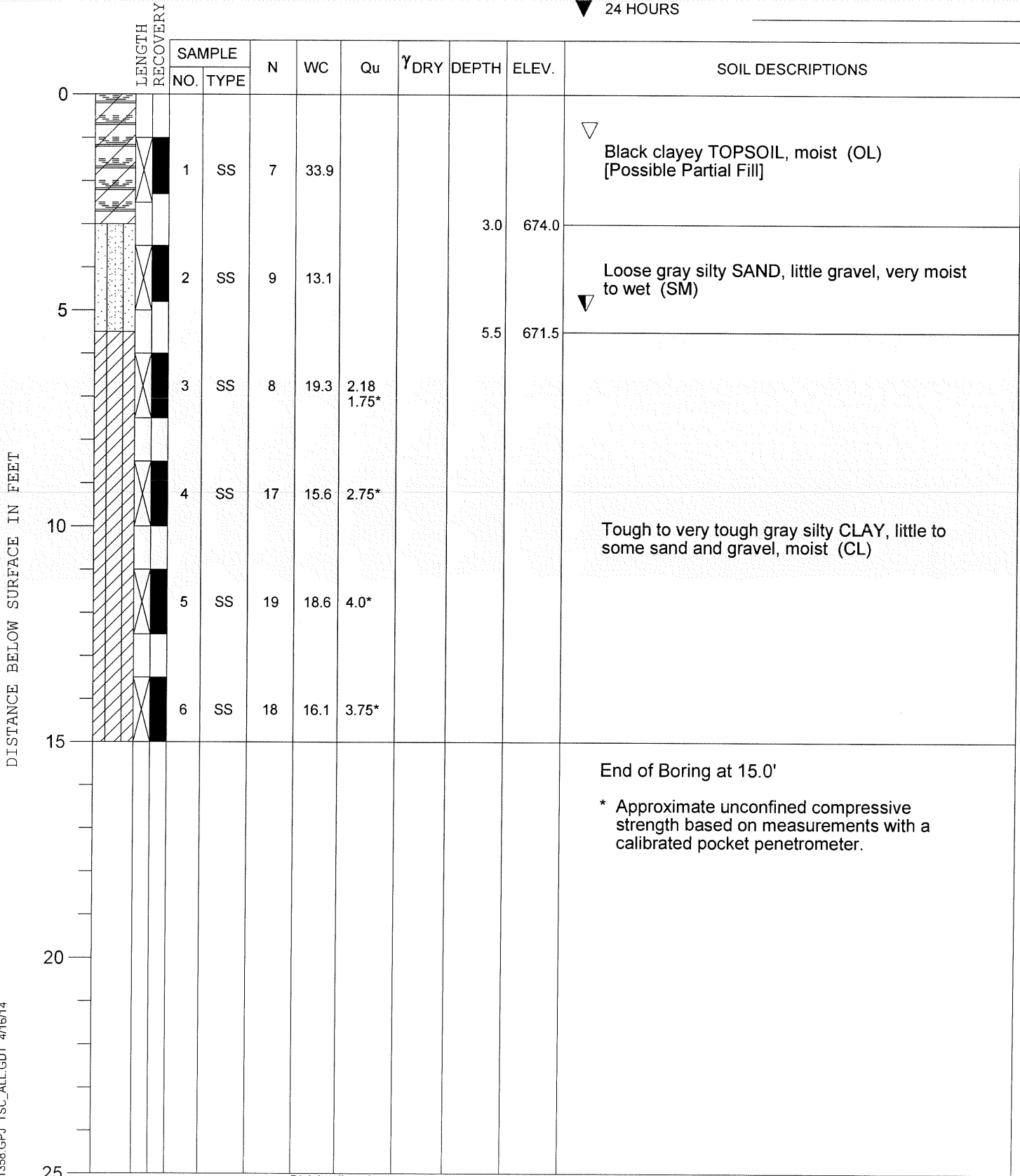
CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **28** DATE STARTED **3-28-14** DATE COMPLETED **3-28-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **677.0**
 END OF BORING **662.0**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **5.0'**
 ▽ AT END OF BORING **1.0'**
 ▽ 24 HOURS



TSC 81358.GPJ TSC_ALL.GDT 4/16/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Buffalo Grove Golf Club, Buffalo Grove, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**



BORING **29** DATE STARTED **3-28-14** DATE COMPLETED **3-28-14** JOB **L-81,358**

ELEVATIONS
 GROUND SURFACE **680.5**
 END OF BORING **665.5**

WATER LEVEL OBSERVATIONS
 ▽ WHILE DRILLING **5.5'**
 ▽ AT END OF BORING **5.0'**
 ▽ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE		N	WC	Qu	γ _{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
		NO.	TYPE							
0										Black clayey TOPSOIL, very moist (OL) [Possible Partial Fill]
2.5		1	SS	6	29.2				678.0	
5.5		2	SS	6	20.3	0.90 1.0*			675.0	▽ ▽
8.0		3	SS	8	24.1	2.42 2.25*			672.5	
13.0		4	SS	14	18.1	4.0*				
		5	SS	18	16.8	4.5+*				
13.0		6	SS	18					667.5	
15.0										End of Boring at 15.0' * Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

TSC 81358.GPJ TSC_ALL.GDT 4/24/14

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.



SCALE 1" = 300'
NTS



NOTE: GROUND SURFACE ELEVATIONS AT THE BORING LOCATIONS WERE ACQUIRED BY TSC USING A TRIMBLE R10 GNSS RECEIVER.

LEGEND
 SOIL BORING LOCATION

BORING LOCATION PLAN
 PROPOSED DOWNTOWN DEVELOPMENT
 BUFFALO GROVE GOLF CLUB
 BUFFALO GROVE, ILLINOIS



TESTING SERVICE CORPORATION
 457 EAST GUNDERSEN DRIVE
 CAROL STREAM, ILLINOIS 60188

DRAWN BY: TRP
 CHECKED BY: MVM
 JOB NO.: L-81,358
 DATE: 04-17-14

PAGE NO.
 1 OF 1

***Appendix 2
Wetland Report***



CHRISTOPHER B. BURKE ENGINEERING, LTD.

9575 West Higgins Road Suite 600 Rosemont, Illinois 60018 TEL (847) 823-0500 FAX (847) 823-0520

July 28, 2014

Village of Buffalo Grove
Public Works Department
51 Raupp Boulevard
Buffalo Grove, Illinois 60089

Attention: Darren Monico, P.E., Village Engineer

Subject: Wetland and Waters of the U.S. Assessment for the Proposed Downtown
Development Site in Buffalo Grove, Lake and Cook Counties, Illinois
(CBBEL Project No. 130035)

Dear Mr. Monico:

As requested, Christopher B. Burke Engineering, Ltd. (CBBEL) completed a wetland and Waters of the U.S. assessment for the Proposed Downtown Development site in Buffalo Grove, Lake and Cook Counties, Illinois. One Waters of the U.S./wetland area consisting of a portion of Buffalo Creek and Farrington Ditch, which is tributary to Buffalo Creek, and four man-made open water ponds, were identified and flagged at the time of our site visit using the U.S. Army Corps of Engineers Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (August 2010). An aerial photograph delineation showing the GPS sub-meter accuracy Waters of the U.S./wetland and man-made pond limits is included as Exhibit 7.

The U.S. Army Corps of Engineers (USACE) no longer has jurisdiction over isolated wetlands with no surface water connection to navigable waterways. Wetlands with direct surface water connections to navigable waterways will be federally regulated by the USACE under Section 404 of the Clean Water Act. Any identified wetlands found to be isolated and not federally regulated, will be regulated as Isolated Waters of Lake County by the Lake County Stormwater Management Commission (LCSMC) under the Lake County Watershed Development Ordinance (WDO) or as Isolated Wetlands by the Metropolitan Water Reclamation District under the Cook County Watershed Management Ordinance.

In our opinion, Buffalo Creek and Farrington Ditch have a direct hydrologic connection to a navigable Waters of the U.S. and will be regulated by the USACE under Section 404 of the Clean Water Act. In our opinion, the four open water ponds identified within the study area were constructed as golf course ponds and as stormwater management

facilities. As such, the four man-made golf course ponds and stormwater management facilities may be exempt from federal regulation by the USACE under Section 404 of the Clean Water Act, by the Metropolitan Water Reclamation District under the Cook County Watershed Management Ordinance and by LCSMC under the Lake County Watershed Development Ordinance.

Our opinion is based on a review of the U.S. Geological Survey (USGS), the Hydrologic Atlas, the Soil Survey of Lake and Cook Counties, Illinois, the Flood Insurance Rate Map and the results of our field investigation. At your request, CBBEL will request that the LCSMC and MWRD complete a Jurisdictional Determination confirming our opinions.

Federal Regulations

In our opinion, Buffalo Creek and Farrington Ditch are federally regulated by the USACE. The four man-made golf course and stormwater management ponds may be federally regulated as well. We understand that the proposed project conceptually includes the construction of a downtown development site requiring the relocation of Farrington Ditch, the four open water ponds and potentially a portion of Buffalo Creek adjacent to Lake-Cook Road. Any impacts to Farrington Creek and Buffalo Creek, and potentially the open water ponds, will require a permit from the USACE under Section 404 of the Clean Water Act.

The Chicago District – USACE reviews and authorizes wetland and Waters of the U.S. impacts under either the Individual Permit review process or the Regional Permit review process. Generally, a Regional Permit is authorized for wetland or Waters of the U.S. impacts that have minimal adverse impacts on aquatic resources while an Individual Permit is required for significant wetland or Waters of the U.S. disturbances. Under all circumstances the USACE has the discretion to require an Individual Permit which is a much more lengthy approval process.

Based on our discussions with the USACE, any relocation of Buffalo Creek will require an Individual Permit. The relocation of Farrington Ditch and potential impacts to the ponds, if they are federally regulated, may be processed under a Regional Permit 5 and Regional Permit 1 for wetland and stream restoration and enhancement and a commercial development, respectively.

For planning purposes, the following summarizes permit conditions for the use of Regional Permit 1 and Regional Permit 5.

Regional Permit 1

Regional Permit 1 (RP1) of the Chicago District Regional Permit Program authorizes residential, commercial and institutional developments that necessitate jurisdictional wetland or waters of the U.S. impacts (cumulative wetland impacts < 1.0 acre). Several special conditions exist under RP1. If cumulative wetland impacts exceed 1.0 acre or if the project cannot meet the special conditions of RP1, authorization under the Individual Permit Program will be required, which can be a lengthy process (average review time

of one year). To assist with land planning, a description of several special conditions is listed below:

Upland Buffers

RP1 requires an upland buffer of native plants to be established adjacent to all created, restored, enhanced or preserved waters of the U.S., including wetlands, rivers, streams, creeks, ponds and lakes, etc. The following summarizes buffer requirements:

- 1) For any area determined to be a high-quality aquatic resource (HQAR), the buffer shall be 100 feet wide;
- 2) For a linear body of water (e.g., river, stream, creek, etc.), the buffer shall be a minimum of 50 feet from the Ordinary High Water Mark (OHWM) on both sides of the linear waterbody;
- 3) For any waters of the U.S., including wetlands, over 0.25 acre and up to 0.50 acre in size, the buffer shall be a minimum of 30 feet wide; and
- 4) For any waters of the U.S., including wetlands, over 0.50 acre in size, the buffer shall be a minimum of 50 feet wide.

RP1 states that the District may allow buffer widths below the above-required minimums but it shall be incumbent on the applicant to demonstrate that no practicable alternatives are available that would not impact the required buffer widths.

RP1 does not allow lot lines to be located within the buffer area or within preserved wetlands or waters of the U.S. However, RP1 does allow stormwater retention/detention facilities and pervious nature trails to be located within a minimum distance of 50 percent of the required buffer, provided the remaining buffer area adjacent to the jurisdictional wetland or waters of the U.S. consists of native vegetation only or other appropriate vegetation approved by the District. The trail must be set back a minimum of 10 percent of the required buffer.

Deed Restrictions/Conservation Easements

RP1 requires that all remaining, preserved, enhanced or restored waters of the U.S., wetlands, and adjacent buffers be permanently preserved and protected either through a deed restriction or conservation easement. A draft deed restriction or conservation easement shall be provided with notification.

Best Management Practices (BMP)

RP1 requires BMPs to be designed as part of the site plan to minimize overall impacts to aquatic resources. RP1 allows BMPs to be located in upland buffers adjacent to wetlands and waters of the U.S. A written narrative must be provided along with a maintenance and monitoring plan for the selected BMPs.

On-Line Detention/Compensatory Storage

RP1 prohibits on-line stormwater management facilities to be constructed in any linear body of water such as a river, or perennial, intermittent or ephemeral stream or creek,

unless there is substantial evidence that the project will provide a benefit to the aquatic system. In our experience, the USACE has been using discretionary authority to review all on-line stormwater facilities (located within both intermittent and perennial waterways) under the Individual Permit process, which involves a very stringent review with a public comment period that is a lengthy and difficult process.

In addition to meeting the general and special conditions of RP1, wetland mitigation is required for projects that impact more than 0.10-acre of wetland or waters of the U.S., generally at a 1.5:1 replacement ratio.

Regional Permit 5

Regional Permit 5 (RP5) of the Regional Permit Program authorizes wetland and stream restoration and enhancements provided the following special conditions can be met:

1. The permit can not be used for the conversion of a stream or creek to another aquatic use, such as the creation of an impoundment for waterfowl habitat.
2. The permit can not be used to authorize the conversion of natural wetlands to another aquatic use, such as creation of waterfowl impoundments where a forested wetland previously existed.
3. A management and monitoring plan shall be required for the restoration, creation or enhancement of aquatic resources.
4. For a project site adjacent to a conservation area, the permittee shall request a letter from the organization responsible for the management of the conservation area that recommends measures to protect the area from potential impacts that may result from the development.

Lake County Wetland Regulations

A Watershed Development Permit is required for any development that impacts a federally jurisdictional Waters of the U.S., that impacts an isolated Waters of Lake County or if the development impacts wetland buffer areas. Permit categories have been established based on the amount of wetland impact necessitated by the proposed development.

Permit categories are as follows:

- (A) Category-I: IWLC impacts less than or equal to 1 acre and does not impact high quality aquatic resources (HQAR);
- (B) Category-II: IWLC impacts greater than 1 acre and less than 2 acres and does not impact high quality aquatic resources;
- (C) Category-III: IWLC impacts greater than 2 acres or impacts high quality aquatic resources; and,
- (D) Category-IV: IWLC impacts for the restoration, creation and enhancement of wetlands provided that there are net gains in aquatic resource function.

Areas of IWLC impact greater than 0.10 acre will require wetland mitigation. Permits processed under Category-I, II or III will require wetland mitigation at a minimum 1.5:1 replacement ratio. Impacts to IWLC classified as high quality aquatic resources will require wetland mitigation at a minimum 3:1 replacement ratio. Impacts to forested IWLC will require wetland mitigation at a minimum 6:1 replacement ratio.

The following buffer setbacks are also required:

- For all water bodies or wetlands with a total surface area greater than one third (1/3) acre but less than one (1) acre, a minimum buffer width of thirty (30) feet shall be established.
- For all water bodies or wetlands with a total surface area greater than one (1) acre but less than two and one half (2½) acres, a minimum buffer width of forty (40) feet shall be established.
- For all water bodies or wetlands with a total surface area greater than two and one half (2½) acres, a minimum buffer width of fifty (50) feet shall be established.
- For all high quality aquatic resources, a minimum buffer width of one hundred (100) feet shall be established.


Cook County Wetland Regulations

Although we believe that the open water pond located within the Cook County portion of the study area may be exempt from federal and local wetland regulations, portions of Buffalo Creek and Farrington Ditch that will be impacted in Cook County will require approval from the MWRD under the Cook County Watershed Management Ordinance.

The attached report describes the identified wetlands and presents the methodology and reference material used to assist in the assessment. Routine On-Site Data Forms, required by the USACE, are also included. This assessment is based on field conditions at the time of the CBBEL site visit and our understanding of current federal, state and local regulations. An evaluation of historic site conditions was not performed.

Please contact our office should you have any additional questions or if we can be of further assistance.

Sincerely,



Thomas G. McArdle
Manager, Environmental Resources Department
LC-CWS #C-019

**WETLAND ASSESSMENT REPORT
PROPOSED DOWNTOWN DEVELOPMENT STUDY AREA
BUFFALO GROVE, LAKE AND COOK COUNTIES, ILLINOIS
CBBEL Project No. 130035**

WETLAND DELINEATION

On March 26, 2014, Christopher B. Burke Engineering, Ltd. (CBBEL) completed a wetland and Waters of the U.S. field investigation of the subject site to determine on-site wetland and Waters of the U.S. boundaries. This report documents our findings. Identified wetland boundaries were delineated using the U.S. Army Corps of Engineers Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (August 2010). The GPS sub-meter accuracy Waters of the U.S./wetland and pond limits are shown on Exhibit 7. The Midwest Region Wetland Determination Data Forms, required by the USACE are also included.

METHODOLOGY

The Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (August 2010), identifies the mandatory technical criteria for wetland identification. The three essential characteristics of a jurisdictional wetland are hydrophytic vegetation, hydric soils and wetland hydrology as described below:

Hydrophytic Vegetation: The hydrophytic vegetation criterion is based on a separation of plants into five basic groups:

- (1) Obligate wetland plants (OBL) almost always occur (estimated probability >99%) in wetlands under natural conditions;
- (2) Facultative wetland plants (FACW) usually occur in wetlands (estimated probability 67-99%), but occasionally are found in non-wetlands;
- (3) Facultative plants (FAC) are equally likely to occur in wetlands or non-wetlands (estimated probability 34-66%);
- (4) Facultative upland plants (FACU) usually occur in non-wetlands (estimated probability 67-99%), but occasionally are found in wetlands; and
- (5) Obligate upland plants (UPL) almost always occur (estimated probability >99%) in non-wetlands under natural conditions.

Four procedures completed in the following order are used to determine if hydrophytic vegetation is present:

- 1) **Rapid Test:** The Rapid Test for hydrophytic vegetation is met if all dominant species across all strata are OBL or FACW, or a combination of the two based on a visual assessment.

- 2) Dominance Test: Using the 50/20 Rule, if greater than 50% of the plants present are FAC, FACW, or OBL, the subject area meets the hydrophytic vegetation criterion.
- 3) Prevalence Index: Each plant species in a sampling plot is assigned a numeric value (OBL=1; FACW=2; FAC=3; FACU=4; UPL=5). Based on the sampling data, the absolute cover is calculated for each species in each stratum and using the specified formula, if the Prevalence Index is 3 or less, hydrophytic vegetation is present.
- 4) Morphological Adaptations: Various species may develop physical characteristics after growing in wetland areas such as multi-stemmed trunks, shallow roots and buttressed stems. Hydrophytic vegetation is present if an adaptation is observed in more than 50% of FACU species growing in an area that contains hydric soil and wetland hydrology.

Hydric Soils: Hydric soils are defined in the manual as "soils that are saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions in the upper part." Field indicators of hydric soil are found in the NTCHS Field Indicators of Hydric Soils in the United States (USDA Natural Resources Conservation Service 2006b or current version).

Wetland Hydrology: The wetland hydrology criterion is often the most difficult to determine. Typically, the presence of water for a portion of the growing season creates anaerobic conditions. Anaerobic conditions lead to the prevalence of wetland plants. Morphological adaptations of plants, driftlines and watermarks are examples of wetland hydrology field indicators.

RESULTS AND DISCUSSION

STUDY AREA

The project site consists of an existing golf course and the Buffalo Grove Village Hall complex. The golf course consists of open space containing grassed fairways, greens, tees, roughs, cart pathways, maintenance facilities, several open water ponds and portions of Buffalo Creek and Farrington Ditch. The Village Hall complex contains office buildings, access roadways and parking lots. In our opinion, Buffalo Creek and Farrington Ditch contain a direct hydrologic connection to a navigable Waters of the U.S. and will be regulated by the USACE under Section 404 of the Clean Water Act. In our opinion, the four open water ponds identified within the study area were constructed as golf course ponds and as stormwater management facilities. As such, we believe that these four man-made golf course ponds and stormwater management facilities may be exempt from federal regulation by the USACE under Section 404 of the Clean Water Act, by the Metropolitan Water Reclamation District under the Cook County Watershed Management Ordinance and by LCSMC under the Lake County Watershed Development Ordinance.

IDENTIFIED WATERS OF THE U.S./WETLAND AND POND AREAS

The following is a brief description of the identified Waters of the U.S./wetland and ponds with a list of the dominant plant species observed and their corresponding wetland indicator categories. A coefficient of conservatism (C-value) is also included for each plant species. C-values were established by Swink and Wilhelm (1999) to quantify an area's native attributes for comparative purposes. Each plant species is rated on a scale of 0 to 10, 0-representing non-native or noxious species commonly found in a variety of habitats, and 10 representing plants found only under specific ecological conditions. The C-values of plants found in wetland areas can give some insight as to the overall quality or value of the wetland. Wetlands containing an abundance of plants with a low C-value suggest that these wetlands have been disturbed in the past. Wetlands containing an abundance of plants with a high C-value suggest that specific ecological conditions necessary for their survival are intact thus disturbance is probably minimal and the wetland maintains some of its original integrity.

Waters of the U.S./Wetland #1 – Buffalo Creek and Farrington Ditch

Waters of the U.S. are defined as the ordinary high water mark in non-tidal waters, provided the jurisdiction is not extended by the presence of wetlands. The term "ordinary high water mark" (OHWM) refers to the line established by fluctuations of water. These fluctuations can be indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, or the presence of litter and debris.

Buffalo Creek and Farrington Ditch – Waters of the U.S./Wetland #1 was characterized at data points 1A, 2A and 3A, as shown on Exhibit 7. Buffalo Creek enters the property in the northwest corner of the site while Farrington Ditch enters the site along the northeast property boundary. Buffalo Creek passes along the southwest side of the site and Farrington Ditch conveys water to the south until the two channels converge immediately north of Lake-Cook Road. Buffalo Creek is classified as a Waters of the U.S./wetland area with an interior of flowing water and side slopes vegetated with a mixture of upland and lowland, woody and herbaceous plant species. Positive wetland hydrology was indicated by flowing water within the creek, soil saturation along the channel bank edges, local soil survey data, and sediment deposits. Farrington Ditch has a narrow, defined bed and bank and is underlain with a large drainage tile that has modified the hydrology of the channel bed. Vegetation within this tributary is intermittently mowed but was dominated by hydroptic plant species at the time of the field investigation. Positive wetland hydrology within the tributary was noted by the presence of saturated soil, drift lines, exposed tree roots and water marks.

The Soil Survey of Lake and Cook Counties, Illinois indicates that this area is mapped as underlain with Ashkum silty clay loam and Sawmill silty clay loam. Both of these soils are classified as hydric by the Lake County Natural Resources Conservation Service and the Cook County Natural Resources Conservation Service. Soil profiles revealed deep dark sediments and low chroma colored matrices, which are indicative of hydric soil conditions.

The following lists identified plants with the calculated native mean C-value:

FLORISTIC QUALITY DATA		Native	48	70.6%	Adventive	20	29.4%
48	NATIVE SPECIES	Tree	5	7.4%	Tree	2	2.9%
68	Total Species	Shrub	2	2.9%	Shrub	0	0.0%
2.6	NATIVE MEAN C	W-Vine	2	2.9%	W-Vine	1	1.5%
1.9	W/Adventives	H-Vine	0	0.0%	H-Vine	0	0.0%
18.3	NATIVE FQI	P-Forb	18	26.5%	P-Forb	7	10.3%
15.4	W/Adventives	B-Forb	2	2.9%	B-Forb	4	5.9%
-2.4	NATIVE MEAN W	A-Forb	6	8.8%	A-Forb	1	1.5%
-1.6	W/Adventives	P-Grass	5	7.4%	P-Grass	4	5.9%
AVG: Fac. Wetland (-)		A-Grass	1	1.5%	A-Grass	1	1.5%
		P-Sedge	7	10.3%	P-Sedge	0	0.0%
		A-Sedge	0	0.0%	A-Sedge	0	0.0%
		Cryptogam	0	0.0%			

ACRONYM	C SCIENTIFIC NAME	W WETNESS	PHYSIOGNOMY	COMMON NAME
ACENEG	0 Acer negundo	-2 FACW-	Nt Tree	BOX ELDER
ACESAI	0 Acer saccharinum	-3 FACW	Nt Tree	SILVER MAPLE
AGRALA	0 AGROSTIS ALBA	-3 FACW	Ad P-Grass	REDTOP
ALLPET	0 ALLIARIA PETIOLATA	0 FAC	Ad B-Forb	GARLIC MUSTARD
AMBARE	0 Ambrosia artemisiifolia elatior	3 FACU	Nt A-Forb	COMMON RAGWEED
AMBTRI	0 Ambrosia trifida	-1 FAC+	Nt A-Forb	GIANT RAGWEED
ANDGER	5 Andropogon gerardii	1 FAC-	Nt P-Grass	BIG BLUESTEM GRASS
APOCAN	4 Apocynum cannabinum	0 FAC	Nt P-Forb	INDIAN HEMP
APOSIB	2 Apocynum sibiricum	-1 FAC+	Nt P-Forb	PRAIRIE INDIAN HEMP
ARCMIN	0 ARCTIUM MINUS	5 UPL	Ad B-Forb	COMMON BURDOCK
ASTNOV	4 Aster novae-angliae	-3 FACW	Nt P-Forb	NEW ENGLAND ASTER
ASTSIS	3 Aster simplex	-5 OBL	Nt P-Forb	PANICLED ASTER
CXCRIS	4 Carex cristatella	-4 FACW+	Nt P-Sedge	CRESTED OVAL SEDGE
CXVULP	2 Carex vulpinoidea	-5 OBL	Nt P-Sedge	BROWN FOX SEDGE
CIRARV	0 CIRSIUM ARVENSE	5 UPL	Ad P-Forb	FIELD THISTLE
CORRAC	1 Cornus racemosa	-2 FACW-	Nt Shrub	GRAY DOGWOOD
CYPESC	0 Cyperus esculentus	-1 [FAC+]	Nt P-Sedge	FIELD NUT SEDGE
DAUCAR	0 DAUCUS CAROTA	5 UPL	Ad B-Forb	QUEEN ANNE'S LACE
ELEERY	2 Eleocharis erythropoda	-5 OBL	Nt P-Sedge	RED-ROOTED SPIKE RUSH
ELYCAN	4 Elymus canadensis	1 FAC-	Nt P-Grass	CANADA WILD RYE
ELYVIR	4 Elymus virginicus	-2 FACW-	Nt P-Grass	VIRGINIA WILD RYE
EPICOL	3 Epilobium coloratum	-5 OBL	Nt P-Forb	CINNAMON WILLOW HERB
ERIAN	0 Erigeron annuus	1 FAC-	Nt B-Forb	ANNUAL FLEABANE
FRAVIR	1 Fragaria virginiana	1 FAC-	Nt P-Forb	WILD STRAWBERRY
FRAPES	1 Fraxinus pennsylvanica sub.	0 FAC	Nt Tree	GREEN ASH
GEUCAN	1 Geum canadense	0 FAC	Nt P-Forb	WOOD AVENS
HACVIR	0 Hackelia virginiana	1 FAC-	Nt B-Forb	STICKSEED
HORJUB	0 HORDEUM JUBATUM	-1 FAC+	Ad P-Grass	SQUIRREL-TAIL GRASS
IMPCAP	3 Impatiens capensis	-3 FACW	Nt A-Forb	ORANGE JEWELWEED
IRIVIS	5 Iris virginica shrevei	-5 OBL	Nt P-Forb	BLUE FLAG
JUNDUD	4 Juncus dudleyi	0 [FAC]	Nt P-Forb	DUDLEY'S RUSH
LACSER	0 LACTUCA SERRIOLA	0 FAC	Ad B-Forb	PRICKLY LETTUCE
LEMMIO	5 Lemna minor	-5 OBL	Nt A-Forb	SMALL DUCKWEED
LYSNUM	0 LYSIMACHIA NUMMULARIA	-4 FACW+	Ad P-Forb	MONEYWORT
MORALB	0 MORUS ALBA	0 FAC	Ad Tree	WHITE MULBERRY
PANCAP	1 Panicum capillare	0 FAC	Nt A-Grass	OLD WITCH GRASS
PANVIR	5 Panicum virgatum	-1 FAC+	Nt P-Grass	SWITCH GRASS
PARQUI	2 Parthenocissus quinquefolia	1 FAC-	Nt W-Vine	VIRGINIA CREEPER
PHAARU	0 PHALARIS ARUNDINACEA	-4 FACW+	Ad P-Grass	REED CANARY GRASS
PLALAN	0 PLANTAGO LANCEOLATA	0 FAC	Ad P-Forb	ENGLISH PLANTAIN
PLAMAJ	0 PLANTAGO MAJOR	-1 FAC+	Ad P-Forb	COMMON PLANTAIN
POAPRA	0 POA PRATENSIS	1 FAC-	Ad P-Grass	KENTUCKY BLUE GRASS
POLAMS	4 Polygonum amphibium stipulaceum	-5 OBL	Nt P-Forb	WATER KNOTWEED
POLLAP	0 Polygonum lapathifolium	-4 FACW+	Nt A-Forb	HEARTSEASE
POLPEN	0 Polygonum pensylvanicum	-4 FACW+	Nt A-Forb	PINKWEED
POLPER	0 POLYGONUM PERSICARIA	1 [FAC-]	Ad A-Forb	LADY'S THUMB
POPDEL	2 Populus deltoides	-1 FAC+	Nt Tree	EASTERN COTTONWOOD
RUMCRI	0 RUMEX CRISPIUS	-1 FAC+	Ad P-Forb	CURLY DOCK
SAGLAT	4 Sagittaria latifolia	-5 OBL	Nt P-Forb	COMMON ARROWHEAD
SALFRA	0 SALIX FRAGILIS	-1 FAC+	Ad Tree	CRACK WILLOW
SALINT	1 Salix interior	-5 OBL	Nt Shrub	SANDBAR WILLOW
SALNIG	4 Salix nigra	-5 OBL	Nt Tree	BLACK WILLOW
SCIATR	4 Scirpus atrovirens	-5 OBL	Nt P-Sedge	DARK GREEN RUSH

SCIFLU	4	Scirpus fluviatilis	-5	OBL	Nt	P-Sedge	RIVER BULRUSH
SCIVAC	5	Scirpus validus creber	-5	OBL	Nt	P-Sedge	GREAT BULRUSH
SETGLA	0	SETARIA GLAUCA	0	FAC	Ad	A-Grass	YELLOW FOXTAIL
SIUSUA	7	Sium suave	-5	OBL	Nt	P-Forb	TALL WATER PARSNIP
SOLDUL	0	SOLANUM DULCAMARA	0	FAC	Ad	W-Vine	BITTERSWEET NIGHTSHADE
SOLGIG	4	Solidago gigantea	-3	FACW	Nt	P-Forb	LATE GOLDENROD
SOLGRN	3	Solidago graminifolia nuttallii	0	[FAC]	Nt	P-Forb	GRASS-LEAVED GOLDENROD
SPAPEC	4	Spartina pectinata	-4	FACW+	Nt	P-Grass	PRAIRIE CORD GRASS
TRIPRA	0	TRIFOLIUM PRATENSE	5	UPL	Ad	P-Forb	RED CLOVER
TRIREP	0	TRIFOLIUM REPENS	2	FACU+	Ad	P-Forb	WHITE CLOVER
TYPANG	1	Typha angustifolia	-5	OBL	Nt	P-Forb	NARROW-LEAVED CATTAIL
TYPLAT	1	Typha latifolia	-5	OBL	Nt	P-Forb	BROAD-LEAVED CATTAIL
VERHAS	4	Verbena hastata	-4	FACW+	Nt	P-Forb	BLUE VERVAIN
VITRIP	2	Vitis riparia	-2	FACW-	Nt	W-Vine	RIVERBANK GRAPE
ZIZAUR	7	Zizia aurea	-1	FAC+	Nt	P-Forb	GOLDEN ALEXANDERS

Open Water Golf Course and Detention Ponds #2, #3, #4 and #5

Information for the Open Water and Detention Ponds #2, #3, #4 and #5 was collected at data points 4A, 5A, 6A and 7A, as shown on Exhibit 7. These areas consist of open water ponds constructed as golf course amenities and for stormwater management. The man-made ponds are surrounded by Kentucky blue grass (*Poa pratensis*) and contain either unvegetated, eroded slopes or vegetated banks dominated by a mixture of lowland and upland vegetation. Some limited areas within the pond edges contain a narrow perimeter of hydrophytic vegetation. These narrow vegetated perimeters were dominated by areas of reed canary grass (*Phalaris arundinacea*), red-rooted spike rush (*Eleocharis erythropoda*), redtop grass (*Agrostis alba*) and small stems of sandbar willow (*Salix interior*). At the time of the field visit, the ponds contained an unknown depth of standing water with additional positive wetland hydrology indicators including sediment deposits, watermarks and drift material along the edges. According to the Soil Survey of Lake and Cook Counties, Illinois, the ponds are mapped as water or underlain with Mundelein silt loam, Sawmill silty clay loam or Ashkum silty clay loam. As previously noted, Ashkum silty clay loam and Sawmill silty clay loam are classified as hydric soils but Mundelein silt loam is classified as non-hydric. Soil probes taken within the pond edges revealed deep sediments, low chroma colors and gleying indicating hydric soil conditions are present.

In our opinion, the four man-made golf course and stormwater management ponds may be exempt from federal regulation by the USACE under Section 404 of the Clean Water Act, by the Metropolitan Water Reclamation District under the Cook County Watershed Management Ordinance and by LCSMC under the Lake County Watershed Development Ordinance.

REFERENCE MATERIALS

The following reference materials were reviewed and used to assist in the wetland field reconnaissance. They are included as Exhibits 1-6.

LOCATION

The project site consists of an existing golf course and the Buffalo Grove Village Hall complex on the north side of Lake-Cook Road, between Buffalo Grove Road to the east and Arlington Heights Road to the west, in Buffalo Grove, Lake and Cook Counties,

Illinois, as shown on Exhibit 1. Geographically, the study area is located in the south half of Section 32, Township 43 North, Range 11, East of the Third Principal Meridian and the north half of Section 5, Township 42 North, Range 11, East of the Third Principal Meridian.

NATIONAL WETLAND INVENTORY

The National Wetland Inventory map (NWI) for the Wheeling Quadrangle (1983), as shown on Exhibit 2, indicates that wetland area is mapped within the study area. The NWI serves only as a large-scale guide and actual wetland locations and types often vary from that mapped. The following wetland type was identified within the subject site:

PUBGx - Palustrine, Unconsolidated Bottom, Intermittently Exposed, Excavated

LAKE COUNTY WETLAND INVENTORY

The Lake County Wetland Inventory map (LCWI) and Advanced Identification map for Vernon Township (2001), as shown on Exhibit 3, indicates that wetlands are mapped within the study area. As with the NWI, the LCWI ADID map serves as a large-scale guide and actual wetland locations often vary from that mapped.

SOIL SURVEY

The Soil Survey of Lake and Cook Counties, Illinois (2001), as shown on Exhibit 4, was reviewed to determine the location of hydric soils within the study area. Mapped hydric soil can be indicative of wetland conditions.

The following soils are mapped within the study area:

146A/B	-	Elliott silt loam		
153A	-	Pella silty clay loam	-	Hydric
223C2	-	Varna silt loam		
232	-	Ashkum silty clay loam	-	Hydric
298	-	Beecher silt loam		
325B	-	Dresden silt loam		
442A	-	Mundelein silt loam		
531C2	-	Markham silt loam		
534	-	Urban Land, Orthents complex, clayey		
989B	-	Mundelein & Elliott silt loams		
1107A	-	Sawmill silty clay loam, wet	-	Hydric
3107A	-	Sawmill silty clay loam, frequently flooded	-	Hydric

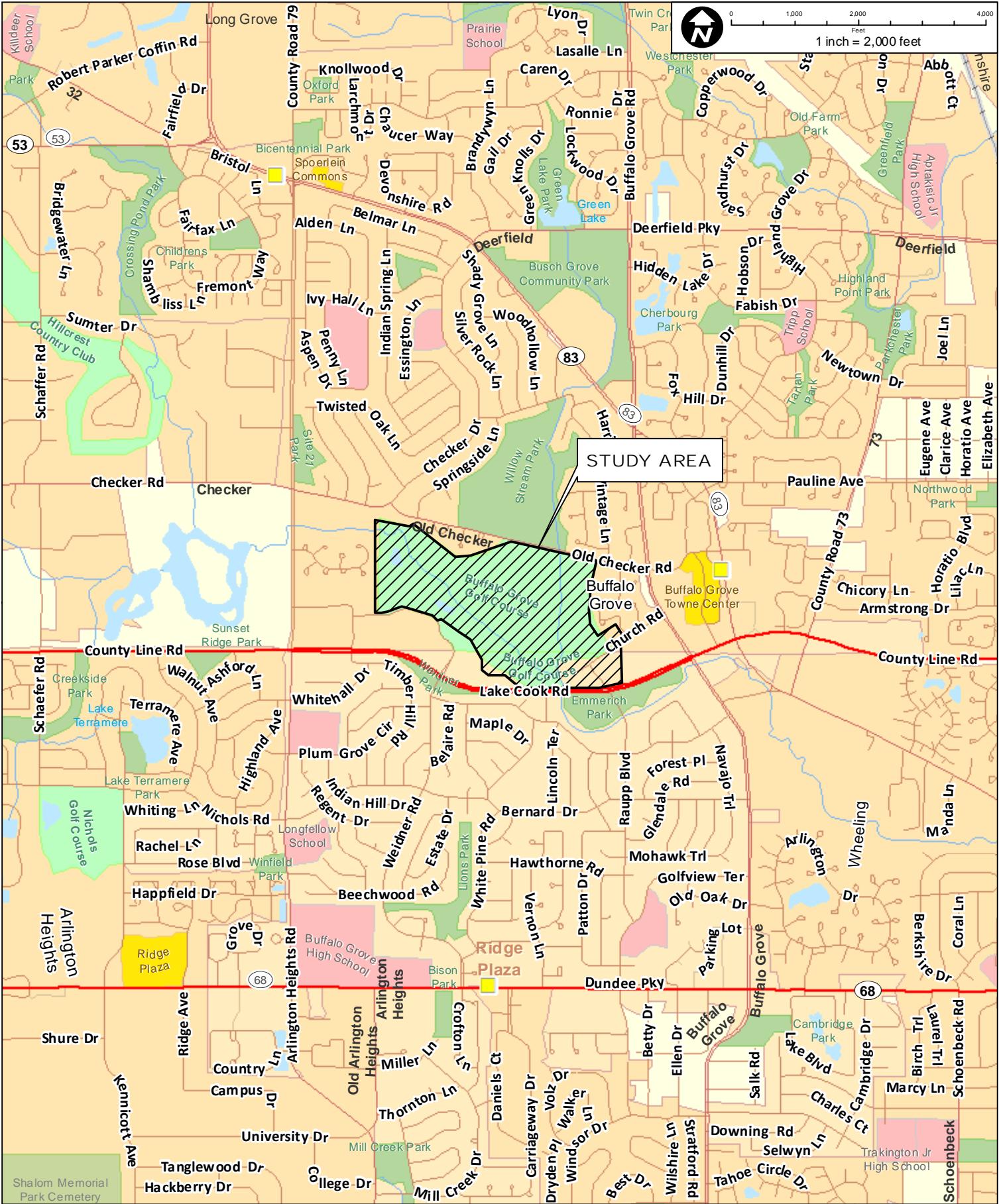
UNITED STATES GEOLOGICAL SURVEY

The United States Geological Survey (USGS) map for the Wheeling Quadrangle (1993), as shown on Exhibit 5, was reviewed to determine historic local drainage patterns. The USGS map indicates that Buffalo Creek and Farrington Ditch pass through the subject site. The subject site is located within the Des Plaines River Watershed.

FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map (FIRM) for Lake County and Incorporated Areas, Map Numbers 17097C0266K and 17097C0270K, effective September 18, 2013, as shown on Exhibit 6, was reviewed to determine the location of regulatory floodplain within the study area. The presence of floodplain can be indicative of wetland hydrology. The FIRM indicates that there is extensive area of regulatory floodplain mapped within the study area.

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CLIENT:
VILLAGE OF BUFFALO GROVE

TITLE:
LOCATION MAP

CBBEL # 13-0035
 DATE: 7/24/14

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

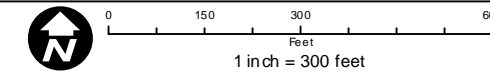
DSGN.	KEK	SCALE:	1" = 2,000'
DWN.	TGM	USER:	kopja
CHKD.		PLOT DATE:	7/30/2014
FILE NAME:	130035_LOC		

EXH 1

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NOTE: TAKEN FROM THE NATIONAL WETLAND INVENTORY (NWI), WHEELING QUADRANGLE (1983)

PUBGx - PALUSTRINE, UNCONSOLIDATED BOTTOM, INTERMITTENTLY EXPOSED, EXCAVATED



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

P:\VILLAGE OF BUFFALO GROVE\130035\130035_NWI.mxd

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 9575 West Higgins Road, Suite 600
 Rosemont, Illinois 60018
 (847) 823-0500

CLIENT:
VILLAGE OF BUFFALO GROVE

NO.	DATE	NATURE OF REVISION	CHKD.	PL OT DATE
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TITLE:
NATIONAL WETLAND INVENTORY

CBBEL # 13-0035
 DATE: 7/24/14
EXH 2

Legend

- ARTIFICIAL WETLAND
- WETLAND



Sources: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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 (847) 823-0500

CLIENT:
VILLAGE OF BUFFALO GROVE

NO.	DATE	NATURE OF REVISION	CHKD.	PL OT DATE
FILE NAME:	130035_LCWI.mxd			
PATH:	P:\VILLAGE OF BUFFALO GROVE\130035\130035_LCWI.mxd			

TITLE:
LAKE COUNTY WETLAND INVENTORY

CBBEL # 13-0035
 DATE: 7/24/14
EXH 3



LEGEND

- W - WATER
- 146/A/B - ELLIOTT SILT LOAM
- 153A - PELLA SILTY CLAY LOAM, HYDRIC
- 223C2 - VARNA SILT LOAM
- 232 - ASHKUM SILTY CLAY LOAM, HYDRIC
- 298 - BEECHER SILT LOAM
- 325B - DRESDEN SILT LOAM
- 442A - MUNDELEIN SILT LOAM
- 531C2 - MARKHAM SILT LOAM
- 534 - URBAN LAND, ORTHENTS COMPLEX, CLAYEY
- 989B - MUNDELEIN AND ELLIOTT SILT LOAMS
- 1107A - SAWMILL SILTY CLAY LOAM, WET, HYDRIC
- 3107A - SAWMILL SILTY CLAY LOAM, FREQUENTLY FLOODED, HYDRIC

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

P:\VILLAGE OF BUFFALO GROVE\130035\130035_SOILS.mxd

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

CLIENT:
VILLAGE OF BUFFALO GROVE

NO.	DATE	NATURE OF REVISION	CHKD.	PL OT DATE	DWN:	kkopja
					DSGN.	KEK
					CHKD.	TGM
					SCALE:	1" = 300'
					MODEL:	ARC GIS 10
FILE NAME:	130035_SOILS.mxd					
PATH:	P:\VILLAGE OF BUFFALO GROVE\130035\130035_SOILS.mxd					

TITLE:
SOIL SURVEY

CBBEL # 13-0035
 DATE: 7/24/14
EXH 4

NOTE: TAKEN FROM THE UNITED STATES GEOLOGICAL SURVEY (USGS), WHEELING QUADRANGLE (1993)



0 1000 2000 4000

1 inch = 2,000 feet



CLIENT:

VILLAGE OF BUFFALO GROVE

TITLE:

UNITED STATES
GEOLOGICAL SURVEY

CBBEL # 13-0035

DATE: 7/24/14

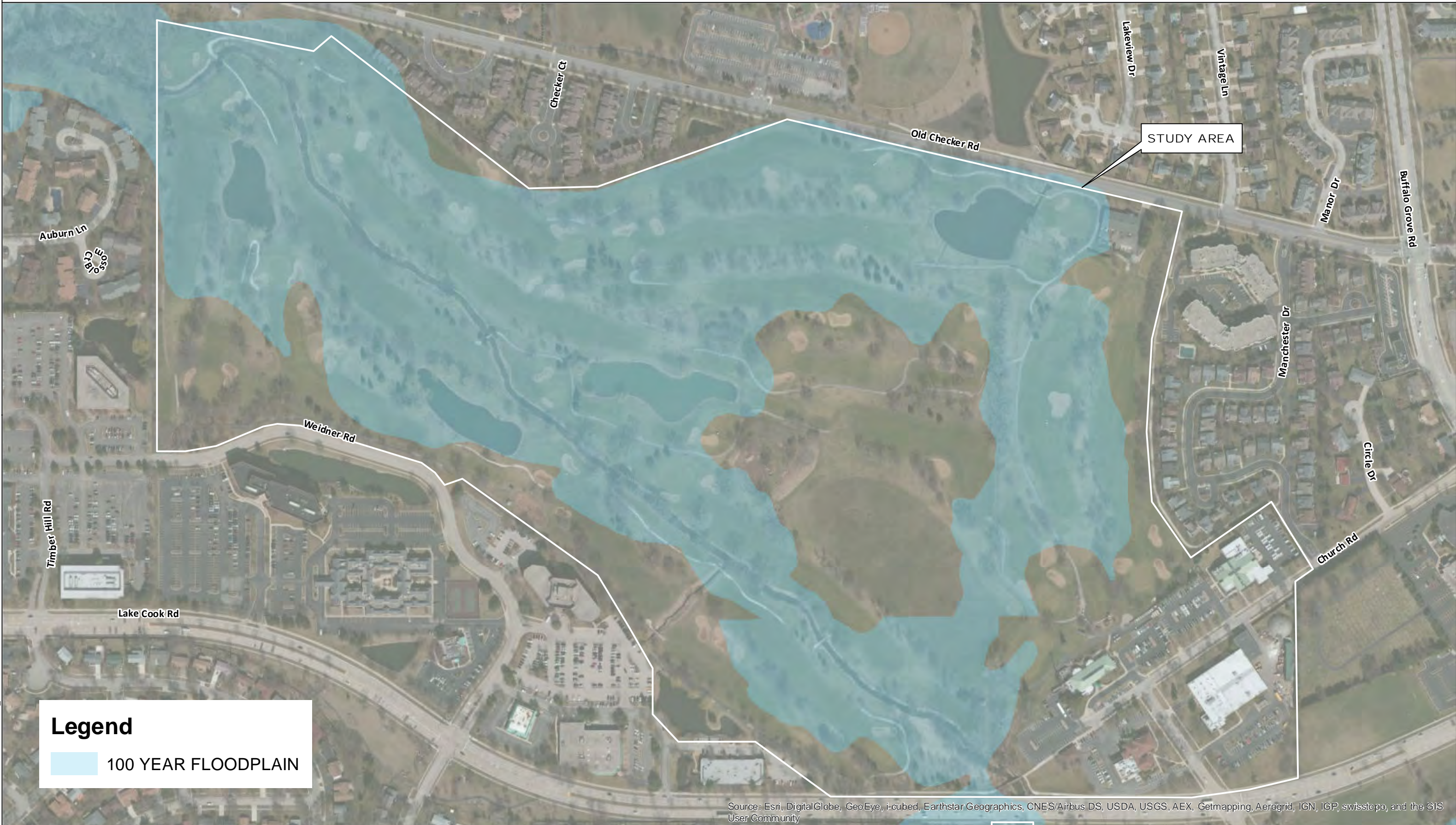


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DSGN.		SCALE:	1" = 2,000'
DWN.	KEK	USER:	kkopja
CHKD.	TGM	PLOT DATE:	7/30/2014
FILE NAME:	130035_USGS		

EXH 5



Legend

100 YEAR FLOODPLAIN

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

P:\VILLAGE OF BUFFALO GROVE\130035\130035_FIRM.mxd

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(847) 823-0500

CLIENT:
VILLAGE OF BUFFALO GROVE

NO.	DATE	NATURE OF REVISION	CHKD.	PL OT DATE	DWN:	kkopja
					DSGN.	KEK
					CHKD.	TGM
					SCALE:	1" = 300'
					MODEL:	ARC GIS 10
FILE NAME:	130035_FIRM.mxd					
PATH:	P:\VILLAGE OF BUFFALO GROVE\130035\130035_FIRM.mxd					

TITLE:
FLOOD INSURANCE RATE MAP

CBBEL # 13-0035
DATE: 7/24/14
EXH 6



Sources: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

P:\VILLAGE OF BUFFALO GROVE\130035\130035_AWD.mxd

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9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

CLIENT:
VILLAGE OF BUFFALO GROVE

NO.	DATE	NATURE OF REVISION	CHKD.	PL. OT DATE
FILE NAME:	130035_AWD.mxd			
PATH:	P:\VILLAGE OF BUFFALO GROVE\130035\130035_AWD.mxd			

TITLE:
APPROXIMATE WETLAND DELINEATION

CBBEL # 13-0035
DATE: 7/24/14
EXH 7

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 1A
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave
 Slope (%): 10% Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Ashkum silty clay loam NWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? present? _____

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present? <u>Y</u>	Is the sampled area within a wetland? <u>Y</u> If yes, optional wetland site ID: _____
Hydric soil present? <u>Y</u>	
Wetland hydrology present? <u>Y</u>	

Remarks: (Explain alternative procedures here or in a separate report.)

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Dominance Test Worksheet Number of Dominant Species that are OBL, FACW, or FAC: <u>3</u> (A) Total Number of Dominant Species Across all Strata: <u>3</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>100.00%</u> (A/B)
1 <u>Populus deltoides</u>	15	Y	FAC	
2 _____	_____	_____	_____	Prevalence Index Worksheet Total % Cover of: OBL species <u>5</u> x 1 = <u>5</u> FACW species <u>40</u> x 2 = <u>80</u> FAC species <u>95</u> x 3 = <u>285</u> FACU species <u>0</u> x 4 = <u>0</u> UPL species <u>0</u> x 5 = <u>0</u> Column totals <u>140</u> (A) <u>370</u> (B) Prevalence Index = B/A = <u>2.64</u>
3 _____	_____	_____	_____	
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
<u>15</u> = Total Cover				
Sapling/Shrub stratum (Plot size: _____)				Hydrophytic Vegetation Indicators: Rapid test for hydrophytic vegetation <input checked="" type="checkbox"/> Dominance test is >50% <input checked="" type="checkbox"/> Prevalence index is ≤3.0* Morphological adaptations* (provide supporting data in Remarks or on a separate sheet) Problematic hydrophytic vegetation* (explain) *Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
1 _____	_____	_____	_____	
2 _____	_____	_____	_____	
3 _____	_____	_____	_____	
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
6 _____	_____	_____	_____	
7 _____	_____	_____	_____	
8 _____	_____	_____	_____	
9 _____	_____	_____	_____	
10 _____	_____	_____	_____	
<u>0</u> = Total Cover				
Herb stratum (Plot size: _____)				Hydrophytic vegetation present? <u>Y</u>
1 <u>Poa pratensis</u>	80	Y	FAC	
2 <u>Phalaris arundinacea</u>	40	Y	FACW	
3 <u>Eleocharis erythropoda</u>	5	N	OBL	
4 _____	_____	_____	_____	
5 _____	_____	_____	_____	
6 _____	_____	_____	_____	
7 _____	_____	_____	_____	
8 _____	_____	_____	_____	
9 _____	_____	_____	_____	
10 _____	_____	_____	_____	
<u>125</u> = Total Cover				
Woody vine stratum (Plot size: _____)				
1 _____	_____	_____	_____	
2 _____	_____	_____	_____	
<u>0</u> = Total Cover				

Remarks: (Include photo numbers here or on a separate sheet)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-9	10 YR 2/1						Silty clay loam	
10-21	10 YR 4/1						Silty clay loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators: <input type="checkbox"/> Histisol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)	<input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input checked="" type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)	Indicators for Problematic Hydric Soils: <input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R) <input type="checkbox"/> Dark Surface (S7) (LRR K, L) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (explain in remarks)
---	---	---

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric soil present? <u>Y</u>
---	-------------------------------

Remarks:

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)			Secondary Indicators (minimum of two required)		
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Surface Soil Cracks (B6)			
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> True Aquatic Plants (B14)	<input type="checkbox"/> Drainage Patterns (B10)			
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Dry-Season Water Table (C2)			
<input checked="" type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Crayfish Burrows (C8)			
<input checked="" type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)			
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Stunted or Stressed Plants (D1)			
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Geomorphic Position (D2)			
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Gauge or Well Data (D9)	<input type="checkbox"/> FAC-Neutral Test (D5)			
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)				
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)					
<input type="checkbox"/> Water-Stained Leaves (B9)					

Field Observations: Surface water present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water table present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____ Saturation present? (includes capillary fringe) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____	Wetland hydrology present? <u>Y</u>
---	-------------------------------------

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 1B
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): Golf Course Local relief (concave, convex, none): None
 Slope (%): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Ashkum silty clay loam VWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? present? _____

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? <u>Y</u>	Is the sampled area within a wetland: <u>N</u> If yes, optional wetland site ID: _____
Hydric soil present? <u>N</u>	
Wetland hydrology present? <u>N</u>	

Remarks: (Explain alternative procedures here or in a separate report.)

Golf Course Fairway

VEGETATION -- Use scientific names of plants.

Tree Stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Dominance Test Worksheet
1	_____	_____	_____	_____	Number of Dominant Species that are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across all Strata: <u>1</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>100.00%</u> (A/B)
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
0 = Total Cover					
Sapling/Shrub stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Prevalence Index Worksheet
1	_____	_____	_____	_____	Total % Cover of: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>100</u> x 3 = <u>300</u> FACU species <u>0</u> x 4 = <u>0</u> UPL species <u>0</u> x 5 = <u>0</u> Column totals <u>100</u> (A) <u>300</u> (B) Prevalence Index = B/A = <u>3.00</u>
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
0 = Total Cover					
Herb stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic Vegetation Indicators:
1	<u>Poa pratensis</u>	<u>100</u>	<u>Y</u>	<u>FAC</u>	Rapid test for hydrophytic vegetation <input checked="" type="checkbox"/> Dominance test is >50% <input checked="" type="checkbox"/> Prevalence index is ≤3.0* Morphological adaptations* (provide supporting data in Remarks or on a separate sheet) Problematic hydrophytic vegetation* (explain) *Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
6	_____	_____	_____	_____	
7	_____	_____	_____	_____	
8	_____	_____	_____	_____	
9	_____	_____	_____	_____	
10	_____	_____	_____	_____	
100 = Total Cover					
Woody vine stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic vegetation present?
1	_____	_____	_____	_____	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes
2	_____	_____	_____	_____	
0 = Total Cover					

Remarks: (Include photo numbers here or on a separate sheet)

Golf Course Fairway

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-22	10 YR 4/3						Silt loam	Golf Course Made Land

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

<p>Hydric Soil Indicators:</p> <p><input type="checkbox"/> Histisol (A1)</p> <p><input type="checkbox"/> Histic Epipedon (A2)</p> <p><input type="checkbox"/> Black Histic (A3)</p> <p><input type="checkbox"/> Hydrogen Sulfide (A4)</p> <p><input type="checkbox"/> Stratified Layers (A5)</p> <p><input type="checkbox"/> 2 cm Muck (A10)</p> <p><input type="checkbox"/> Depleted Below Dark Surface (A11)</p> <p><input type="checkbox"/> Thick Dark Surface (A12)</p> <p><input type="checkbox"/> Sandy Mucky Mineral (S1)</p> <p><input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)</p>	<p><input type="checkbox"/> Sandy Gleyed Matrix (S4)</p> <p><input type="checkbox"/> Sandy Redox (S5)</p> <p><input type="checkbox"/> Stripped Matrix (S6)</p> <p><input type="checkbox"/> Loamy Mucky Mineral (F1)</p> <p><input type="checkbox"/> Loamy Gleyed Matrix (F2)</p> <p><input type="checkbox"/> Depleted Matrix (F3)</p> <p><input type="checkbox"/> Redox Dark Surface (F6)</p> <p><input type="checkbox"/> Depleted Dark Surface (F7)</p> <p><input type="checkbox"/> Redox Depressions (F8)</p>	<p>Indicators for Problematic Hydric Soils:</p> <p><input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R)</p> <p><input type="checkbox"/> Dark Surface (S7) (LRR K, L)</p> <p><input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)</p> <p><input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R)</p> <p><input type="checkbox"/> Very Shallow Dark Surface (TF12)</p> <p><input type="checkbox"/> Other (explain in remarks)</p> <p>*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic</p>
--	---	--

<p>Restrictive Layer (if observed):</p> <p>Type: _____</p> <p>Depth (inches): _____</p>	<p>Hydric soil present? <u> N </u></p>
--	--

Remarks:

Golf Course Made Land

HYDROLOGY

Wetland Hydrology Indicators:

<p><u>Primary Indicators (minimum of one is required; check all that apply)</u></p> <p><input type="checkbox"/> Surface Water (A1)</p> <p><input type="checkbox"/> High Water Table (A2)</p> <p><input type="checkbox"/> Saturation (A3)</p> <p><input type="checkbox"/> Water Marks (B1)</p> <p><input type="checkbox"/> Sediment Deposits (B2)</p> <p><input type="checkbox"/> Drift Deposits (B3)</p> <p><input type="checkbox"/> Algal Mat or Crust (B4)</p> <p><input type="checkbox"/> Iron Deposits (B5)</p> <p><input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)</p> <p><input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)</p> <p><input type="checkbox"/> Water-Stained Leaves (B9)</p>	<p><u>Secondary Indicators (minimum of two required)</u></p> <p><input type="checkbox"/> Aquatic Fauna (B13)</p> <p><input type="checkbox"/> True Aquatic Plants (B14)</p> <p><input type="checkbox"/> Hydrogen Sulfide Odor (C1)</p> <p><input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)</p> <p><input type="checkbox"/> Presence of Reduced Iron (C4)</p> <p><input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)</p> <p><input type="checkbox"/> Thin Muck Surface (C7)</p> <p><input type="checkbox"/> Gauge or Well Data (D9)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>	<p><input type="checkbox"/> Surface Soil Cracks (B6)</p> <p><input type="checkbox"/> Drainage Patterns (B10)</p> <p><input type="checkbox"/> Dry-Season Water Table (C2)</p> <p><input type="checkbox"/> Crayfish Burrows (C8)</p> <p><input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)</p> <p><input type="checkbox"/> Stunted or Stressed Plants (D1)</p> <p><input type="checkbox"/> Geomorphic Position (D2)</p> <p><input type="checkbox"/> FAC-Neutral Test (D5)</p>
---	---	---

<p>Field Observations:</p> <p>Surface water present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____</p> <p>Water table present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____</p> <p>Saturation present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)</p>	<p>Wetland hydrology present? <u> N </u></p>
--	---

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Well drained golf course fairway

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 2A
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): _____ Depression _____ Local relief (concave, convex, none): _____ Concave _____
 Slope (%): 10% Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Ashkum silty clay loam NWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? _____ Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? _____ present? _____

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present? <u>Y</u>	Is the sampled area within a wetland? <u>Y</u> If yes, optional wetland site ID: _____
Hydric soil present? <u>Y</u>	
Wetland hydrology present? <u>Y</u>	

Remarks: (Explain alternative procedures here or in a separate report.)

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Dominance Test Worksheet
1 <u>Salix nigra</u>	30	Y	OBL	Number of Dominant Species that are OBL, FACW, or FAC: <u>6</u> (A) Total Number of Dominant Species Across all Strata: <u>6</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>100.00%</u> (A/B)
2 <u>Populus deltoides</u>	15	Y	FAC	
3 <u>Acer negundo</u>	5	N	FACW	
4 _____				
5 _____				
<u>50</u> = Total Cover				Prevalence Index Worksheet Total % Cover of: OBL species <u>80</u> x 1 = <u>80</u> FACW species <u>75</u> x 2 = <u>150</u> FAC species <u>45</u> x 3 = <u>135</u> FACU species <u>5</u> x 4 = <u>20</u> UPL species <u>0</u> x 5 = <u>0</u> Column totals <u>205</u> (A) <u>385</u> (B) Prevalence Index = B/A = <u>1.88</u>
Sapling/Shrub stratum (Plot size: _____)				
1 <u>Salix exigua subsp. interior</u>	35	Y	OBL	
2 <u>Cornus racemosa</u>	20	Y	FACW	
3 _____				
4 _____				
5 _____				
<u>55</u> = Total Cover				
Herb stratum (Plot size: _____)				
1 <u>Phalaris arundinacea</u>	50	Y	FACW	Hydrophytic Vegetation Indicators: _____ Rapid test for hydrophytic vegetation <input checked="" type="checkbox"/> Dominance test is >50% <input checked="" type="checkbox"/> Prevalence index is ≤3.0* _____ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet) _____ Problematic hydrophytic vegetation* (explain) *Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
2 <u>Poa pratensis</u>	30	Y	FAC	
3 <u>Typha angustifolia</u>	10	N	OBL	
4 <u>Eleocharis erythropoda</u>	5	N	OBL	
5 <u>Cirsium arvense</u>	5	N	FACU	
6 _____				
7 _____				
8 _____				
9 _____				
10 _____				
<u>100</u> = Total Cover				
Woody vine stratum (Plot size: _____)				
1 _____				
2 _____				
<u>0</u> = Total Cover			Hydrophytic vegetation present? <u>Y</u>	

Remarks: (Include photo numbers here or on a separate sheet)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-21	10 YR 2/1						Silty clay loam	Deep sediments

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input type="checkbox"/> Histisol (A1)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Dark Surface (S7) (LRR K, L)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> 2 cm Muck (A10)	<input type="checkbox"/> Other (explain in remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Loamy Mucky Mineral (F1)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input type="checkbox"/> Depleted Matrix (F3)	
<input checked="" type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric soil present? <u>Y</u>
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Remarks:

HYDROLOGY

Wetland Hydrology Indicators:	
Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Aquatic Fauna (B13)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> True Aquatic Plants (B14)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input checked="" type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input checked="" type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Gauge or Well Data (D9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	
<input type="checkbox"/> Water-Stained Leaves (B9)	

Field Observations: Surface water present? Yes <u>X</u> No _____ Depth (inches): <u>2"</u> Water table present? Yes <u>X</u> No _____ Depth (inches): _____ Saturation present? Yes <u>X</u> No _____ Depth (inches): _____ (includes capillary fringe)	Wetland hydrology present? <u>Y</u>
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Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Flowing channel

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 2B
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): Golf Course Local relief (concave, convex, none): None
 Slope (%): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Sawmill silty clay loam NWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? _____

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present? <u>N</u>	Is the sampled area within a wetland? <u>N</u> If yes, optional wetland site ID: _____
Hydric soil present? <u>N</u>	
Wetland hydrology present? <u>N</u>	

Remarks: (Explain alternative procedures here or in a separate report.)

Golf Course Fairway

VEGETATION -- Use scientific names of plants.

Tree Stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Dominance Test Worksheet Number of Dominant Species that are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across all Strata: <u>3</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>33.33%</u> (A/B)
1	_____	_____	_____	_____	
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
		<u>0</u>	= Total Cover		
Sapling/Shrub stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Prevalence Index Worksheet Total % Cover of: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>25</u> x 3 = <u>75</u> FACU species <u>50</u> x 4 = <u>200</u> UPL species <u>50</u> x 5 = <u>250</u> Column totals <u>125</u> (A) <u>525</u> (B) Prevalence Index = B/A = <u>4.20</u>
1	_____	_____	_____	_____	
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
		<u>0</u>	= Total Cover		
Herb stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	
1	<u>Bromus inermis</u>	40	Y	UPL	
2	<u>Festuca pratensis</u>	30	Y	FACU	
3	<u>Poa pratensis</u>	25	Y	FAC	
4	<u>Cirsium arvense</u>	15	N	FACU	
5	<u>Daucus carota</u>	10	N	UPL	
6	<u>Trifolium pratense</u>	5	N	FACU	
7	_____	_____	_____	_____	
8	_____	_____	_____	_____	
9	_____	_____	_____	_____	
10	_____	_____	_____	_____	
		<u>125</u>	= Total Cover		
Woody vine stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	
1	_____	_____	_____	_____	
2	_____	_____	_____	_____	
		<u>0</u>	= Total Cover		

Remarks: (Include photo numbers here or on a separate sheet)

Golf Course Fairway

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-22	10 YR 4/3						Silt loam	Golf Course Made Land

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input type="checkbox"/> Histisol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)	<input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)
	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R) <input type="checkbox"/> Dark Surface (S7) (LRR K, L) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric soil present? <u> N </u>
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Remarks:
Golf Course Made Land

HYDROLOGY

Wetland Hydrology Indicators:	
Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Gauge or Well Data (D9) <input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> FAC-Neutral Test (D5)

Field Observations: Surface water present? Yes _____ No <u> X </u> Depth (inches): _____ Water table present? Yes _____ No <u> X </u> Depth (inches): _____ Saturation present? Yes _____ No <u> X </u> Depth (inches): _____ (includes capillary fringe)	Wetland hydrology present? <u> N </u>
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Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Well drained golf course

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 3A
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave
 Slope (%): 10% Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Sawmill silty clay loam NWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? present? _____

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present? <u>Y</u>	Is the sampled area within a wetland? <u>Y</u> If yes, optional wetland site ID: _____
Hydric soil present? <u>Y</u>	
Wetland hydrology present? <u>Y</u>	

Remarks: (Explain alternative procedures here or in a separate report.)

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Dominance Test Worksheet
1 <u>Salix nigra</u>	30	Y	OBL	
2 <u>Acer saccharinum</u>	5	N	FACW	
3 <u>Populus deltoides</u>	5	N	FAC	
4 _____				
5 _____				
	40 = Total Cover			
Sapling/Shrub stratum (Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Prevalence Index Worksheet
1 <u>Salix exigua subsp. interior</u>	60	Y	OBL	
2 _____				
3 _____				
4 _____				
5 _____				
	60 = Total Cover			
Herb stratum (Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic Vegetation Indicators:
1 <u>Phalaris arundinacea</u>	90	Y	FACW	
2 <u>Typha angustifolia</u>	10	N	OBL	
3 _____				
4 _____				
5 _____				
6 _____				
7 _____				
8 _____				
9 _____				
10 _____				
	100 = Total Cover			
Woody vine stratum (Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic vegetation present? <u>Y</u>
1 _____				
2 _____				
	0 = Total Cover			

Remarks: (Include photo numbers here or on a separate sheet)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-21	10 YR 2/1						Silty clay loam	Deep sediments

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input type="checkbox"/> Histisol (A1)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Dark Surface (S7) (LRR K, L)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> 2 cm Muck (A10)	<input type="checkbox"/> Other (explain in remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Loamy Mucky Mineral (F1)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input type="checkbox"/> Depleted Matrix (F3)	
<input checked="" type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric soil present? <u>Y</u>
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Remarks:

HYDROLOGY

Wetland Hydrology Indicators:	
Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Aquatic Fauna (B13)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> True Aquatic Plants (B14)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input checked="" type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input checked="" type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Gauge or Well Data (D9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	
<input type="checkbox"/> Water-Stained Leaves (B9)	
	<input type="checkbox"/> Surface Soil Cracks (B6)
	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Crayfish Burrows (C8)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Stunted or Stressed Plants (D1)
	<input type="checkbox"/> Geomorphic Position (D2)
	<input type="checkbox"/> FAC-Neutral Test (D5)

Field Observations: Surface water present? Yes <u>X</u> No _____ Depth (inches): <u>2"</u> Water table present? Yes <u>X</u> No _____ Depth (inches): _____ Saturation present? Yes <u>X</u> No _____ Depth (inches): _____ (includes capillary fringe)	Wetland hydrology present? <u>Y</u>
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Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Flowing channel

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 3B
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): Golf Course Local relief (concave, convex, none): None
 Slope (%): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Sawmill silty clay loam VWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? _____

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	<u>N</u>	Is the sampled area within a wetland? <u>N</u> If yes, optional wetland site ID: _____
Hydric soil present?	<u>N</u>	
Wetland hydrology present?	<u>N</u>	

Remarks: (Explain alternative procedures here or in a separate report.)

Golf Course Fairway

VEGETATION -- Use scientific names of plants.

Tree Stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	
1	_____	_____	_____	_____	Dominance Test Worksheet Number of Dominant Species that are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across all Strata: <u>3</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>33.33%</u> (A/B)
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
		<u>0</u>	= Total Cover		Prevalence Index Worksheet Total % Cover of: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>80</u> x 3 = <u>240</u> FACU species <u>65</u> x 4 = <u>260</u> UPL species <u>5</u> x 5 = <u>25</u> Column totals <u>150</u> (A) <u>525</u> (B) Prevalence Index = B/A = <u>3.50</u>
Sapling/Shrub stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	
1	_____	_____	_____	_____	
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
		<u>0</u>	= Total Cover		
Herb stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic Vegetation Indicators: _____ Rapid test for hydrophytic vegetation _____ Dominance test is >50% _____ Prevalence index is ≤3.0* Morphological adaptations* (provide supporting data in Remarks or on a separate sheet) _____ Problematic hydrophytic vegetation* (explain) *Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
1	<u>Poa pratensis</u>	<u>80</u>	<u>Y</u>	<u>FAC</u>	
2	<u>Festuca pratensis</u>	<u>30</u>	<u>Y</u>	<u>FACU</u>	
3	<u>Melilotus alba</u>	<u>30</u>	<u>Y</u>	<u>FACU</u>	
4	<u>Cirsium arvense</u>	<u>5</u>	<u>N</u>	<u>FACU</u>	
5	<u>Daucus carota</u>	<u>5</u>	<u>N</u>	<u>UPL</u>	
6	_____	_____	_____	_____	
7	_____	_____	_____	_____	
8	_____	_____	_____	_____	
9	_____	_____	_____	_____	
10	_____	_____	_____	_____	
		<u>150</u>	= Total Cover		
Woody vine stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic vegetation present? <u>N</u>
1	_____	_____	_____	_____	
2	_____	_____	_____	_____	
		<u>0</u>	= Total Cover		

Remarks: (Include photo numbers here or on a separate sheet)

Golf Course Fairway

SOIL

Sampling Point: 3B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-22	10 YR 4/3						Silt loam	Golf Course Made Land

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input type="checkbox"/> Histisol (A1)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Dark Surface (S7) (LRR K, L)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> 2 cm Muck (A10)	<input type="checkbox"/> Other (explain in remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Loamy Mucky Mineral (F1)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric soil present? <u> N </u>
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Remarks:

Golf Course Made Land

HYDROLOGY

Wetland Hydrology Indicators:	
Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Aquatic Fauna (B13)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> True Aquatic Plants (B14)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Gauge or Well Data (D9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	
<input type="checkbox"/> Water-Stained Leaves (B9)	
	<input type="checkbox"/> Surface Soil Cracks (B6)
	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Crayfish Burrows (C8)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Stunted or Stressed Plants (D1)
	<input type="checkbox"/> Geomorphic Position (D2)
	<input type="checkbox"/> FAC-Neutral Test (D5)

Field Observations: Surface water present? Yes _____ No <u> X </u> Depth (inches): _____ Water table present? Yes _____ No <u> X </u> Depth (inches): _____ Saturation present? Yes _____ No <u> X </u> Depth (inches): _____ (includes capillary fringe)	Wetland hydrology present? <u> N </u>
--	--

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Well drained golf course

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 4A
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave
 Slope (%): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Elliott silt loam NWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? present? _____

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	<u>N</u>	Is the sampled area within a wetland? <u>N</u> If yes, optional wetland site ID: _____
Hydric soil present?	<u>Y</u>	
Wetland hydrology present?	<u>Y</u>	

Remarks: (Explain alternative procedures here or in a separate report.)

Unvegetated open water pond

VEGETATION -- Use scientific names of plants.

Tree Stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Dominance Test Worksheet
1	_____	_____	_____	_____	Number of Dominant Species that are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across all Strata: <u>0</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>0.00%</u> (A/B)
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
		<u>0</u> = Total Cover			
Sapling/Shrub stratum	(Plot size: _____)				Prevalence Index Worksheet Total % Cover of: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>0</u> x 3 = <u>0</u> FACU species <u>0</u> x 4 = <u>0</u> UPL species <u>0</u> x 5 = <u>0</u> Column totals <u>0</u> (A) <u>0</u> (B) Prevalence Index = B/A = _____
1	_____	_____	_____	_____	
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
		<u>0</u> = Total Cover			
Herb stratum	(Plot size: _____)				Hydrophytic Vegetation Indicators: _____ Rapid test for hydrophytic vegetation _____ Dominance test is >50% _____ Prevalence index is ≤3.0* _____ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet) _____ Problematic hydrophytic vegetation* (explain) *Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
1	_____	_____	_____	_____	
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
6	_____	_____	_____	_____	
7	_____	_____	_____	_____	
8	_____	_____	_____	_____	
9	_____	_____	_____	_____	
10	_____	_____	_____	_____	
		<u>0</u> = Total Cover			
Woody vine stratum	(Plot size: _____)				Hydrophytic vegetation present? <u>N</u>
1	_____	_____	_____	_____	
2	_____	_____	_____	_____	
		<u>0</u> = Total Cover			

Remarks: (Include photo numbers here or on a separate sheet)

Unvegetated open water pond

SOIL

Sampling Point: 4A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-21	10 YR 4/1						Silty clay loam	Deep sediments

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators: <input type="checkbox"/> Histisol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)	<input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input checked="" type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)	Indicators for Problematic Hydric Soils: <input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R) <input type="checkbox"/> Dark Surface (S7) (LRR K, L) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (explain in remarks)
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*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric soil present? <u>Y</u>
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Remarks:

Pond sediments

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)		Secondary Indicators (minimum of two required)	
<input checked="" type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input checked="" type="checkbox"/> Water Marks (B1) <input checked="" type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Gauge or Well Data (D9) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> FAC-Neutral Test (D5)	

Field Observations: Surface water present? Yes <u>X</u> No _____ Depth (inches): <u>>21"</u> Water table present? Yes <u>X</u> No _____ Depth (inches): _____ Saturation present? Yes <u>X</u> No _____ Depth (inches): _____ (includes capillary fringe)	Wetland hydrology present? <u>Y</u>
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Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Open water pond

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 4B
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): Lawn Local relief (concave, convex, none): None
 Slope (%): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Elliott silt loam NWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? _____

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present? <u>Y</u>	Is the sampled area within a wetland? <u>N</u> If yes, optional wetland site ID: _____
Hydric soil present? <u>N</u>	
Wetland hydrology present? <u>N</u>	

Remarks: (Explain alternative procedures here or in a separate report.)

VEGETATION -- Use scientific names of plants.

Tree Stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Dominance Test Worksheet Number of Dominant Species that are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across all Strata: <u>1</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>100.00%</u> (A/B)
1 _____					
2 _____					
3 _____					
4 _____					
5 _____					
		0	= Total Cover		
Sapling/Shrub stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Prevalence Index Worksheet Total % Cover of: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>90</u> x 3 = <u>270</u> FACU species <u>10</u> x 4 = <u>40</u> UPL species <u>0</u> x 5 = <u>0</u> Column totals <u>100</u> (A) <u>310</u> (B) Prevalence Index = B/A = <u>3.10</u>
1 _____					
2 _____					
3 _____					
4 _____					
5 _____					
		0	= Total Cover		
Herb stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	
1 <u>Poa pratensis</u>		90	Y	FAC	
2 <u>Taraxacum officinale</u>		10	N	FACU	
3 _____					
4 _____					
5 _____					
6 _____					
7 _____					
8 _____					
9 _____					
10 _____					
		100	= Total Cover		
Woody vine stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	
1 _____					
2 _____					
		0	= Total Cover		

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: 4B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-22	10 YR 4/3						Silt loam	Made land

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- Histisol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- 5 cm Mucky Peat or Peat (S3)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- Coast Prairie Redox (A16) (LRR K, L, R)
- Dark Surface (S7) (LRR K, L)
- 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- Iron-Manganese Masses (F12) (LRR K, L, R)
- Very Shallow Dark Surface (TF12)
- Other (explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric soil present? N

Remarks:

Made Land

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9)

- Aquatic Fauna (B13)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- FAC-Neutral Test (D5)

Field Observations:

Surface water present? Yes No Depth (inches): _____
 Water table present? Yes No Depth (inches): _____
 Saturation present? Yes No Depth (inches): _____
 (includes capillary fringe)

Wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 5A
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave
 Slope (%): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Water NWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? present? _____

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present? <u>N</u>	Is the sampled area within a wetland? <u>N</u> If yes, optional wetland site ID: _____
Hydric soil present? <u>Y</u>	
Wetland hydrology present? <u>Y</u>	

Remarks: (Explain alternative procedures here or in a separate report.)

Unvegetated open water pond

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Dominance Test Worksheet	
1 _____	_____	_____	_____	Number of Dominant Species that are OBL, FACW, or FAC: <u>0</u> (A)	
2 _____	_____	_____	_____	Total Number of Dominant Species Across all Strata: <u>0</u> (B)	
3 _____	_____	_____	_____	Percent of Dominant Species that are OBL, FACW, or FAC: <u>0.00%</u> (A/B)	
4 _____	_____	_____	_____		
5 _____	_____	_____	_____		
0 = Total Cover					
Sapling/Shrub stratum (Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Prevalence Index Worksheet	
1 _____	_____	_____	_____	Total % Cover of:	
2 _____	_____	_____	_____	OBL species <u>0</u> x 1 = <u>0</u>	
3 _____	_____	_____	_____	FACW species <u>0</u> x 2 = <u>0</u>	
4 _____	_____	_____	_____	FAC species <u>0</u> x 3 = <u>0</u>	
5 _____	_____	_____	_____	FACU species <u>0</u> x 4 = <u>0</u>	
6 _____	_____	_____	_____	UPL species <u>0</u> x 5 = <u>0</u>	
7 _____	_____	_____	_____	Column totals <u>0</u> (A) <u>0</u> (B)	
8 _____	_____	_____	_____	Prevalence Index = B/A = _____	
9 _____	_____	_____	_____		
10 _____	_____	_____	_____		
0 = Total Cover					
Woody vine stratum (Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic Vegetation Indicators:	
1 _____	_____	_____	_____	_____ Rapid test for hydrophytic vegetation	
2 _____	_____	_____	_____	_____ Dominance test is >50%	
				_____ Prevalence index is ≤3.0*	
				_____ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)	
				_____ Problematic hydrophytic vegetation* (explain)	
0 = Total Cover				*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic	
				Hydrophytic vegetation present? <u>N</u>	

Remarks: (Include photo numbers here or on a separate sheet)

Unvegetated open water pond

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-21	10 YR 4/1						Silty clay loam	Deep sediments

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:

- Histisol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- 5 cm Mucky Peat or Peat (S3)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)

Indicators for Problematic Hydric Soils:

- Coast Prairie Redox (A16) (LRR K, L, R)
- Dark Surface (S7) (LRR K, L)
- 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- Iron-Manganese Masses (F12) (LRR K, L, R)
- Very Shallow Dark Surface (TF12)
- Other (explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric soil present? Y

Remarks:

Pond sediments

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9)

Secondary Indicators (minimum of two required)

- Aquatic Fauna (B13)
- True Aquatic Plants (B14)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Gauge or Well Data (D9)
- Other (Explain in Remarks)
- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- FAC-Neutral Test (D5)

Field Observations:

Surface water present? Yes X No _____ Depth (inches): >21"
 Water table present? Yes X No _____ Depth (inches): _____
 Saturation present? Yes X No _____ Depth (inches): _____
 (includes capillary fringe)

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Open water pond

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 5B
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): Golf Course Local relief (concave, convex, none): None
 Slope (%): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Mundelein silt loam NWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? present? _____

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present? <u>Y</u>	Is the sampled area within a wetland? <u>N</u> If yes, optional wetland site ID: _____
Hydric soil present? <u>N</u>	
Wetland hydrology present? <u>N</u>	

Remarks: (Explain alternative procedures here or in a separate report.)
Golf Course Fairway

VEGETATION -- Use scientific names of plants.

Tree Stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Dominance Test Worksheet Number of Dominant Species that are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across all Strata: <u>1</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>100.00%</u> (A/B)
1					
2					
3					
4					
5					
		<u>0</u>	= Total Cover		
Sapling/Shrub stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Prevalence Index Worksheet Total % Cover of: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>100</u> x 3 = <u>300</u> FACU species <u>0</u> x 4 = <u>0</u> UPL species <u>0</u> x 5 = <u>0</u> Column totals <u>100</u> (A) <u>300</u> (B) Prevalence Index = B/A = <u>3.00</u>
1					
2					
3					
4					
5					
		<u>0</u>	= Total Cover		
Herb stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic Vegetation Indicators: _____ Rapid test for hydrophytic vegetation <input checked="" type="checkbox"/> Dominance test is >50% <input checked="" type="checkbox"/> Prevalence index is ≤3.0* Morphological adaptations* (provide supporting data in Remarks or on a separate sheet) Problematic hydrophytic vegetation* (explain) _____ *Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
1	<u>Poa pratensis</u>	<u>100</u>	<u>Y</u>	<u>FAC</u>	
2					
3					
4					
5					
6					
7					
8					
9					
10					
		<u>100</u>	= Total Cover		
Woody vine stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic vegetation present? <u>Y</u>
1					
2					
		<u>0</u>	= Total Cover		

Remarks: (Include photo numbers here or on a separate sheet)
Golf Course Fairway

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-22	10 YR 4/3						Silt loam	Golf Course Made Land

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input type="checkbox"/> Histisol (A1)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Dark Surface (S7) (LRR K, L)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> 2 cm Muck (A10)	<input type="checkbox"/> Other (explain in remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	
<input type="checkbox"/> Thick Dark Surface (A12)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	
<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Loamy Mucky Mineral (F1)	
<input type="checkbox"/> Loamy Gleyed Matrix (F2)	
<input type="checkbox"/> Depleted Matrix (F3)	
<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Redox Depressions (F8)	

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric soil present? <u> N </u>
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Remarks:

Golf Course Made Land

HYDROLOGY

Wetland Hydrology Indicators:	
Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Aquatic Fauna (B13)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> True Aquatic Plants (B14)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Gauge or Well Data (D9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	
<input type="checkbox"/> Water-Stained Leaves (B9)	
	<input type="checkbox"/> Surface Soil Cracks (B6)
	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Crayfish Burrows (C8)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Stunted or Stressed Plants (D1)
	<input type="checkbox"/> Geomorphic Position (D2)
	<input type="checkbox"/> FAC-Neutral Test (D5)

Field Observations: Surface water present? Yes _____ No <u> X </u> Depth (inches): _____ Water table present? Yes _____ No <u> X </u> Depth (inches): _____ Saturation present? Yes _____ No <u> X </u> Depth (inches): _____ (includes capillary fringe)	Wetland hydrology present? <u> N </u>
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Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Well drained golf course fairway

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 6A
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave
 Slope (%): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Sawmill silty clay loam NWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? present? _____

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present? <u>N</u>	Is the sampled area within a wetland? <u>N</u> If yes, optional wetland site ID: _____
Hydric soil present? <u>Y</u>	
Wetland hydrology present? <u>Y</u>	

Remarks: (Explain alternative procedures here or in a separate report.)

Unvegetated open water pond

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Dominance Test Worksheet	
1 _____	_____	_____	_____	Number of Dominant Species that are OBL, FACW, or FAC: <u>0</u> (A)	
2 _____	_____	_____	_____	Total Number of Dominant Species Across all Strata: <u>0</u> (B)	
3 _____	_____	_____	_____	Percent of Dominant Species that are OBL, FACW, or FAC: <u>0.00%</u> (A/B)	
4 _____	_____	_____	_____		
5 _____	_____	_____	_____		
<u>0</u> = Total Cover					
Sapling/Shrub stratum (Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Prevalence Index Worksheet	
1 _____	_____	_____	_____	Total % Cover of:	
2 _____	_____	_____	_____	OBL species <u>0</u> x 1 = <u>0</u>	
3 _____	_____	_____	_____	FACW species <u>0</u> x 2 = <u>0</u>	
4 _____	_____	_____	_____	FAC species <u>0</u> x 3 = <u>0</u>	
5 _____	_____	_____	_____	FACU species <u>0</u> x 4 = <u>0</u>	
<u>0</u> = Total Cover				UPL species <u>0</u> x 5 = <u>0</u>	
<u>0</u> = Total Cover				Column totals <u>0</u> (A) <u>0</u> (B)	
<u>0</u> = Total Cover				Prevalence Index = B/A = _____	
Herb stratum (Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic Vegetation Indicators:	
1 _____	_____	_____	_____	____ Rapid test for hydrophytic vegetation	
2 _____	_____	_____	_____	____ Dominance test is >50%	
3 _____	_____	_____	_____	____ Prevalence index is ≤3.0*	
4 _____	_____	_____	_____	____ Morphological adaptations* (provide supporting data in Remarks or on a separate sheet)	
5 _____	_____	_____	_____	____ Problematic hydrophytic vegetation* (explain)	
6 _____	_____	_____	_____	____	
7 _____	_____	_____	_____	____	
8 _____	_____	_____	_____	____	
9 _____	_____	_____	_____	____	
10 _____	_____	_____	_____	____	
<u>0</u> = Total Cover				*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic	
Woody vine stratum (Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic vegetation present? <u>N</u>	
1 _____	_____	_____	_____		
2 _____	_____	_____	_____		
<u>0</u> = Total Cover					

Remarks: (Include photo numbers here or on a separate sheet)

Unvegetated open water pond

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-21	10 YR 4/1						Silty clay loam	Deep sediments

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators: <input type="checkbox"/> Histisol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)	<input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input checked="" type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)	Indicators for Problematic Hydric Soils: <input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R) <input type="checkbox"/> Dark Surface (S7) (LRR K, L) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (explain in remarks)
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*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric soil present? <u>Y</u>
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Remarks:

Pond sediments

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)			Secondary Indicators (minimum of two required)		
<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Surface Soil Cracks (B6)			
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> True Aquatic Plants (B14)	<input type="checkbox"/> Drainage Patterns (B10)			
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Dry-Season Water Table (C2)			
<input checked="" type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Crayfish Burrows (C8)			
<input checked="" type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)			
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Stunted or Stressed Plants (D1)			
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Geomorphic Position (D2)			
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Gauge or Well Data (D9)	<input type="checkbox"/> FAC-Neutral Test (D5)			
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)				
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)					
<input type="checkbox"/> Water-Stained Leaves (B9)					

Field Observations: Surface water present? Yes <u>X</u> No _____ Depth (inches): <u>>21"</u> Water table present? Yes <u>X</u> No _____ Depth (inches): _____ Saturation present? Yes <u>X</u> No _____ Depth (inches): _____ (includes capillary fringe)	Wetland hydrology present? <u>Y</u>
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Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Open water pond

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 6B
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): Golf Course Local relief (concave, convex, none): None
 Slope (%): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Sawmill silty clay loam NWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? present? _____

SUMMARY OF FINDINGS (If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	<u>Y</u>	Is the sampled area within a wetland? <u>N</u> If yes, optional wetland site ID: _____
Hydric soil present?	<u>N</u>	
Wetland hydrology present?	<u>N</u>	

Remarks: (Explain alternative procedures here or in a separate report.)

Golf Course Fairway

VEGETATION -- Use scientific names of plants.

Tree Stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Dominance Test Worksheet
1	_____	_____	_____	_____	Number of Dominant Species that are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across all Strata: <u>1</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>100.00%</u> (A/B)
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
		<u>0</u>	= Total Cover		
Sapling/Shrub stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Prevalence Index Worksheet
1	_____	_____	_____	_____	Total % Cover of: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>100</u> x 3 = <u>300</u> FACU species <u>0</u> x 4 = <u>0</u> UPL species <u>0</u> x 5 = <u>0</u> Column totals <u>100</u> (A) <u>300</u> (B) Prevalence Index = B/A = <u>3.00</u>
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
		<u>0</u>	= Total Cover		
Herb stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic Vegetation Indicators:
1	<u>Poa pratensis</u>	<u>100</u>	<u>Y</u>	<u>FAC</u>	Rapid test for hydrophytic vegetation <input checked="" type="checkbox"/> Dominance test is >50% <input checked="" type="checkbox"/> Prevalence index is ≤3.0* Morphological adaptations* (provide supporting data in Remarks or on a separate sheet) Problematic hydrophytic vegetation* (explain) *Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
6	_____	_____	_____	_____	
7	_____	_____	_____	_____	
8	_____	_____	_____	_____	
9	_____	_____	_____	_____	
10	_____	_____	_____	_____	
		<u>100</u>	= Total Cover		
Woody vine stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic vegetation present?
1	_____	_____	_____	_____	<input type="checkbox"/> <u>Y</u>
2	_____	_____	_____	_____	
		<u>0</u>	= Total Cover		

Remarks: (Include photo numbers here or on a separate sheet)

Golf Course Fairway

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-22	10 YR 4/3						Silt loam	Golf Course Made Land

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils:
<input type="checkbox"/> Histisol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)	<input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)
	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R) <input type="checkbox"/> Dark Surface (S7) (LRR K, L) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (explain in remarks)

*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric soil present? <u> N </u>
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Remarks:

Golf Course Made Land

HYDROLOGY

Wetland Hydrology Indicators:	
Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Gauge or Well Data (D9) <input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> FAC-Neutral Test (D5)

Field Observations: Surface water present? Yes _____ No <u> X </u> Depth (inches): _____ Water table present? Yes _____ No <u> X </u> Depth (inches): _____ Saturation present? Yes _____ No <u> X </u> Depth (inches): _____ (includes capillary fringe)	Wetland hydrology present? <u> N </u>
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Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Well drained golf course fairway

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 7A
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): _____ Depression _____ Local relief (concave, convex, none): _____ Concave _____
 Slope (%): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Water NWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? _____ Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? _____ present? _____

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	<u>N</u>	Is the sampled area within a wetland? <u>N</u> If yes, optional wetland site ID: _____
Hydric soil present?	<u>Y</u>	
Wetland hydrology present?	<u>Y</u>	

Remarks: (Explain alternative procedures here or in a separate report.)

Unvegetated open water pond

VEGETATION -- Use scientific names of plants.

Tree Stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Dominance Test Worksheet
1	_____	_____	_____	_____	Number of Dominant Species that are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across all Strata: <u>0</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>0.00%</u> (A/B)
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
		<u>0</u> = Total Cover			
Sapling/Shrub stratum	(Plot size: _____)				Prevalence Index Worksheet Total % Cover of: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>0</u> x 3 = <u>0</u> FACU species <u>0</u> x 4 = <u>0</u> UPL species <u>0</u> x 5 = <u>0</u> Column totals <u>0</u> (A) <u>0</u> (B) Prevalence Index = B/A = _____
1	_____	_____	_____	_____	
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
		<u>0</u> = Total Cover			
Herb stratum	(Plot size: _____)				Hydrophytic Vegetation Indicators: _____ Rapid test for hydrophytic vegetation _____ Dominance test is >50% _____ Prevalence index is ≤3.0* Morphological adaptations* (provide supporting data in Remarks or on a separate sheet) _____ Problematic hydrophytic vegetation* (explain) *Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
1	_____	_____	_____	_____	
2	_____	_____	_____	_____	
3	_____	_____	_____	_____	
4	_____	_____	_____	_____	
5	_____	_____	_____	_____	
6	_____	_____	_____	_____	
7	_____	_____	_____	_____	
8	_____	_____	_____	_____	
9	_____	_____	_____	_____	
10	_____	_____	_____	_____	
		<u>0</u> = Total Cover			
Woody vine stratum	(Plot size: _____)				Hydrophytic vegetation present? <u>N</u>
1	_____	_____	_____	_____	
2	_____	_____	_____	_____	
		<u>0</u> = Total Cover			

Remarks: (Include photo numbers here or on a separate sheet)

Unvegetated open water pond

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-21	10 YR 4/1						Silty clay loam	Deep sediments

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

<p>Hydric Soil Indicators:</p> <p><input type="checkbox"/> Histisol (A1)</p> <p><input type="checkbox"/> Histic Epipedon (A2)</p> <p><input type="checkbox"/> Black Histic (A3)</p> <p><input type="checkbox"/> Hydrogen Sulfide (A4)</p> <p><input type="checkbox"/> Stratified Layers (A5)</p> <p><input type="checkbox"/> 2 cm Muck (A10)</p> <p><input type="checkbox"/> Depleted Below Dark Surface (A11)</p> <p><input type="checkbox"/> Thick Dark Surface (A12)</p> <p><input type="checkbox"/> Sandy Mucky Mineral (S1)</p> <p><input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)</p>	<p><input type="checkbox"/> Sandy Gleyed Matrix (S4)</p> <p><input type="checkbox"/> Sandy Redox (S5)</p> <p><input type="checkbox"/> Stripped Matrix (S6)</p> <p><input type="checkbox"/> Loamy Mucky Mineral (F1)</p> <p><input type="checkbox"/> Loamy Gleyed Matrix (F2)</p> <p><input type="checkbox"/> Depleted Matrix (F3)</p> <p><input checked="" type="checkbox"/> Redox Dark Surface (F6)</p> <p><input type="checkbox"/> Depleted Dark Surface (F7)</p> <p><input type="checkbox"/> Redox Depressions (F8)</p>	<p>Indicators for Problematic Hydric Soils:</p> <p><input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R)</p> <p><input type="checkbox"/> Dark Surface (S7) (LRR K, L)</p> <p><input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)</p> <p><input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R)</p> <p><input type="checkbox"/> Very Shallow Dark Surface (TF12)</p> <p><input type="checkbox"/> Other (explain in remarks)</p> <p>*Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic</p>
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<p>Restrictive Layer (if observed):</p> <p>Type: _____</p> <p>Depth (inches): _____</p>	<p>Hydric soil present? <u>Y</u></p>
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Remarks:

Pond sediments

HYDROLOGY

<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators (minimum of one is required; check all that apply)</p> <p><input checked="" type="checkbox"/> Surface Water (A1)</p> <p><input type="checkbox"/> High Water Table (A2)</p> <p><input checked="" type="checkbox"/> Saturation (A3)</p> <p><input checked="" type="checkbox"/> Water Marks (B1)</p> <p><input checked="" type="checkbox"/> Sediment Deposits (B2)</p> <p><input type="checkbox"/> Drift Deposits (B3)</p> <p><input type="checkbox"/> Algal Mat or Crust (B4)</p> <p><input type="checkbox"/> Iron Deposits (B5)</p> <p><input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)</p> <p><input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)</p> <p><input type="checkbox"/> Water-Stained Leaves (B9)</p>			<p>Secondary Indicators (minimum of two required)</p> <p><input type="checkbox"/> Aquatic Fauna (B13)</p> <p><input type="checkbox"/> True Aquatic Plants (B14)</p> <p><input type="checkbox"/> Hydrogen Sulfide Odor (C1)</p> <p><input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)</p> <p><input type="checkbox"/> Presence of Reduced Iron (C4)</p> <p><input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)</p> <p><input type="checkbox"/> Thin Muck Surface (C7)</p> <p><input type="checkbox"/> Gauge or Well Data (D9)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>			<p><input type="checkbox"/> Surface Soil Cracks (B6)</p> <p><input type="checkbox"/> Drainage Patterns (B10)</p> <p><input type="checkbox"/> Dry-Season Water Table (C2)</p> <p><input type="checkbox"/> Crayfish Burrows (C8)</p> <p><input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)</p> <p><input type="checkbox"/> Stunted or Stressed Plants (D1)</p> <p><input type="checkbox"/> Geomorphic Position (D2)</p> <p><input type="checkbox"/> FAC-Neutral Test (D5)</p>		
--	--	--	--	--	--	---	--	--

<p>Field Observations:</p> <p>Surface water present? Yes <u>X</u> No _____ Depth (inches): <u>>21"</u></p> <p>Water table present? Yes <u>X</u> No _____ Depth (inches): _____</p> <p>Saturation present? Yes <u>X</u> No _____ Depth (inches): _____ (includes capillary fringe)</p>	<p>Wetland hydrology present? <u>Y</u></p>
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Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Open water pond

WETLAND DETERMINATION DATA FORM - Midwest Region

Project/Site Lake-Cook Road City/County: Buffalo Grove Sampling Date: 3/26/14
 Applicant/Owner: Village of Buffalo Grove State: IL Sampling Point: 7B
 Investigator(s): Thomas McArdle Section, Township, Range: Sec. 32 & 5, T42 & 43N, R11E
 Landform (hillslope, terrace, etc.): Golf Course Local relief (concave, convex, none): None
 Slope (%): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name Pella silty clay loam NWI Classification: _____

Are climatic/hydrologic conditions of the site typical for this time of the year? _____ (If no, explain in remarks)
 Are vegetation _____, soil _____, or hydrology _____ significantly disturbed? Are "normal circumstances" present? _____
 Are vegetation _____, soil _____, or hydrology _____ naturally problematic? present? _____

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present? <u>Y</u>	Is the sampled area within a wetland? <u>N</u> If yes, optional wetland site ID: _____
Hydric soil present? <u>N</u>	
Wetland hydrology present? <u>N</u>	

Remarks: (Explain alternative procedures here or in a separate report.)

Golf Course Fairway

VEGETATION -- Use scientific names of plants.

Tree Stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Dominance Test Worksheet
1 _____					Number of Dominant Species that are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across all Strata: <u>1</u> (B) Percent of Dominant Species that are OBL, FACW, or FAC: <u>100.00%</u> (A/B)
2 _____					
3 _____					
4 _____					
5 _____					
		<u>0</u> = Total Cover			
Sapling/Shrub stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Prevalence Index Worksheet
1 _____					Total % Cover of: OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>100</u> x 3 = <u>300</u> FACU species <u>0</u> x 4 = <u>0</u> UPL species <u>0</u> x 5 = <u>0</u> Column totals <u>100</u> (A) <u>300</u> (B) Prevalence Index = B/A = <u>3.00</u>
2 _____					
3 _____					
4 _____					
5 _____					
		<u>0</u> = Total Cover			
Herb stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic Vegetation Indicators:
1 <u>Poa pratensis</u>		<u>100</u>	<u>Y</u>	<u>FAC</u>	Rapid test for hydrophytic vegetation <input checked="" type="checkbox"/> Dominance test is >50% <input checked="" type="checkbox"/> Prevalence index is ≤3.0* Morphological adaptations* (provide supporting data in Remarks or on a separate sheet) Problematic hydrophytic vegetation* (explain) *Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic
2 _____					
3 _____					
4 _____					
5 _____					
6 _____					
7 _____					
8 _____					
9 _____					
10 _____					
		<u>100</u> = Total Cover			
Woody vine stratum	(Plot size: _____)	Absolute % Cover	Dominant Species	Indicator Status	Hydrophytic vegetation present?
1 _____					<u>Y</u>
2 _____					
		<u>0</u> = Total Cover			

Remarks: (Include photo numbers here or on a separate sheet)

Golf Course Fairway

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (Inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type*	Loc**		
0-22	10 YR 4/3						Silt loam	Golf Course Made Land

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Matrix

Hydric Soil Indicators: <input type="checkbox"/> Histisol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)	<input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)	Indicators for Problematic Hydric Soils: <input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R) <input type="checkbox"/> Dark Surface (S7) (LRR K, L) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (explain in remarks)
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Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric soil present? <u> N </u>
---	-----------------------------------

Remarks:
Golf Course Made Land

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)			Secondary Indicators (minimum of two required)		
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Aquatic Fauna (B13)	<input type="checkbox"/> Surface Soil Cracks (B6)			
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> True Aquatic Plants (B14)	<input type="checkbox"/> Drainage Patterns (B10)			
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Dry-Season Water Table (C2)			
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)	<input type="checkbox"/> Crayfish Burrows (C8)			
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)			
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Stunted or Stressed Plants (D1)			
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Geomorphic Position (D2)			
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Gauge or Well Data (D9)	<input type="checkbox"/> FAC-Neutral Test (D5)			
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)				
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)					
<input type="checkbox"/> Water-Stained Leaves (B9)					

Field Observations: Surface water present? Yes _____ No <u> X </u> Depth (inches): _____ Water table present? Yes _____ No <u> X </u> Depth (inches): _____ Saturation present? Yes _____ No <u> X </u> Depth (inches): _____ (includes capillary fringe)	Wetland hydrology present? <u> N </u>
--	---

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Well drained golf course fairway

Appendix 3
Floodplain and Floodway Calculations for Alternative 1A

Existing Conditions - Farrington Ditch
FLOODPLAIN FILL VOLUME (NWL TO 10-YR)

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets[FP Fill Volume by XS - CU-FT 073014.xls]NWL to 10-yr
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
0.20	37.29				166,399.20	3.82
0.33	269.62	153.46	675.00	103,582.13	269,981.33	6.20
0.35	220.05	244.84	100.00	24,483.50	294,464.83	6.76
D/S Face Checker Rd	220.05	220.05	140.00	30,807.00	325,271.83	7.47

FILL VOLUME = 7.47 ac-ft

Existing Conditions - Farrington Ditch
FLOODPLAIN FILL VOLUME (10- TO 100-YR)

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\FP Fill Volume by XS - CU-FT 073014.xls\10- to 100-yr
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
0.20	990.31				1,036,292.40	23.79
0.33	2,484.78	1,737.55	675.00	1,172,842.88	2,209,135.28	50.71
0.35	841.17	1,662.98	100.00	166,297.50	2,375,432.78	54.53
D/S Face Checker Rd	841.17	841.17	140.00	117,763.80	2,493,196.58	57.24

FILL VOLUME = 57.24 ac-ft

Existing Conditions - Farrington Ditch
FLOODPLAIN FILL VOLUME (NWL TO 100-YR)

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\[FP Fill Volume by XS - CU-FT 073014.xls]NWL to 100-yr
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
0.20	1,027.60	1,891.00	675.00	1,276,425.00	1,202,691.60	22.61
0.33	2,754.40	1,907.81	100.00	190,781.00	2,479,116.60	56.91
0.35	1,061.22	1,061.22	140.00	148,570.80	2,669,897.60	61.29
D/S Face Checker Rd	1,061.22				2,818,468.40	64.70

FILL VOLUME = 64.70 ac-ft

EX-FP
FARRINGTON

HEC-RAS Plan: EX - FW Analysis River: Farrington Ditch Reach: Main Stem

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main Stem	0.20	100-yr	220.00	670.24	679.46		679.47	0.000026	0.34	1027.60	520.00	0.03
Main Stem	0.20	10-yr	105.00	670.24	676.23		676.36	0.007807	2.97	37.29	29.46	0.40
Main Stem	0.33	100-yr	210.00	674.24	679.47		679.47	0.000001	0.10	2754.40	1028.35	0.01
Main Stem	0.33	10-yr	100.00	674.24	676.61		676.61	0.000106	0.72	269.62	492.89	0.10
Main Stem	0.35	100-yr	210.00	670.04	679.47		679.47	0.000003	0.30	1061.22	515.82	0.02
Main Stem	0.35	10-yr	100.00	670.04	676.61		676.61	0.000015	0.50	220.05	74.02	0.04
Main Stem	0.39		Culvert									
Main Stem	0.47	100-yr	200.00	671.94	679.52	674.74	679.53	0.000028	0.45	952.93	800.00	0.03
Main Stem	0.47	10-yr	95.00	671.94	676.81	673.87	676.85	0.000671	1.46	65.21	22.61	0.15
Main Stem	.5675*	100-yr	165.00	673.09	679.55		679.55	0.000108	0.79	450.94	556.14	0.06
Main Stem	.5675*	10-yr	80.00	673.09	677.23		677.27	0.000952	1.60	50.03	19.59	0.18
Main Stem	.665*	100-yr	165.00	674.24	679.64		679.66	0.000403	1.34	197.72	259.92	0.12
Main Stem	.665*	10-yr	80.00	674.24	677.88		677.94	0.001624	1.96	40.80	17.40	0.23
Main Stem	.7625*	100-yr	165.00	675.39	679.91		679.94	0.000660	1.54	166.03	153.40	0.15
Main Stem	.7625*	10-yr	80.00	675.39	678.81		678.88	0.001894	2.13	41.63	52.57	0.24
Main Stem	0.86	100-yr	165.00	676.54	680.31		680.33	0.000803	1.53	164.41	157.59	0.15
Main Stem	0.86	10-yr	80.00	676.54	679.67		679.70	0.001220	1.67	75.82	121.23	0.19
Main Stem	0.94		Culvert									
Main Stem	0.99	100-yr	160.00	676.54	681.56	677.89	681.56	0.000004	0.12	1536.87	824.76	0.01
Main Stem	0.99	10-yr	78.00	676.54	680.30	677.66	680.30	0.000006	0.11	727.70	515.81	0.01

**Existing Conditions - Buffalo Creek
FLOODPLAIN FILL VOLUME (NWL TO 10-YR)**

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\FP Fill Volume by XS - CU-FT 073014.xls\BC - EX NWL-10
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
28633.00	0.00	0.00	58.75	0.00	26,571.60	0.61
28697.00	0.00	2.76	127.48	351.21	26,571.60	0.61
28824.00	5.51	24.27	392.81	9,531.53	26,922.81	0.62
29217.00	43.02	24.94	289.39	7,217.39	36,454.34	0.84
29506.00	6.86	3.43	17.61	60.40	43,671.73	1.00
29524.00	0.00	4.91	125.21	614.78	43,732.13	1.00
29649.00	9.82	36.26	74.68	2,707.90	44,346.91	1.02
29724.00	31.27	22.15	76.54	1,695.36	26,922.81	0.62
29800.00	13.03	23.45	5.00	117.25	28,618.17	0.66
29823.00	33.87	45.18	32.90	1,486.26	28,735.42	0.66
29855.00	56.48	52.38	34.90	1,828.06	30,221.68	0.69
30067.00	48.28	84.00	36.90	3,099.60	32,049.74	0.74
30398.00	119.72	96.53	38.90	3,755.02	35,149.34	0.81
30420.00	73.34	50.18	40.90	2,052.36	38,904.35	0.89
30618.00	27.02	44.86	42.90	1,924.49	40,956.72	0.94
30798.00	62.70	61.71	44.90	2,770.55	42,881.21	0.98
30787.00	60.71	77.20	46.90	3,620.68	45,651.77	1.05
30943.00	93.69	68.44	48.90	3,346.47	49,272.45	1.13
31096.00	43.18				52,618.92	1.21

WEST

FILL VOLUME = ac-ft EAST

**Existing Conditions - Buffalo Creek
FLOODPLAIN FILL VOLUME (10-YR TO 100-YR)**

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\FP Fill Volume by XS - CU-FT 073014.xls\BC EX - 10- to 100-yr
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
28633.00	8.10	4.44	58.75	260.85	9,147.60	0.21
28697.00	0.78	6.45	127.48	822.25	9,408.45	0.22
28824.00	12.12	131.04	392.81	51,471.86	10,230.70	0.23
29217.00	249.95	196.18	289.39	56,771.08	61,702.55	1.42
29506.00	142.40	122.50	17.61	2,157.23	118,473.64	2.72
29524.00	102.60	129.61	125.21	16,227.84	120,630.86	2.77
29649.00	156.61	107.91	74.68	8,058.35	136,858.70	3.14
29724.00	59.20	63.99	76.54	4,897.79	144,917.05	3.33
29800.00	68.78	55.61	5.00	278.05	149,814.84	3.44
29823.00	42.44	49.13	32.90	1,616.21	150,092.89	3.45
29855.00	55.81	49.00	34.90	1,710.10	151,709.11	3.48
30067.00	42.19	63.71	36.90	2,350.90	153,419.21	3.52
30398.00	85.23	70.73	38.90	2,751.20	155,770.11	3.58
30420.00	56.22	101.06	40.90	4,133.15	158,521.31	3.64
30618.00	145.89	109.56	42.90	4,699.91	162,654.46	3.73
30798.00	73.22	70.99	44.90	3,187.23	167,354.37	3.84
30787.00	68.75	75.37	46.90	3,534.62	170,541.59	3.92
30943.00	81.98	55.25	48.90	2,701.73	174,076.21	4.00
31096.00	28.52				176,777.94	4.06

FILL VOLUME = 4.06 ac-ft

**Existing Conditions - Buffalo Creek
FLOODPLAIN FILL VOLUME (NWL TO 100-YR)**

JOB NO.: 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\[FP Fill Volume by XS - CU-FT 073014.xls]BC - EX NW to 100-yr
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
28633.00	8.10	4.44	58.75	260.85	35,719.20	0.32
28697.00	0.78	9.21	127.48	1,173.45	35,980.05	0.83
28824.00	17.63	155.30	392.81	61,003.39	37,153.50	0.85
29217.00	292.97	221.12	289.39	63,988.47	98,156.90	2.25
29506.00	149.26	125.93	17.61	2,217.63	162,145.37	3.72
29524.00	102.60	134.52	125.21	16,842.62	164,362.99	3.77
29649.00	166.43	128.45	74.68	9,592.65	181,205.62	4.16
29724.00	90.47	86.14	76.54	6,593.16	190,798.26	4.38
29800.00	81.81	79.06	5.00	395.30	197,391.42	4.53
29823.00	76.31	94.30	32.90	3,102.47	197,786.72	4.54
29855.00	112.29	101.38	34.90	3,538.16	200,889.19	4.61
30067.00	90.47	147.71	36.90	5,450.50	204,427.35	4.69
30398.00	204.95	167.26	38.90	6,506.22	209,877.85	4.82
30420.00	129.56	151.24	40.90	6,185.51	216,384.07	4.97
30618.00	172.91	154.42	42.90	6,624.40	222,569.58	5.11
30798.00	135.92	132.69	44.90	5,957.78	229,193.98	5.26
30787.00	129.46	152.57	46.90	7,155.30	235,151.76	5.40
30943.00	175.67	123.69	48.90	6,048.20	242,307.06	5.56
31096.00	71.70				248,355.26	5.70

FILL VOLUME = 5.70 ac-ft

Existing Conditions - Farrington Ditch
FLOODWAY FILL VOLUME (NWL TO 100-YR)

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\FW Fill Volume by XS - CU-FT 082614.xls\NWL to 100-yr - Fill Volume
DATE: 26-Aug-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
0.20	686.00				987,505.20	
		1,331.50	675.00	898,762.50		
0.33	1,977.00				1,886,267.70	43.30
		1,307.00	100.00	130,700.00		
0.35	637.00				2,016,967.70	46.30
		637.00	140.00	89,180.00		
D/S Face Checker Rd	637.00				2,106,147.70	48.35

FILL VOLUME = 48.35 ac-ft

EX - FW
FARRINGTON

HEC-RAS Plan: EX - FW Analysis River: Farrington Ditch Reach: Main Stem Profile: FLW

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main Stem	0.20	FLW	220.00	670.24	679.56		679.56	0.000040	0.42	686.41	212.00	0.03
Main Stem	0.33	FLW	210.00	674.24	679.56		679.56	0.000001	0.12	1976.97	609.00	0.01
Main Stem	0.35	FLW	210.00	670.04	679.56		679.56	0.000005	0.40	636.77	152.00	0.03
Main Stem	0.39		Culvert									
Main Stem	0.47	FLW	200.00	671.94	679.61	674.74	679.61	0.000050	0.61	487.33	203.00	0.05
Main Stem	.5675*	FLW	165.00	673.09	679.64		679.65	0.000127	0.87	291.57	177.25	0.07
Main Stem	.665*	FLW	165.00	674.24	679.75		679.77	0.000396	1.34	169.23	138.12	0.12
Main Stem	.7625*	FLW	165.00	675.39	680.01		680.04	0.000621	1.52	146.97	95.61	0.14
Main Stem	0.86	FLW	165.00	676.54	680.39		680.41	0.000788	1.54	142.07	98.08	0.15
Main Stem	0.94		Culvert									
Main Stem	0.99	FLW	160.00	676.54	681.73	677.94	681.73	0.000004	0.11	1547.36	802.48	0.01

Proposed Conditions - Farrington Ditch
Alternative 1
FLOODWAY CUT VOLUME (NWL TO 100-YR)

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\FW Fill Volume by XS - CU-FT 082614.xls\NWL to 100-yr - Alt 1 Cut Vol
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
0.02	815.35	820.11	160	131217.60	15246.00	0.350
0.05	824.87	564.21	165	93094.65	146463.60	3.362
0.08	303.55	303.55	10	3035.50	239558.25	5.500
0.085	303.55	306.07	94	28770.58	242593.75	5.569
0.095	308.59	308.59	26	8023.34	271364.33	6.230
0.10	308.59	597.20	235	140342.00	279387.67	6.414
0.15	885.81	871.75	195	169991.25	419729.67	9.636
0.19	857.69	801.635	825	661348.88	589720.92	13.538
0.34	745.58	694.565	800	555652.00	1251069.80	28.721
0.49	643.55	772.635	395	305190.83	1806721.80	41.477
0.57*	901.72				2111912.62	48.483

* Downstream Face of Checker Road

CUT VOLUME = 48.48 ac-ft

PRO
ALT 1

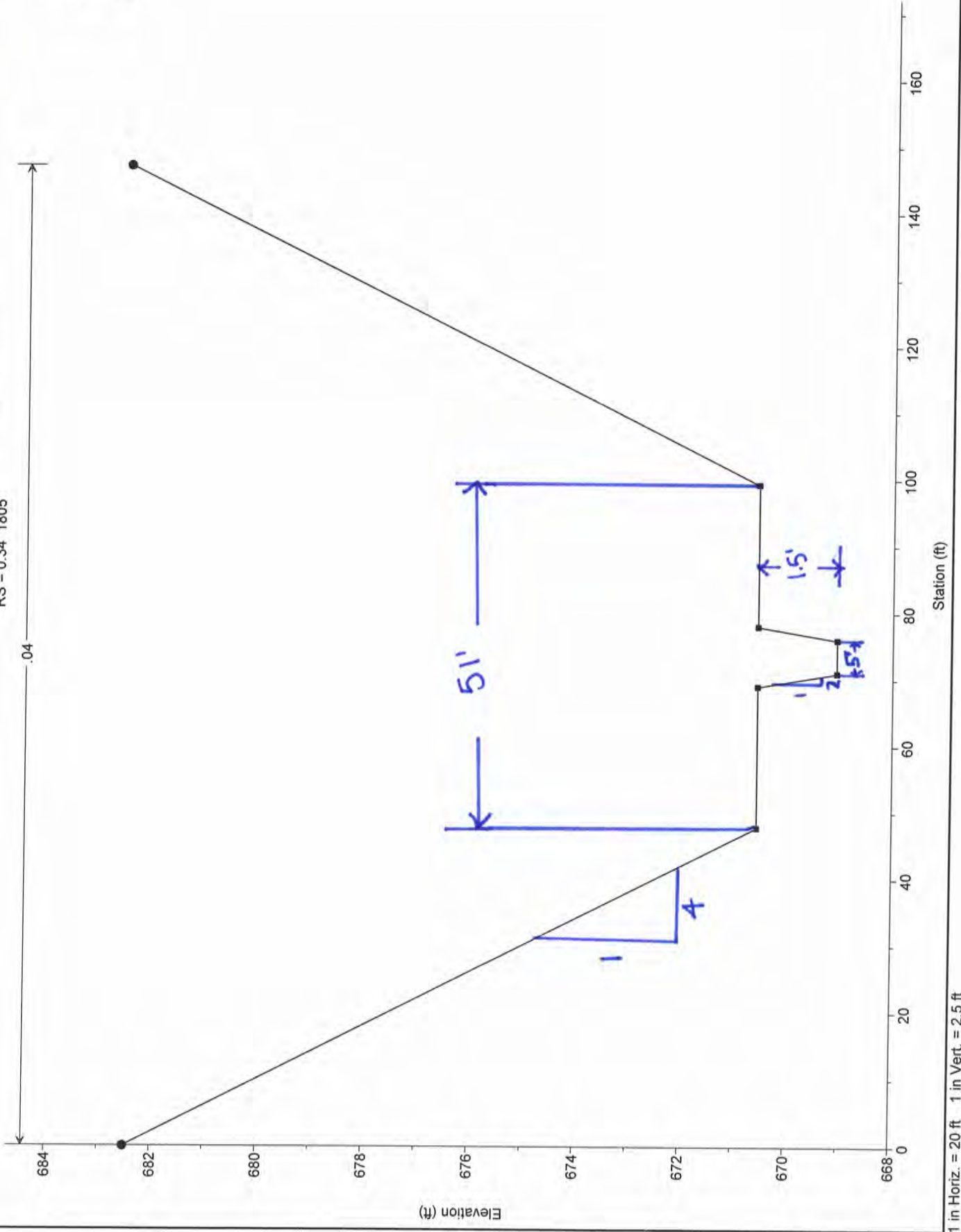
HEC-RAS Plan: E Align - FW Sto River: Farrington Ditch Reach: Main Stem Profile: 100 FW

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main Stem	0.02	100 FW	220.00	667.18	678.75	669.33	678.75	0.000004	0.27	815.35	101.06	0.02
Main Stem	0.05	100 FW	220.00	667.35	678.75		678.75	0.000004	0.27	824.87	121.71	0.02
Main Stem	0.08	100 FW	220.00	667.53	678.75	669.82	678.76	0.000018	0.72	303.55	120.25	0.04
Main Stem	0.09		Culvert									
Main Stem	0.10	100 FW	220.00	667.68	679.12	670.02	679.12	0.000017	0.71	308.59	130.99	0.04
Main Stem	0.15	100 FW	220.00	667.93	679.13		679.13	0.000004	0.25	885.81	129.06	0.02
Main Stem	0.19	100 FW	220.00	668.15	679.13		679.13	0.000004	0.26	857.69	127.31	0.02
Main Stem	0.34	100 FW	210.00	669.06	679.13		679.13	0.000005	0.28	745.58	120.06	0.02
Main Stem	0.49	100 FW	200.00	669.94	679.13		679.14	0.000007	0.31	643.55	113.05	0.02
Main Stem	0.57	100 FW	165.00	670.04	679.14		679.14	0.000002	0.27	901.72	431.88	0.02
Main Stem	0.61		Culvert									
Main Stem	0.69	100 FW	165.00	671.94	679.38	674.49	679.38	0.000027	0.44	837.64	800.00	0.03
Main Stem	1.10	100 FW	160.00	676.54	679.46	678.89	679.72	0.010033	4.54	51.52	100.54	0.53
Main Stem	1.18		Culvert									
Main Stem	1.23	100 FW	160.00	676.54	681.48	677.89	681.48	0.000005	0.12	1478.94	789.58	0.01

EAST

Combined Model Plan: E alignment for fw storage 8/26/2014
RS = 0.34 1805

Legend	
—	Ground
•	Bank Sta



1 in Horiz. = 20 ft 1 in Vert. = 2.5 ft

Appendix 4
Floodplain and Floodway Calculations for Alternative 2A

Existing Conditions - Farrington Ditch
FLOODPLAIN FILL VOLUME (NWL TO 10-YR)

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets[FP Fill Volume by XS - CU-FT 073014.xls]NWL to 10-yr
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
0.20	37.29	153.46	675.00	103,582.13	166,399.20	3.82
0.33	269.62	244.84	100.00	24,483.50	269,981.33	6.20
0.35	220.05	220.05	140.00	30,807.00	294,464.83	6.76
D/S Face Checker Rd	220.05				325,271.83	7.47

FILL VOLUME = 7.47 ac-ft

Existing Conditions - Farrington Ditch
FLOODPLAIN FILL VOLUME (10- TO 100-YR)

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\[FP Fill Volume by XS - CU-FT.073014.xls]10- to 100-yr.
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
0.20	990.31	1,737.55	675.00	1,172,842.88	1,036,292.40	23.79
0.33	2,484.78	1,662.98	100.00	166,297.50	2,209,135.28	50.71
0.35	841.17	841.17	140.00	117,763.80	2,375,432.78	54.53
D/S Face Checker Rd	841.17				2,493,196.58	57.24

FILL VOLUME = 57.24 ac-ft

Existing Conditions - Farrington Ditch
FLOODPLAIN FILL VOLUME (NWL TO 100-YR)

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\[FP Fill Volume by XS - CU-FT 073014.xls]NWL to 100-yr
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
0.20	1,027.60	1,891.00	675.00	1,276,425.00	1,202,691.60	27.81
0.33	2,754.40	1,907.81	100.00	190,781.00	2,479,116.60	56.91
0.35	1,061.22	1,061.22	140.00	148,570.80	2,669,897.60	61.29
D/S Face Checker Rd	1,061.22				2,818,468.40	64.70

FILL VOLUME = 64.70 ac-ft

EX-FP
FARRINGTON

HEC-RAS Plan: EX - FW Analysis River: Farrington Ditch Reach: Main Stem

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main Stem	0.20	100-yr	220.00	670.24	679.46		679.47	0.000026	0.34	1027.60	520.00	0.03
Main Stem	0.20	10-yr	105.00	670.24	676.23		676.36	0.007807	2.97	37.29	29.46	0.40
Main Stem	0.33	100-yr	210.00	674.24	679.47		679.47	0.000001	0.10	2754.40	1028.35	0.01
Main Stem	0.33	10-yr	100.00	674.24	676.61		676.61	0.000106	0.72	269.62	492.89	0.10
Main Stem	0.35	100-yr	210.00	670.04	679.47		679.47	0.000003	0.30	1061.22	515.82	0.02
Main Stem	0.35	10-yr	100.00	670.04	676.61		676.61	0.000015	0.50	220.05	74.02	0.04
Main Stem	0.39		Culvert									
Main Stem	0.47	100-yr	200.00	671.94	679.52	674.74	679.53	0.000028	0.45	952.93	800.00	0.03
Main Stem	0.47	10-yr	95.00	671.94	676.81	673.87	676.85	0.000671	1.46	65.21	22.61	0.15
Main Stem	.5675*	100-yr	165.00	673.09	679.55		679.55	0.000108	0.79	450.94	556.14	0.06
Main Stem	.5675*	10-yr	80.00	673.09	677.23		677.27	0.000952	1.60	50.03	19.59	0.18
Main Stem	.665*	100-yr	165.00	674.24	679.64		679.66	0.000403	1.34	197.72	259.92	0.12
Main Stem	.665*	10-yr	80.00	674.24	677.88		677.94	0.001624	1.96	40.80	17.40	0.23
Main Stem	.7625*	100-yr	165.00	675.39	679.91		679.94	0.000660	1.54	166.03	153.40	0.15
Main Stem	.7625*	10-yr	80.00	675.39	678.81		678.88	0.001894	2.13	41.63	52.57	0.24
Main Stem	0.86	100-yr	165.00	676.54	680.31		680.33	0.000803	1.53	164.41	157.59	0.15
Main Stem	0.86	10-yr	80.00	676.54	679.67		679.70	0.001220	1.67	75.82	121.23	0.19
Main Stem	0.94		Culvert									
Main Stem	0.99	100-yr	160.00	676.54	681.56	677.89	681.56	0.000004	0.12	1536.87	824.76	0.01
Main Stem	0.99	10-yr	78.00	676.54	680.30	677.66	680.30	0.000006	0.11	727.70	515.81	0.01

**Existing Conditions - Buffalo Creek
FLOODPLAIN FILL VOLUME (NWL TO 10-YR)**

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\FP Fill Volume by XS - CU-FT 073014.xls\BC - EX NWL-10
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
28633.00	0.00	0.00	58.75	0.00	26,571.60	0.61
28697.00	0.00	2.76	127.48	351.21	26,571.60	0.61
28824.00	5.51	24.27	392.81	9,531.53	26,922.81	0.62
29217.00	43.02	24.94	289.39	7,217.39	36,454.34	0.84
29506.00	6.86	3.43	17.61	60.40	43,671.73	1.00
29524.00	0.00	4.91	125.21	614.78	43,732.13	1.00
29649.00	9.82	36.26	74.68	2,707.90	44,346.91	1.02
29724.00	31.27	22.15	76.54	1,695.36	26,922.81	0.62
29800.00	13.03	23.45	5.00	117.25	28,618.17	0.66
29823.00	33.87	45.18	32.90	1,486.26	28,735.42	0.66
29855.00	56.48	52.38	34.90	1,828.06	30,221.68	0.69
30067.00	48.28	84.00	36.90	3,099.60	32,049.74	0.74
30398.00	119.72	96.53	38.90	3,755.02	35,149.34	0.81
30420.00	73.34	50.18	40.90	2,052.36	38,904.35	0.89
30618.00	27.02	44.86	42.90	1,924.49	40,956.72	0.94
30798.00	62.70	61.71	44.90	2,770.55	42,881.21	0.96
30787.00	60.71	77.20	46.90	3,620.68	45,651.77	1.05
30943.00	93.69	68.44	48.90	3,346.47	49,272.45	1.13
31096.00	43.18				52,618.92	1.21

WEST

FILL VOLUME = 1.21 ac-ft EAST

**Existing Conditions - Buffalo Creek
FLOODPLAIN FILL VOLUME (10-YR TO 100-YR)**

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\[FP Fill Volume by XS - CU-FT 073014.xls]BC EX - 10- to 100-yr
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
28633.00	8.10	4.44	58.75	260.85	9,147.60	0.21
28697.00	0.78	6.45	127.48	822.25	9,408.45	0.22
28824.00	12.12	131.04	392.81	51,471.86	10,230.70	0.23
29217.00	249.95	196.18	289.39	56,771.08	61,702.55	1.42
29506.00	142.40	122.50	17.61	2,157.23	118,473.64	2.72
29524.00	102.60	129.61	125.21	16,227.84	120,630.86	2.77
29649.00	156.61	107.91	74.68	8,058.35	136,858.70	3.14
29724.00	59.20	63.99	76.54	4,897.79	144,917.05	3.33
29800.00	68.78	55.61	5.00	278.05	149,814.84	3.44
29823.00	42.44	49.13	32.90	1,616.21	150,092.89	3.45
29855.00	55.81	49.00	34.90	1,710.10	151,709.11	3.48
30067.00	42.19	63.71	36.90	2,350.90	153,419.21	3.52
30398.00	85.23	70.73	38.90	2,751.20	155,770.11	3.58
30420.00	56.22	101.06	40.90	4,133.15	158,521.31	3.64
30618.00	145.89	109.56	42.90	4,699.91	162,654.46	3.73
30798.00	73.22	70.99	44.90	3,187.23	167,354.37	3.84
30787.00	68.75	75.37	46.90	3,534.62	170,541.59	3.92
30943.00	81.98	55.25	48.90	2,701.73	174,076.21	4.00
31096.00	28.52				176,777.94	4.06

FILL VOLUME = 4.06 ac-ft

**Existing Conditions - Buffalo Creek
FLOODPLAIN FILL VOLUME (NWL TO 100-YR)**

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\FP Fill Volume by XS - CU-FT 073014.xls]BC - EX NW to 100-yr
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
28633.00	8.10	4.44	58.75	260.85	35,719.20	0.32
28697.00	0.78	9.21	127.48	1,173.45	35,980.05	0.83
28824.00	17.63	155.30	392.81	61,003.39	37,153.50	0.85
29217.00	292.97	221.12	289.39	63,988.47	98,156.90	2.25
29506.00	149.26	125.93	17.61	2,217.63	162,145.37	3.72
29524.00	102.60	134.52	125.21	16,842.62	164,362.99	3.77
29649.00	166.43	128.45	74.68	9,592.65	181,205.62	4.16
29724.00	90.47	86.14	76.54	6,593.16	190,798.26	4.38
29800.00	81.81	79.06	5.00	395.30	197,391.42	4.53
29823.00	76.31	94.30	32.90	3,102.47	197,786.72	4.54
29855.00	112.29	101.38	34.90	3,538.16	200,889.19	4.61
30067.00	90.47	147.71	36.90	5,450.50	204,427.35	4.69
30398.00	204.95	167.26	38.90	6,506.22	209,877.85	4.82
30420.00	129.56	151.24	40.90	6,185.51	216,384.07	4.97
30618.00	172.91	154.42	42.90	6,624.40	222,569.58	5.11
30798.00	135.92	132.69	44.90	5,957.78	229,193.98	5.26
30787.00	129.46	152.57	46.90	7,155.30	235,151.76	5.40
30943.00	175.67	123.69	48.90	6,048.20	242,307.06	5.56
31096.00	71.70				248,355.26	5.70

FILL VOLUME = 5.70 ac-ft

Existing Conditions - Farrington Ditch
FLOODWAY FILL VOLUME (NWL TO 100-YR)

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\FW Fill Volume by XS - CU-FT 082614.xls\NWL to 100-yr - Fill Volume
DATE: 26-Aug-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
0.20	686.00	1,331.50	675.00	898,762.50	987,505.20	22.67
0.33	1,977.00	1,307.00	100.00	130,700.00	1,886,267.70	43.30
0.35	637.00	637.00	140.00	89,180.00	2,016,967.70	46.30
D/S Face Checker Rd	637.00				2,106,147.70	48.35

FILL VOLUME = 48.35 ac-ft

EX - FW
FARRINGTON

HEC-RAS Plan: EX - FW Analysis River: Farrington Ditch Reach: Main Stem Profile: FLW

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main Stem	0.20	FLW	220.00	670.24	679.56		679.56	0.000040	0.42	686.41	212.00	0.03
Main Stem	0.33	FLW	210.00	674.24	679.56		679.56	0.000001	0.12	1976.97	609.00	0.01
Main Stem	0.35	FLW	210.00	670.04	679.56		679.56	0.000005	0.40	636.77	152.00	0.03
Main Stem	0.39		Culvert									
Main Stem	0.47	FLW	200.00	671.94	679.61	674.74	679.61	0.000050	0.61	487.33	203.00	0.05
Main Stem	.5675*	FLW	165.00	673.09	679.64		679.65	0.000127	0.87	291.57	177.25	0.07
Main Stem	.665*	FLW	165.00	674.24	679.75		679.77	0.000396	1.34	169.23	138.12	0.12
Main Stem	.7625*	FLW	165.00	675.39	680.01		680.04	0.000621	1.52	146.97	95.61	0.14
Main Stem	0.86	FLW	165.00	676.54	680.39		680.41	0.000788	1.54	142.07	98.08	0.15
Main Stem	0.94		Culvert									
Main Stem	0.99	FLW	160.00	676.54	681.73	677.94	681.73	0.000004	0.11	1547.36	802.48	0.01

Proposed Conditions - Farrington Ditch
Alternative 2
FLOODWAY CUT VOLUME (NWL TO 100-YR)

JOB NO. 13-0035
PROJECT: Buffalo Grove Downtown Redevelopment
LOCATION: Village of Buffalo Grove
FILE: N:\BuffaloGrove\130035\Water\Spreadsheets\FW Fill Volume by XS - CU-FT 082614.xls\NWL to 10-yr - Fill Volume
DATE: 14-Jul-14
SIDE SLOPES: Vary

CROSS-SECTION (Sta.)	AREA (s.f.)	AVERAGE AREA (s.f.)	Δ DISTANCE (ft)	INCREMENTAL VOLUME (cu-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
0.02	690.92				15246.00	0.350
0.1	684.03	687.475	411	282552.23	297798.23	6.837
0.14	680.61	682.32	227	154886.64	452684.87	10.392
0.17	678.34	679.475	151	102600.73	555285.59	12.748
0.18	676.02	677.18	83	56205.94	611491.53	14.038
0.20	674.88	675.45	74	49983.30	661474.83	15.185
0.21	673.77	674.33	77	51923.03	713397.86	16.377
0.26	670.38	672.075	238	159953.85	873351.71	20.049
0.34	663.57	666.975	416	277461.60	1150813.31	26.419
0.41	657.93	660.75	371	245138.25	1395951.56	32.047
0.62*	638.89	648.41	1157	750210.37	2146161.93	49.269

* Downstream Face of Checker Road

CUT VOLUME = 49.27 ac-ft

HEC-RAS Plan: PR W Align River: Farrington Ditch Reach: Main Stem Profile: FLW

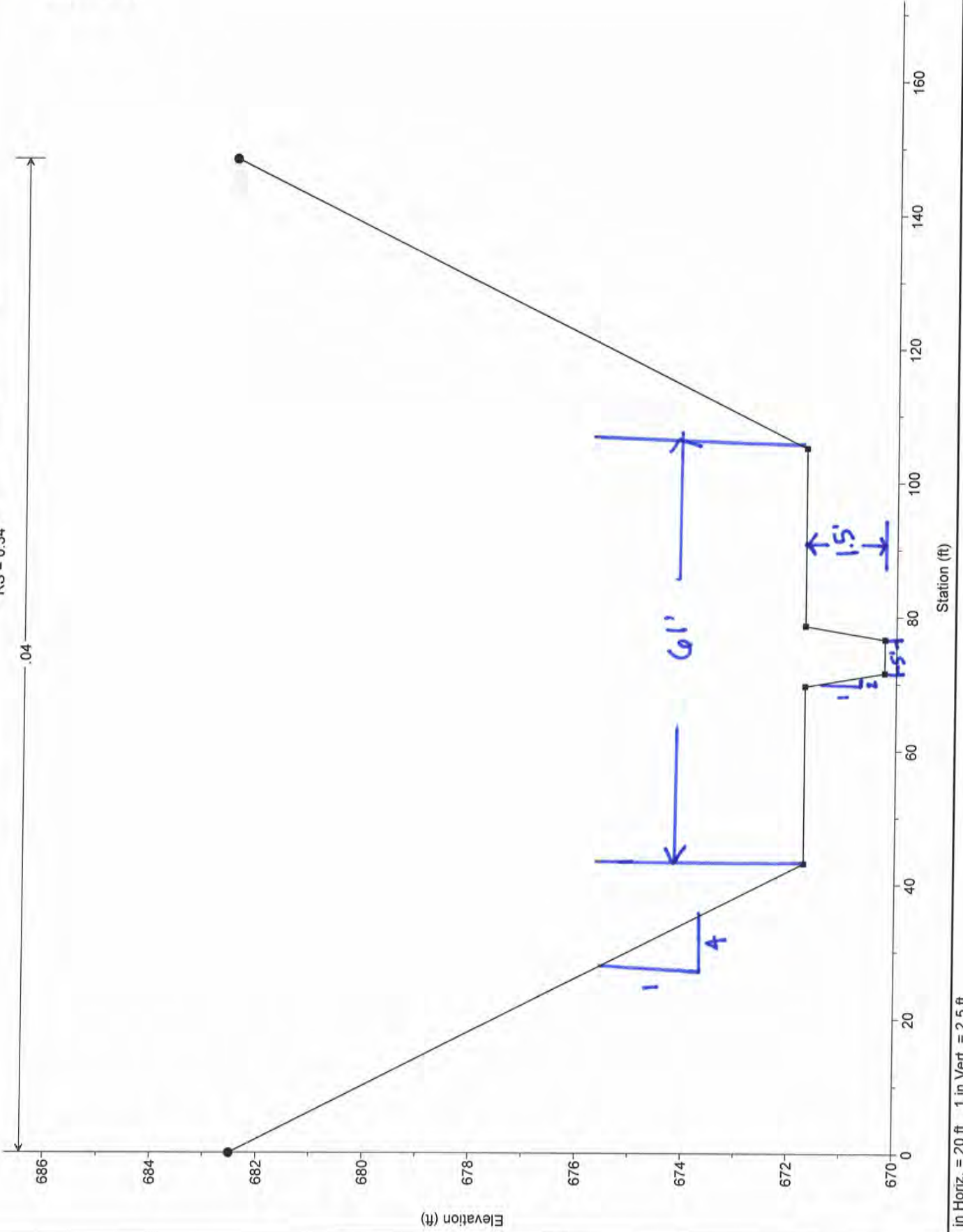
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main Stem	0.02	FLW	220.00	669.98	678.90		678.90	0.000007	0.32	690.92	121.37	0.02
Main Stem	0.10	FLW	220.00	670.04	678.90		678.91	0.000008	0.32	684.03	120.92	0.02
Main Stem	0.14	FLW	220.00	670.07	678.91		678.91	0.000008	0.32	680.61	120.69	0.02
Main Stem	0.17	FLW	220.00	670.09	678.91		678.91	0.000008	0.32	678.34	120.54	0.02
Main Stem	0.18	FLW	220.00	670.11	678.91		678.91	0.000008	0.33	676.02	120.38	0.02
Main Stem	0.20	FLW	220.00	670.12	678.91		678.91	0.000008	0.33	674.88	120.31	0.02
Main Stem	0.21	FLW	210.00	670.13	678.91		678.91	0.000007	0.31	673.77	120.23	0.02
Main Stem	0.26	FLW	210.00	670.16	678.91		678.91	0.000007	0.31	670.38	120.01	0.02
Main Stem	0.34	FLW	210.00	670.22	678.91		678.92	0.000008	0.32	663.57	119.55	0.02
Main Stem	0.41	FLW	210.00	670.27	678.92		678.92	0.000008	0.32	657.93	119.18	0.02
Main Stem	0.62	FLW	210.00	670.44	678.93		678.93	0.000008	0.33	638.89	117.89	0.02
Main Stem	0.66		Culvert									
Main Stem	0.75	FLW	200.00	671.94	679.56	674.74	679.57	0.000025	0.43	984.96	800.00	0.03
Main Stem	0.85	FLW	165.00	673.09	679.59		679.59	0.000099	0.76	472.56	577.15	0.06
Main Stem	0.95	FLW	165.00	674.24	679.67		679.69	0.000379	1.30	206.01	271.79	0.12
Main Stem	1.05	FLW	165.00	675.39	679.93		679.95	0.000636	1.52	168.71	154.59	0.14
Main Stem	1.15	FLW	165.00	676.54	680.31		680.33	0.000790	1.52	165.40	157.95	0.15
Main Stem	1.18		Culvert									
Main Stem	1.28	FLW	160.00	676.54	681.60	677.89	681.60	0.000004	0.11	1576.17	847.80	0.01

WEST

Combined Model Plan: PR Relocation - West Align 8/26/2014
RS = 0.34

.04

Legend	
—	Ground
●	Bank Sta



1 in Horiz. = 20 ft 1 in Vert. = 2.5 ft

Appendix 5
Detention Storage Calculations

Runoff Curve Number

Project Name: Buffalo Grove Downtown Developmnet
Project No: 13-0035
Conditions: Proposed - Alt 1A **Description:** Project site

By: JMG **Date:** 7/18/2014
Checked: BLL **Date:** 7/29/14

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	Curve Number			Area <input checked="" type="checkbox"/> acres <input type="checkbox"/> sq. mi. <input type="checkbox"/> %	Product of Curve Number and Area
		Table 2-2	Figure 2-3	Figure 2-4		
C	Commercial	94			60.00	5640.00
Totals =					60.00	5640.00

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{5640.00}{60.00} = \underline{94.00}$ Use CN = 94

Time of Concentration (T_c) or Travel Time (T_t)

Project: Buffalo Grove Downtown Development
 Location: Village of Buffalo Grove
 File: N:\BuffaloGrove\130035\Water\Model\TR20\Deter

By: JJD
 Checked: BLK

Date: 7/18/2014
 Date: 7/29/14

Present / Developed
 Tc through subarea

Alt 1A

SHEET FLOW

	Segment ID	I				
Surface Description (table 3-1)		grass				
Manning's roughness coeff., n						
Flow Length, L (total L ≤ 300') (ft)						
Two-yr 24-hr rainfall, P2 (in)						
Land slope, s (ft/ft)						
$T_t = (0.007(nL)^{0.8}) / (P_2^{0.5} s^{0.4})$ (hr)			+		=	

SHALLOW CONCENTRATED FLOW

	Segment ID	II				
Surface Description (paved or unpaved)						
Flow Length, L (ft)						
Watercourse slope, s (ft/ft)						
Average velocity, V (ft/s)						
$T_t = L / 3600 V$ (hr)			+		+	

CHANNEL FLOW

	Segment ID					
Cross-sectional flow area, a (ft ²)						
Wetted perimeter, Pw (ft)						
Hydraulic radius, r = a/Pw (ft)						
Channel slope, s (ft/ft)						
Manning's roughness coeff., n						
$V = (1.49 r^{0.667} s^{0.5}) / n$ (ft/s)						
Flow length, L (ft)						
$T_t = L / 3600 V$ (hr)			+		=	

Watershed or subarea T_c or T_t

= 0.25 hr

Assume 15 minutes

EAST ALIGNMENT ALT 1A

1

*****80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY*****

JOB TR-20		BUFFALO GROVE DOWNTOWN DEVELOPMENT		13-0035		NO PLOTS	
TITLE		JULY 2014, DETLA.T20 COMMERCIAL AREA - ZERO RELEASE					
5	RAINFL 1	0.05					
8		0.00	0.16	0.33	0.43	0.52	HUFF
8		0.60	0.66	0.71	0.75	0.79	DIST.
8		0.82	0.84	0.86	0.88	0.90	1stQTR
8		0.92	0.94	0.96	0.97	0.98	
8		1.00	1.00	1.00	1.00	1.00	
9	ENDTBL						
5	RAINFL 2	0.05					
8		0.00	0.03	0.08	0.12	0.16	HUFF
8		0.22	0.29	0.39	0.51	0.62	DIST.
8		0.70	0.76	0.81	0.85	0.88	2ndQTR
8		0.91	0.93	0.95	0.97	0.98	
8		1.00	1.00	1.00	1.00	1.00	
9	ENDTBL						
5	RAINFL 3	0.05					
8		0.00	0.03	0.06	0.09	0.12	HUFF
8		0.15	0.19	0.23	0.27	0.32	DIST.
8		0.38	0.45	0.57	0.70	0.79	3rdQTR
8		0.85	0.89	0.92	0.95	0.97	
8		1.00	1.00	1.00	1.00	1.00	
9	ENDTBL						
5	RAINFL 4	0.05					
8		0.00	0.02	0.05	0.08	0.10	HUFF
8		0.13	0.16	0.19	0.22	0.25	DIST.
8		0.28	0.32	0.35	0.39	0.45	4thQTR
8		0.51	0.59	0.72	0.84	0.92	
8		1.00	1.00	1.00	1.00	1.00	
9	ENDTBL						
3	STRUCT	10					
8		670.000	0.000	0.000	0.000		
8		671.000	2.100	5.598	5.598		
8		671.700	3.125	9.625	9.625		
8		672.000	3.473	11.378	11.378		
8		673.000	8.390	17.345	17.345		
8		674.000	11.249	23.500	23.500		
9	ENDTBL						
6	RUNOFF 1	1	1	0.09375	94.	0.25	1 1 1 SITE
	ENDATA						
7	INCREM 6			0.20			
7	COMPUT 7	1	1	0.00	24.		3 2 1 99 100yr
	ENDCMP 1						
	ENDJOB 2						

*****END OF 80-80 LIST*****

+ EXECUTIVE CONTROL OPERATION INCREM

MAIN TIME INCREMENT = .20 HOURS

RECORD ID

+ EXECUTIVE CONTROL OPERATION COMPUT

FROM XSECTION 1

RECORD ID 100YR

TO XSECTION 1

STARTING TIME = .00 RAIN DEPTH = 6.50 RAIN DURATION = 24.00 RAIN TABLE NO. = 3 ANT. MOIST. COND = 2
ALTERNATE NO. = 10 STORM NO. = 99 MAIN TIME INCREMENT = .20 HOURS

OPERATION RUNOFF CROSS SECTION 1

PEAK TIME (HRS)	PEAK DISCHARGE (CFS)	PEAK ELEVATION (FEET)
15.50	42.78	(RUNOFF)
16.70	29.79	(RUNOFF)
17.90	19.90	(RUNOFF)
19.10	13.20	(RUNOFF)
21.50	9.97	(RUNOFF)
23.78	9.74	(RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 5.78 WATERSHED INCHES, 349.99 CFS-HRS, 28.92 ACRE-FEET; BASEFLOW = .00 CFS

REQ

+ EXECUTIVE CONTROL OPERATION ENDCMP

COMPUTATIONS COMPLETED FOR PASS 1

RECORD ID

1 EXECUTIVE CONTROL OPERATION ENDJOB

RECORD ID

TR20 XEQ 07-29-14 17:21 BUFFALO GROVE DOWNTOWN DEVELOPMENT 13-0035
REV PC 09/83(.2) JULY 2014, DET1A.T20 COMMERCIAL AREA - ZERO RELEASE

JOB 1 SUMMARY
PAGE 1

SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
(A STAR(*) AFTER THE PEAK DISCHARGE TIME AND RATE (CFS) VALUES INDICATES A FLAT TOP HYDROGRAPH
A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	#	PRECIPITATION		RUNOFF		PEAK DISCHARGE								
				RAIN ANTEC TABLE MOIST TIME	COND INCREM (HR)	BEGIN (HR)	AMOUNT (IN)	DURATION (HR)	AMOUNT (IN)	ELEVATION (FT)	TIME (HR)	RATE (CFS)	RATE (CSM)			
ALTERNATE 10	STORM 99															
XSECTION 1	RUNOFF	.09	3	2	.20	.0	6.50	24.00	5.78	---	15.50	42.78	456.3			

TR20 XEQ 07-29-14 17:21
REV PC 09/83 (.2)

BUFFALO GROVE DOWNTOWN DEVELOPMENT 13-0035
JULY 2014, DET1A.T20 COMMERCIAL AREA - ZERO RELEASE

JOB 1 SUMMARY
PAGE 2

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.....
------------------------------	-----------------------------	--------------------

0 XSECTION 1 .09

+

ALTERNATE 10 42.78

TEND OF 1 JOBS IN THIS RUN

Runoff Curve Number

Project Name: Buffalo Grove Downtown Developmnet
Project No: 13-0035
Conditions: Proposed - Alt 2A **Description:** Project site

By: JMG **Date:** 7/18/2014
Checked: BLH **Date:** 7/23/14

Soil Name and Hydrologic Group (Appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	Curve Number			Area	Product of Curve Number and Area
		Table 2-2	Figure 2-3	Figure 2-4	<input checked="" type="checkbox"/> acres <input type="checkbox"/> sq. mi. <input type="checkbox"/> %	
C	Commercial	94			51.00	4794.00
Totals =					51.00	4794.00

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{4794.00}{51.00} = \underline{94.00}$ Use CN = **94**

Time of Concentration (T_c) or Travel Time (T_t)

Project: Buffalo Grove Downtown Development
 Location: Village of Buffalo Grove
 File: N:\BuffaloGrove\130035\Water\Model\TR20\Deter

By: JMG
 Checked: BLH

Date: 7/18/2014
 Date: 7/29/14

Present / Developed

T_c through subarea

Alt 2A

SHEET FLOW

	Segment ID	I					
Surface Description (table 3-1)		grass					
Manning's roughness coeff., n							
Flow Length, L (total L ≤ 300') (ft)							
Two-yr 24-hr rainfall, P2 (in)							
Land slope, s (ft/ft)							
$T_t = (0.007(nL)^{0.8}) / (P_2^{0.5} s^{0.4})$ (hr)				+		=	

SHALLOW CONCENTRATED FLOW

	Segment ID	II					
Surface Description (paved or unpaved)							
Flow Length, L (ft)							
Watercourse slope, s (ft/ft)							
Average velocity, V (ft/s)							
$T_t = L / 3600 V$ (hr)				+		+	
						=	

CHANNEL FLOW

	Segment ID						
Cross-sectional flow area, a (ft ²)							
Wetted perimeter, Pw (ft)							
Hydraulic radius, r = a/Pw (ft)							
Channel slope, s (ft/ft)							
Manning's roughness coeff., n							
$V = (1.49 r^{0.667} s^{0.5}) / n$ (ft/s)							
Flow length, L (ft)							
$T_t = L / 3600 V$ (hr)				+		=	

Watershed or subarea T_c or T_t

= 0.25 hr

Assume 15 minutes

WEST ALIGNMENT
ALT 2A

*****80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY*****

JOB TR-20	TITLE	NO PLOTS
8	0.00	0.43
8	0.60	0.75
8	0.82	0.88
8	0.92	0.97
8	1.00	1.00
9 ENDTBL		
5 RAINFL 2	0.05	0.16
8	0.00	0.12
8	0.22	0.51
8	0.70	0.85
8	0.91	0.97
8	1.00	1.00
9 ENDTBL		
5 RAINFL 3	0.05	0.06
8	0.00	0.09
8	0.15	0.27
8	0.38	0.57
8	0.85	0.92
8	1.00	1.00
9 ENDTBL		
5 RAINFL 4	0.05	0.05
8	0.00	0.02
8	0.13	0.19
8	0.28	0.35
8	0.51	0.72
8	1.00	1.00
9 ENDTBL		
3 STRUCT	10	
8	670.000	0.000
8	671.000	2.100
8	671.700	3.125
8	672.000	3.473
8	673.000	8.390
8	674.000	11.249
9 ENDTBL		
6 RUNOFF 1	1	1
ENDATA		
7 INCREM 6	0.20	
7 COMPUT 7	1	1
ENDCMP 1		
ENDJOB 2		

*****END OF 80-80 LIST*****

EXECUTIVE CONTROL OPERATION INCREM
 + MAIN TIME INCREMENT = .20 HOURS RECORD ID

EXECUTIVE CONTROL OPERATION COMPUT
 + FROM XSECTION 1 TO XSECTION 1 RECORD ID 100YR
 + STARTING TIME = .00 RAIN DEPTH = 6.50 RAIN DURATION= 24.00 RAIN TABLE NO.= 3 ANT. MOIST. COND= 2
 ALTERNATE NO.=10 STORM NO.=99 MAIN TIME INCREMENT = .20 HOURS

OPERATION RUNOFF CROSS SECTION 1
 PEAK TIME (HRS) PEAK DISCHARGE (CFS) PEAK ELEVATION (FEET)
 15.50 36.36 (RUNOFF)
 16.70 25.32 (RUNOFF)
 17.90 16.91 (RUNOFF)
 19.10 11.22 (RUNOFF)
 21.50 8.48 (RUNOFF)
 23.78 8.28 (RUNOFF)

RUNOFF VOLUME ABOVE BASEFLOW = 5.78 WATERSHED INCHES, 297.50 CFS-HRS, 24.59 ACRE-FEET, .00 CFS
 BASEFLOW =

EXECUTIVE CONTROL OPERATION ENDCMP
 + COMPUTATIONS COMPLETED FOR PASS 1 RECORD ID

EXECUTIVE CONTROL OPERATION ENDJOB
 1 RECORD ID

TR20 XEQ 07-29-14 17:23 BUFFALO GROVE DOWNTOWN DEVELOPMENT 13-0035
 REV PC 09/83(.2) JULY 2014, DET2A.T20 COMMERCIAL AREA - ZERO RELEASE

JOB 1 SUMMARY
 PAGE 1

SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
 (A STAR(*) AFTER THE PEAK DISCHARGE TIME AND RATE (CFS) VALUES INDICATES A FLAT TOP HYDROGRAPH
 A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION (SQ MI)	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC COND (HR)	MOIST INCREM (HR)	PRECIPITATION AMOUNT (IN)	RUNOFF DURATION (HR)	PEAK DISCHARGE RATE (CFS)	ELEVATION (FT)	TIME (HR)	RATE (CSM)
ALTERNATE 10	STORM 99										
XSECTION 1	RUNOFF	.08	3	2	.20	.0	6.50	24.00	5.78	15.50	456.3
											36.36

TR20 XEQ 07-29-14 17:23
REV PC 09/83 (.2)

BUFFALO GROVE DOWNTOWN DEVELOPMENT 13-0035
JULY 2014, DET2A.T20 COMMERCIAL AREA - ZERO RELEASE

JOB 1 SUMMARY
PAGE 2

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS.....
------------------------------	-----------------------------	--------------------

0 XSECTION 1 .08

ALTERNATE 10 36.36

LEND OF 1 JOBS IN THIS RUN

*Appendix 6
Earthwork Calculations*

7696 - Buffalo Grove Golfcourse Earthwork Totals

East Channel

West Channel

<u>Existing vs. Topsoil Strip</u>	AREA (ft ²)	CUT (yd ³)	FILL (yd ³)	TOTAL (yd ³)	AREA (ft ²)	CUT (yd ³)	FILL (yd ³)	TOTAL (yd ³)
TOTAL SITE	4727100	376381	0	376381	4765900	375741	0	375741
BUILDABLE AREA	2653700	245434	0	245434	2261100	194473	0	194473
COMP STORAGE	1336000	83538	0	83538	1544200	108995	0	108995

<u>Topsoil Strip vs. Undercut</u>	AREA (ft ²)	CUT (yd ³)	FILL (yd ³)	TOTAL (yd ³)	AREA (ft ²)	CUT (yd ³)	FILL (yd ³)	TOTAL (yd ³)
TOTAL SITE	4727100	99490	0	99490	4765900	100982	0	100982
BUILDABLE AREA	2653700	36440	0	36440	2261100	43315	0	43315
COMP STORAGE	1336000	36589	0	36589	1544200	39303	0	39303

<u>Undercut vs. Proposed (-12")</u>	AREA (ft ²)	CUT (yd ³)	FILL (yd ³)	TOTAL (yd ³)	AREA (ft ²)	CUT (yd ³)	FILL (yd ³)	TOTAL (yd ³)
TOTAL SITE	4727100	209550	573105	-363555	4765900	216071	470234	-254163
BUILDABLE AREA	2653700	37033	481635	-444602	2261100	29210	380496	-351286
COMP STORAGE	1336000	89700	22761	66939	1544200	123015	24095	98920

7696MJMEAST: Existing vs. PROPOSED TOP SOIL STRIP

	Bank Cut (cu yd)	Bank Fill (cu yd)	Cut Swell (%)	Fill Shrink (%)	Adjusted Cut (cu yd)	Adjusted Fill (cu yd)
Excavation Volumes						
TOTAL SITE EAST	376381.14	16630.04	0.00	15.00	376381.14	19124.55
BUILDABLE AREA EAST	245434.26	2088.31	0.00	15.00	245434.26	2401.56
COMP STORAGE EAST	83538.12	13510.07	0.00	15.00	83538.12	15536.58
CHANNEL EAST 1	41692.07	786.37	0.00	15.00	41692.07	904.33
Excavation Areas	Cut Area (sq ft)	Fill Area (sq ft)	Total Area (sq ft)			
TOTAL SITE EAST	3882269.87	584180.13	4727100.00			
BUILDABLE AREA EAST	2283063.47	198086.53	2653700.00			
COMP STORAGE EAST	1066213.20	269786.80	1336000.00			
CHANNEL EAST 1	458330.85	99519.15	645800.00			

Project Totals

	Bank Cut (cu yd)	Bank Fill (cu yd)	Cut Swell (%)	Fill Shrink (%)	Adjusted Cut (cu yd)	Adjusted Fill (cu yd)
Excavation Volumes						
Project Totals:	0.00	0.00	0.00	0.00	0.00	0.00
Excavation Areas	Cut Area (sq ft)	Fill Area (sq ft)	Total Area (sq ft)			
Project Totals:	0.00	0.00	0.00			
Removal Quantities	Boundary (ft)		Area (sq ft)	Volume (cu yd)		
Project Totals:	0.00		0.00	0.00		

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.

7696MJMEAST: PROPOSED TOP SOIL STRIP vs. PROPOSED UNDERCUT

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
TOTAL SITE EAST	99490.46	0.00	0.00	15.00	99490.46	0.00
BUILDABLE AREA EAST	36439.66	0.00	0.00	15.00	36439.66	0.00
COMP STORAGE EAST	36588.78	0.00	0.00	15.00	36588.78	0.00
CHANNEL EAST 1	25680.63	0.00	0.00	15.00	25680.63	0.00

<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>
TOTAL SITE EAST	2652775.00	0.00	4727100.00
BUILDABLE AREA EAST	1409625.00	0.00	2653700.00
COMP STORAGE EAST	784850.00	0.00	1336000.00
CHANNEL EAST 1	413225.00	0.00	645800.00

Project Totals

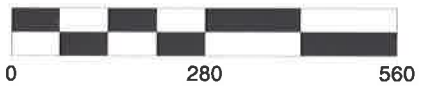
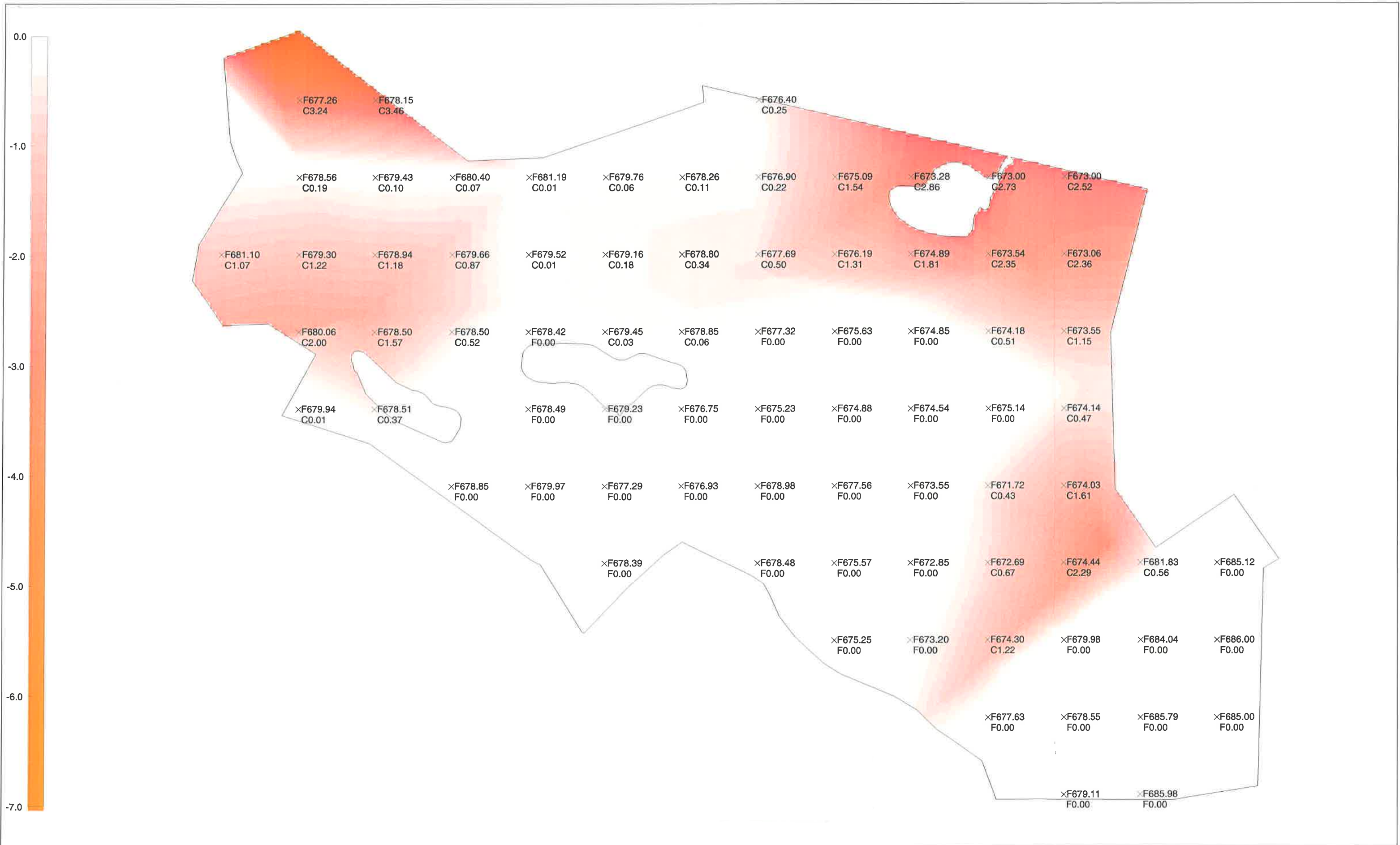
<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
Project Totals:	0.00	0.00	0.00	0.00	0.00	0.00

<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>
Project Totals:	0.00	0.00	0.00

<u>Removal Quantities</u>	<u>Boundary (ft)</u>	<u>Area (sq ft)</u>	<u>Volume (cu yd)</u>
Project Totals:	0.00	0.00	0.00

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.



<p>SPACECO, Inc. 9575 W. Higgins Rd. Suite 700 Rosemont, IL. 60018 847-696-4060 · 847-696-4065</p>	<p>Cut/Fill Locations Report 7696MJM 7696MJMEAST PROPOSED TOP SOIL STRIP vs. PROPOSED UNDERCUT July 24, 2014 · 04:22 PM</p>
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7696MJMEAST: PROPOSED UNDERCUT vs. PROPOSED EAST CHANNEL

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
TOTAL SITE EAST	209549.59	498351.89	0.00	15.00	209549.59	573104.67
BUILDABLE AREA EAST	37032.54	418813.25	0.00	15.00	37032.54	481635.24
COMP STORAGE EAST	89699.52	19792.07	0.00	15.00	89699.52	22760.88
CHANNEL EAST 1	82408.95	51839.84	0.00	15.00	82408.95	59615.82
DETENTION EAST 1	28520.58	480.55	0.00	15.00	28520.58	552.64
DETENTION EAST 2	259.59	1571.22	0.00	15.00	259.59	1806.91

<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>
TOTAL SITE EAST	1829118.50	2897581.50	4727100.00
BUILDABLE AREA EAST	458290.34	2195009.66	2653700.00
COMP STORAGE EAST	967940.90	368059.10	1336000.00
CHANNEL EAST 1	384321.39	261478.61	645800.00
DETENTION EAST 1	231831.85	12068.15	243900.00
DETENTION EAST 2	10704.97	24195.03	34900.00

Project Totals

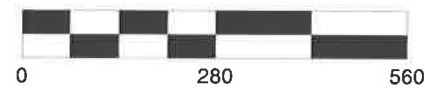
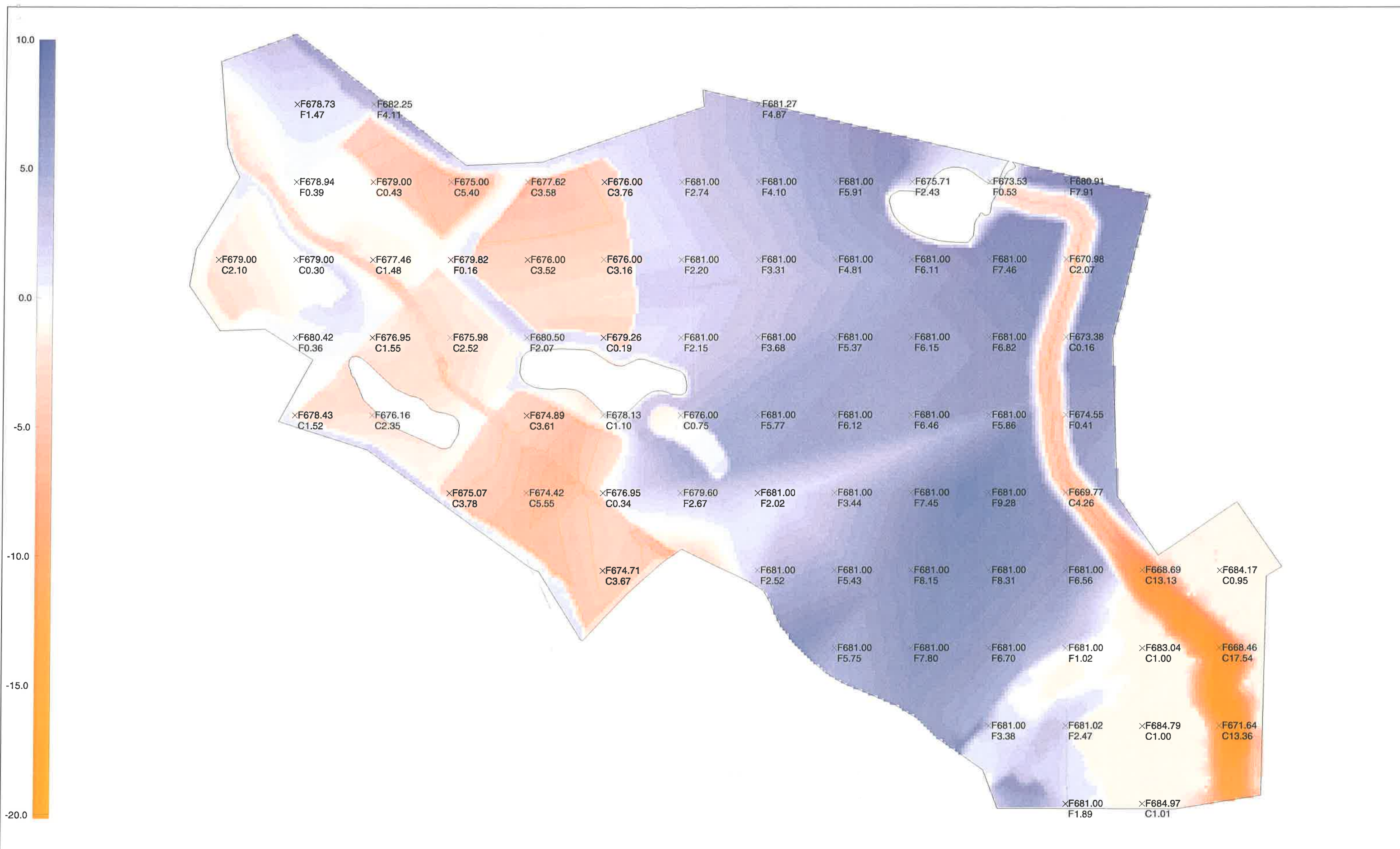
<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
Project Totals:	0.00	0.00	0.00	0.00	0.00	0.00

<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>
Project Totals:	0.00	0.00	0.00

<u>Removal Quantities</u>	<u>Boundary (ft)</u>	<u>Area (sq ft)</u>	<u>Volume (cu yd)</u>
Project Totals:	0.00	0.00	0.00

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.



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Cut/Fill Locations Report
 7696MJM
 7696MJMEAST
 PROPOSED UNDERCUT vs. PROPOSED EAST CHANNEL
 July 29, 2014 · 10:00 AM

7696MJMWEST: Existing vs. PROPOSED TOP SOIL STRIP

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
TOTAL SITE WEST	375741.11	17377.05	0.00	15.00	375741.11	19983.61
BUILDABLE AREA WEST	194473.17	1142.03	0.00	15.00	194473.17	1313.34
CHANNEL WEST	35580.17	2052.76	0.00	15.00	35580.17	2360.68
COMP STORAGE WEST	108995.02	12712.01	0.00	15.00	108995.02	14618.81

<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>
TOTAL SITE WEST	3903963.42	595936.58	4765900.00
BUILDABLE AREA WEST	1790085.15	216414.85	2261100.00
CHANNEL WEST	354128.72	67671.28	424600.00
COMP STORAGE WEST	1294169.68	250030.32	1544200.00

Project Totals

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
Project Totals:	0.00	0.00	0.00	0.00	0.00	0.00

<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>
Project Totals:	0.00	0.00	0.00

<u>Removal Quantities</u>	<u>Boundary (ft)</u>	<u>Area (sq ft)</u>	<u>Volume (cu yd)</u>
Project Totals:	0.00	0.00	0.00

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.

7696MJMWEST: PROPOSED TOP SOIL STRIP vs. PROPOSED UNDERCUT

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
TOTAL SITE WEST	100982.42	0.00	0.00	15.00	100982.42	0.00
BUILDABLE AREA WEST	43315.31	0.00	0.00	15.00	43315.31	0.00
CHANNEL WEST	5030.30	0.00	0.00	15.00	5030.30	0.00
COMP STORAGE WEST	39303.39	0.00	0.00	15.00	39303.39	0.00

<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>
TOTAL SITE WEST	2633875.00	0.00	4765900.00
BUILDABLE AREA WEST	1008525.00	0.00	2261100.00
CHANNEL WEST	195400.00	0.00	424600.00
COMP STORAGE WEST	988200.00	0.00	1544200.00

Project Totals

<u>Excavation Volumes</u>	<u>Bank Cut (cu yd)</u>	<u>Bank Fill (cu yd)</u>	<u>Cut Swell (%)</u>	<u>Fill Shrink (%)</u>	<u>Adjusted Cut (cu yd)</u>	<u>Adjusted Fill (cu yd)</u>
Project Totals:	0.00	0.00	0.00	0.00	0.00	0.00

<u>Excavation Areas</u>	<u>Cut Area (sq ft)</u>	<u>Fill Area (sq ft)</u>	<u>Total Area (sq ft)</u>
Project Totals:	0.00	0.00	0.00

<u>Removal Quantities</u>	<u>Boundary (ft)</u>	<u>Area (sq ft)</u>	<u>Volume (cu yd)</u>
Project Totals:	0.00	0.00	0.00

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.

7696MJM WEST: PROPOSED UNDERCUT vs. PROPOSED WEST CREEK 1

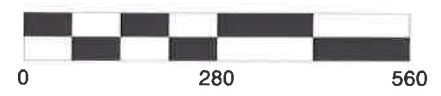
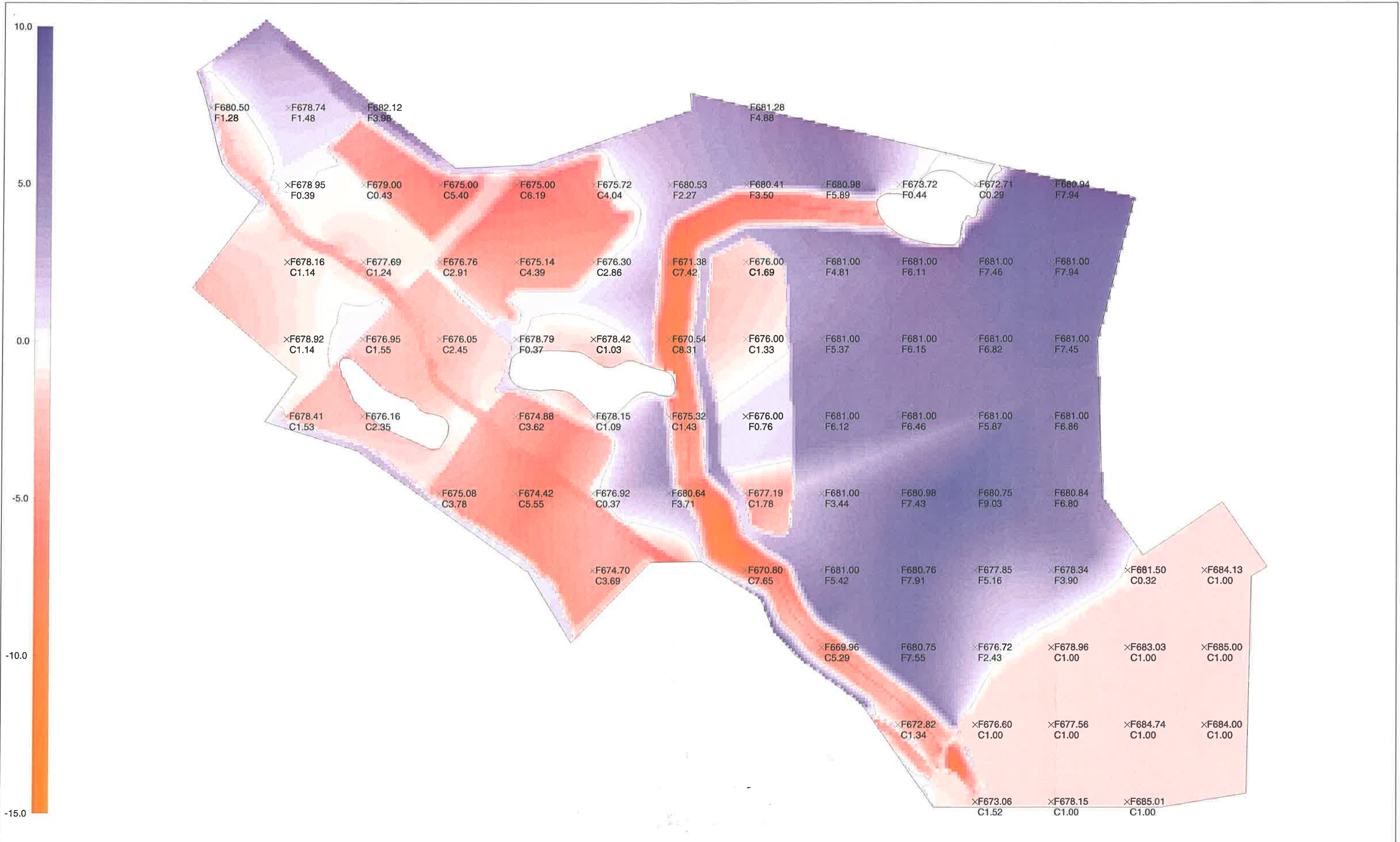
Excavation Volumes	Bank Cut (cu yd)	Bank Fill (cu yd)	Cut Swell (%)	Fill Shrink (%)	Adjusted Cut (cu yd)	Adjusted Fill (cu yd)
TOTAL SITE WEST	216071.29	408898.82	0.00	15.00	216071.29	470233.64
BUILDABLE AREA WEST	29210.55	330866.37	0.00	15.00	29210.55	380496.32
CHANNEL WEST	57775.55	10825.82	0.00	15.00	57775.55	12449.70
COMP STORAGE WEST	123015.13	20952.37	0.00	15.00	123015.13	24095.22
DETENTIONWEST	8159.19	4371.60	0.00	15.00	8159.19	5027.34
Excavation Areas	Cut Area (sq ft)	Fill Area (sq ft)	Total Area (sq ft)			
TOTAL SITE WEST	2414829.61	2351070.39	4765900.00			
BUILDABLE AREA WEST	721469.65	1539630.35	2261100.00			
CHANNEL WEST	320786.97	103813.03	424600.00			
COMP STORAGE WEST	1208838.40	335361.60	1544200.00			
DETENTIONWEST	140531.48	95268.52	235800.00			

Project Totals

Excavation Volumes	Bank Cut (cu yd)	Bank Fill (cu yd)	Cut Swell (%)	Fill Shrink (%)	Adjusted Cut (cu yd)	Adjusted Fill (cu yd)
Project Totals:	0.00	0.00	0.00	0.00	0.00	0.00
Excavation Areas	Cut Area (sq ft)	Fill Area (sq ft)	Total Area (sq ft)	Volume (cu yd)		
Project Totals:	0.00	0.00	0.00	0.00		
Removal Quantities	Boundary (ft)		Area (sq ft)			
Project Totals:	0.00		0.00			

* Only Drawing Master AOI's or single selected Drawing AOI's are used for Project Excavation Totals.

* Removal Quantities are clipped to Drawing Master AOI or the individually selected AOI.



SPACECO, Inc.
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Cut/Fill Locations Report
 7696MJM
 7696MJMWEST
 PROPOSED UNDERCUT vs. PROPOSED WEST CREEK 1
 July 29, 2014 · 02:16 PM

*Appendix 7
Cost Estimate*

**EAST RELOCATION
EARTHWORK AND STORMWATER STORAGE PRELIMINARY BUDGET**

TOPSOIL/UNSUITABLE SUMMARY

			UNIT \$		TOTAL
Topsoil / Unsuitable Soil Strip to Stockpile (±25" Avg.)	380,000	CY	\$ 4.00	\$	1,520,000
Topsoil Respresd					
- To Floodplain Area (12")	150,000	CY	\$ 5.00	\$	750,000
- To Development Area (6" - 80% Impervious)	10,000	CY	\$ 5.00	\$	50,000
- Total	160,000	CY			
Topsoil Excess Volume	220,000	CY			
Unsuitable Volume	100,000	CY	\$ 20.00	\$	2,000,000
Total Excess Material for Borrow	320,000				

CLAY/STRUCTURAL FILL SUMMARY

Clay Excavation from Disturbed Area	210,000	CY	\$ 6.00	\$	1,260,000
Clay Borrow (Topsoil & Undercut Amount from above)	320,000	CY	\$ 6.00	\$	1,920,000
Detention Basin Excavation	30,000	CY	\$ 12.00	\$	360,000
Total Clay Excavation	560,000	CY			

BALANCE SUMMARY

Total Fill Req'd Per Creek Relocation	480,000	CY			
Non-Structural Fill For Composite Storage Area	90,000	CY			
Total Site Fill	570,000				

Import For Structural Material Shortage Allowance (Subject to Geotechnical Engineer Review & Meetings)	Lump Sum			\$	4,000,000
Seeding Allowance	140 acres		\$ 7,500	\$	1,050,000
Erosion Control Allowance	Lump Sum			\$	500,000
Dewatering Allowance	Lump Sum			\$	250,000
Lake Cook Road Box Culvert Crossing, Headwall, & New Channel To Buffalo Creek	Lump Sum			\$	1,000,000
Detention & Flood Plain Storm Sewer Allowance	Lump Sum			\$	250,000
			Total	\$	14,910,000
				Contingency @ 20%	\$ 2,982,000
				Engineering & Permitting Fees @ 20%	\$ 2,982,000
				TOTAL BUDGET	\$ 20,874,000

CONCEPTUAL BUDGET \$ 21,000,000

LIST OF ASSUMPTIONS

- 1) Quantities were determined from Basic Grading concepts within development and approximate location of compensatory storage basins. Lake County 1' topographic map was used.
- 2) All topsoil strip and unsuitable material cut depths based on boring report by TSC dated: 04/24/14
- 3) Unsuitable soils found at borings: B-3, B-5, B-14, B-21, B-22, B-27, B-29. Additional borings required to determine actual amount of undercut within limits of disturbance.
- 4) No structural fill needed for Southeast area that is currently developed.
- 5) Existing ponds will not be re graded.
- 6) Respread depths are approximate
- 7) Total Detention required within development area is 29 ac-ft.
- 8) Detention provided is accounted for in cut/fill analysis.
- 9) Location of detention facilities are to be determined. Locations shown on Buildable Area Exhibit are approximate and are for planning purposes only.
- 10) Entire development area will be filled to finished grade of the Flood Protection Elevation Subgrade (682). All final grades were lowered 12" to account for topsoil respread and pavement adjustments
- 11) Floodplain excavation per preliminary drainage analysis of existing floodways.
- 12) This summary is a guide only for conceptual budgeting only. A detailed site plan, preliminary design, and final design and investigation is required to determine actual costs.
- 13) Assume sufficient structural material borrow found on-site, Geotechnical Engineer to review and offer opinion. Additional borings will be required to determine actual amount of structural material borrow within limits of disturbance. An allowance has been added for shortage of available on-site structural fill.

**WEST RELOCATION
EARTHWORK AND STORMWATER STORAGE PRELIMINARY BUDGET**

TOPSOIL/UNSUITABLE SUMMARY

			UNIT \$		TOTAL
Topsoil / Unsuitable Soil Strip to Stockpile (± 25" Avg.)	380,000	CY	\$ 4.00	\$	1,520,000
Topsoil Respread					
- To Floodplain Area (12")	150,000	CY	\$ 5.00	\$	750,000
- To Development Area (6" - 80% Impervious)	10,000	CY	\$ 5.00	\$	50,000
- Total	160,000	CY			
Topsoil Excess Volume	220,000	CY			
Unsuitable Volume	100,000	CY	\$ 20.00	\$	2,000,000
Total Excess Material for Borrow	320,000	CY			

CLAY/STRUCTURAL FILL SUMMARY

Clay Excavation from Disturbed Area	220,000	CY	\$ 6.00	\$	1,320,000
Clay Borrow (Topsoil & Undercut Amount from above)	320,000	CY	\$ 6.00	\$	1,920,000
Detention Basin Excavation	30,000	CY	\$ 12.00	\$	360,000
Total Clay Excavation	570,000	CY			

BALANCE SUMMARY

Total Clay Fill Req'd to FPE Elevation	380,000	CY			
Non-Structural Fill for Composite Storage Area	90,000	CY			
Total Site Fill	470,000				

Amount to Raise Buildable Area ± 1 ft

Import For Structural Material Shortage Allowance
(Subject To Geotechnical Engineer Review & Meetings) Lump Sum \$ 4,000,000

Seeding 140 acres \$ 7,500 \$ 1,050,000

Erosion Control Allowance Lump Sum \$ 500,000

Dewatering Allowance Lump Sum \$ 250,000

Detention & Flood Plain Storm Sewer Allowance Lump Sum \$ 500,000

Total \$ 14,220,000

Contingency @ 20% \$ 2,844,000

Engineering & Permitting Fees @ 20% \$ 2,844,000

TOTAL BUDGET \$ 19,908,000

CONCEPTUAL BUDGET \$ 20,000,000

LIST OF ASSUMPTIONS

- 1) Quantities were determined from Basic Grading concepts within development and approximate location of compensatory storage basins. Lake County 1' topographic map was used.
- 2) All topsoil strip and unsuitable material cut depths based on boring report by TSC dated: 04/24/14
- 3) Unsuitable soils found at borings: B-3, B-5, B-14, B-21, B-22, B-27, B-29. Additional borings required to determine actual amount of undercut within limits of disturbance.
- 4) No structural fill needed for Southeast area that is currently developed.
- 5) Existing ponds will not be re graded.
- 6) Respread depths are approximate
- 7) Total Detention required within development area is 25 ac-ft.
- 8) Detention provided is accounted for in cut/fill analysis.
- 9) Location of detention facilities are to be determined. Locations shown on Buildable Area Exhibit are approximate and are for planning purposes only.
- 10) Entire development area will be filled to finished grade of the Flood Protection Elevation Subgrade (682). All final grades were lowered 12" to account for topsoil respread and pavement adjustments
- 11) Floodplain excavation per preliminary drainage analysis of existing floodways.
- 12) This summary is a guide only for conceptual budgeting only. A detailed site plan, preliminary design, and final design and investigation is required to determine actual costs.
- 13) Assume sufficient structural material borrow found on-site, Geotechnical Engineer to review and offer opinion. Additional borings will be required to determine actual amount of structural material borrow within limits of disturbance. An allowance has been added for shortage of available on-site structural fill.

*Appendix 8
Correspondence*

MINUTES OF MEETING

June 5, 2014

TO: All Attendees

FROM: Jeana Gowin

SUBJECT: Buffalo Grove Downtown Redevelopment
IDNR-OWR Permitting

ATTENDEES: Bill Boyd – IDNR-OWR
Darren Monico – Village Engineer, Village of Buffalo Grove
Darren Olson – CBBEL
Jeana Gowin – CBBEL

This meeting was held at the Illinois Department of Natural Resources – Office of Water Resources (IDNR-OWR) Bartlett, Illinois office at 10:00 am. The purpose of this meeting was to present the conceptual plan for the Downtown Redevelopment and identify permitting requirements and/or any issues associated with the development.

Proposed Creek Alignments

The current phase of the project is to determine the maximum buildable area. This analysis will be affected by wetlands, floodplain, floodway and poor soils on site. Farrington Ditch traverses north to south through the middle of the conceptual site plan. The confluence of Buffalo Creek and Farrington Ditch is located in Cook County just north of Lake Cook Road. Therefore part of the project will be determining a relocation of Farrington Ditch on both the east and west side of the concept project area. The eastern alignment will provide a buffer for the homes from the development located in the subdivision to the east. This alignment also relocates the confluence with Buffalo Creek to downstream of Raupp Boulevard, thus causing a lower flow rate through Buffalo Creek adjacent to the homes between Lake Cook Road and Raupp Boulevard, and reducing the risk of flooding in this repetitive flooding area.

Permitting

At Old Checker Road, the drainage area to Farrington Ditch at Old Checker Road is approximately 0.6 square miles. Therefore, if the total drainage area at the confluence with Buffalo Creek is less than one square mile, Farrington Ditch will **not** be under the jurisdiction of IDNR-OWR. IDNR-OWR will, however, have the authority to review the tie-in at the confluence with Buffalo Creek regardless of the location since IDNR-OWR does have permitting authority over Buffalo Creek. Additionally, any remapping of either of the creeks will also be under the jurisdiction of IDNR-OWR.

The Village of Buffalo Grove (Village) is not a certified community and since this is also a Village project, the project will need to be reviewed by Lake County Stormwater



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MINUTES OF MEETING

Management Commission (SMC), the Metropolitan Water Reclamation District of Greater Chicago (MWRD) and IDNR-OWR. The floodway construction permit for the portion in Lake County will be issued by SMC and the floodway construction permit for the portion in Cook County will be issued by IDNR-OWR or MWRD. Based on the Village's implementation of the MWRD Watershed Management Ordinance (WMO), MWRD may also review the floodplain, floodway and wetlands portions of the development.

CBBEL and the Village will meet with the U.S. Army Corps of Engineers and SMC.

The above minutes constitute the author's understanding of the issues discussed and conclusions reached. Please notify the author of any comments or revisions to these minutes within ten (10) days of issue.

Prepared by: Jeana Gowin, PE

Date: June 5, 2014

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MINUTES OF MEETING

June 26, 2014

TO: All Attendees

FROM: Jeana Gowin, PE

SUBJECT: Lake County Stormwater Management Commission (LCSMC)
Buffalo Grove Downtown Development Meeting on June 18, 2014
(CBBEL Project # 130035)

ATTENDEES: Darren Monico – Village of Buffalo Grove
Bob Gardiner – LCSMC
Juli Crane – LCSMC
Kurt Woolford – LCSMC
Darren Olson – CBBEL
Jedd Anderson – CBBEL
Jeana Gowin – CBBEL

The meeting was held on June 18, 2014 at Lake County SMC in Grayslake, Illinois at 10:00 am. The meeting was to present the conceptual plan for the Downtown Redevelopment and identify permitting requirements and/or any issues associated with the development.

Farrington Ditch/Buffalo Creek

- Farrington Ditch has less than one square mile of drainage area with a defined floodplain/floodway. The ditch low flow is conveyed within pipes through the golf course. While it is considered a “waters of the U.S.”, Bob commented that there is not a lot of biological integrity associated with the existing creek.
- Bob indicated that Lindley did a study of Farrington Ditch on north side of old Checker Rd. CBBEL requested the study from LCSMC.
- Buffalo Creek has approximately 20 square miles of drainage area at the golf course with regulatory floodplain and floodway. A minor relocation of Buffalo Creek is proposed. Relocation of Buffalo Creek will likely present a challenge due to the biological integrity and stream characteristics.
- Farrington Ditch is proposed to be relocated either to the east or west side of the proposed development area. The eastern alignment would provide a buffer for the residential neighborhood to the east. The east alignment would also relocate the confluence of Buffalo Creek and Farrington Ditch to the downstream side of Raupp Boulevard. The relocation would provide a flow reduction in Buffalo Creek immediately downstream of Lake-Cook Road providing flood reduction benefits to the homes on St. Mary’s Parkway that are adjacent to the creek. The Buffalo Creek



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MINUTES OF MEETING

streambank through this stretch is in poor condition and, although this is not the sole reason to relocate Farrington Ditch, it does provide an added benefit.

Buildable Area Analysis

- CBBEL is currently performing a buildable area analysis. CBBEL and the Village met with IDNR. They will perform the review of the Cook County portion of Buffalo Creek and, but since the tributary area to Farrington Ditch is less than one square mile, even though it has regulatory floodway, the review will fall under the jurisdiction of LCSMC for the Lake County portion. IDNR-OWR will only be involved in remapping.
- To compute the buildable area, CBBEL will determine floodway width required for conveyance and then calculate floodplain/floodway fill. The compensatory storage area within the golf course to the west will provide added benefits of natural setting/trail system.
- Buildable area includes determining the area needed for detention, etc., including water quality. Detention will be partially stored underground (high water table, though) BFE's will set pad that will be 2.5' above the BFE (Village's FPE) and will determine floodplain/floodway fill.

Buffalo Grove Golf Course Use

- Soil borings were completed within the golf course. Topsoil was found to be 1 foot up to 8 feet deep. Below the topsoil suitable soils were found. No peat deposits were found.
- A drain tile survey has not yet been completed. The survey will be completed during Phase 1 engineering. Absence or presence of tile not critical to determination of buildable area.

Wetlands

- Wetland boundaries were delineated by CBBEL, but have not been submitted to US Army Corps of Engineers (USACE). We expect that all onsite wetland and waters will be determined to be USACE jurisdictional.
- The USACE will require a functional based evaluation regarding the proposed stream relocation. The new channel(s) will likely be required to show a functional lift post project. The proposed project will be discussed with the USACE. Relocation of Farrington ditch will include elimination of the pipes and daylighting of low flow. The new channel will be design as a natural area using nature stream and flood plain morphology.



MINUTES OF MEETING

- Meeting with USACE on Friday, June 20, 2014.

Permitting

- Recommendations from Bob for runoff volume reduction (RVR) requirements: the use of permeable pavers/porous pavers does not provide a reduction in detention.
- The critical aspect is to not increase flood risk by moving the creek/floodplain closer to residents on the east side of the development. Relocating Farrington Ditch will increase the stream length and provide floodway volume in this corridor with floodplain volume in the basins on the golf course at a 1.2:1 ratio.
- LCSMC – maintain floodway storage and demonstrate conveyance by not increasing flood risk to upstream properties; WDO permit includes floodplain/floodway permit compliance and includes detention/compensatory storage permitting.
- CLOMR – LCSMC/IDNR – both will need to review for remapping, and then a LOMR will be applied for through FEMA upon completion of construction.
- COE – It is unknown if the project will qualify for a Regional Permit or and Individual Permit (IP) – if it requires an IP, the project must be reviewed by IEPA, which will require that the project provide a functional lift
- MWRD – will permit Cook County portion (Buffalo Grove not certified community) except floodway, which will be reviewed by IDNR-OWR, if applicable; residents along St. Mary's Parkway flooded in June 2013 before the Buffalo Creek Flood Control Reservoir overtopped

According to Kurt, the LCSMC WDO allows for use the 1993 aerial to determine the existing developed area – i.e. Village Hall, and swap impervious area for impervious area to provide a reduction in detention storage volume required. The USACE will likely not allow on-line detention, but offline detention within the floodplain may be allowed. The proposed release rate for detention basins in the floodplain will be based on a 10-year tailwater.

The above minutes constitute the author's understanding of the issues discussed and conclusions reached. Please notify the author of any comments or revisions to these minutes within ten (10) days of issue.

JMG
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MINUTES OF MEETING

June 20, 2014

TO: Project File

FROM: Darren Olson, PE
Jedd Anderson

SUBJECT: Buffalo Grove Downtown Development
US Army Corps of Engineers (USACE) Coordination Meeting
June 20, 2014
(CBBEL Project 13-0035)

ATTENDEES: Melissa Navis - USACE
Kathy Chernich - USACE
Darren Olson – CBBEL
Jedd Anderson – CBBEL

The following items were discussed at the meeting:

- Darren provided an explanation of the project and the purpose of the early coordination meeting to discuss permitting requirements.
 - The project includes development of a downtown corridor on the current golf course and municipal complex.
 - Buffalo Creek and Farrington Ditch drain through the site. The latter is contained in a series of pipes under low flow conditions.
 - Farrington Ditch is proposed to be daylighted and relocated as part of the project. An alignment to the east or west of the proposed development is currently being considered.
 - The developer would also like to relocate a portion of Buffalo Creek to provide for more frontage along Lake Cook Road.
 - The remaining undeveloped portion of the site will be off-line compensatory storage basins.
 - Stormwater BMPs and detention basins will be provided to treat the site runoff prior to discharge into the creeks per the WDO, WMO and other regulatory requirements.
- Jedd provided a wetland/waters map based on a CBBEL site visit. It was assumed that all creeks and ponds would be considered under the jurisdiction of the USACE.
- The total acreage of wetland/waters impact will be greater than 1 acre.
- Kathy indicated that the daylighting and relocation of Farrington Ditch could be permitted under RP-1 and RP-5. She indicated that this portion of the project would provide an environmental benefit. Information above and beyond the typical required USACE application materials should include:
 - Historical aerials
 - Historical creek maps



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MINUTES OF MEETING

- Utility atlases of golf course
- Any relocation of Buffalo Creek would cause the whole project to be processed as an Individual Permit. An individual permit would entail the following:
 - Extensive alternative site analysis – both from an alternative locations evaluation and alternative onsite design evaluations.
 - IEPA water quality certification and anti-degradation review
 - Public Notices - USACE and IEPA separately
 - Public hearings may be required by agencies

DTO/JMA

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August 12, 2014

Village of Buffalo Grove
Department of Public Works
51 Raupp Boulevard
Buffalo Grove, IL 60089

Attention: Mr. Darren Monico, PE
Village Engineer

Subject: Buffalo Grove Downtown Development
(CBBEL Project No. 130035)

Dear Mr. Monico:

This letter is in response to your email dated August 1, 2014 regarding questions pertaining to the Buffalo Grove Downtown Development. The comments from your email and the responses are presented below.

Comment 1: Can anything be built in the open space on the west side of the creek by Lake Cook Road?

Response 1: Yes, but it would have to be constructed outside of the floodway. It would also require stormwater detention and water quality treatment to be placed in the immediate vicinity.

Comment 2: Can some of the detention for the site be moved towards the frontage of Lake Cook Road for a water feature?

Response 2: Yes, the stormwater detention was shown on the exhibits schematically to cover the approximate surface area we anticipate given the stormwater detention is located above ground. The location will vary from what is shown on our exhibits and we would anticipate that a land planner would divide up and place the stormwater detention within the net buildable area as necessary to accommodate the land plan.

Comment 3: Can Farrington Ditch be moved as far east as possible towards the east line?

Response 3: Yes, Farrington Ditch can be moved east under Alternative 1. There would still be an area around the existing Police Station that would likely remain open space as the creek would not be able to make the multiple bends to fill this area.

Comment 4: Can the open space on the far west side be used for anything such as parks or buildings?

Response 4: Yes, it could be used for parks or buildings; however the soils report indicates poor soils in this location. Any development in this area would require stormwater detention. Compensatory storage would be required for any fill in the floodplain, and development activities would have to be located outside of the floodway.

Comment 5: Can the compensatory storage be moved a little to the west to help square out the buildable area?

Response 5: Yes.

Comment 6: Can the existing pond at the north for Farrington Ditch be moved to the west a little?

Response 6: The soils within and adjacent to the existing pond are likely to be of poor structural quality. We would think it is feasible to reshape the existing pond area, but a wholesale move of the basin will require additional investigation of the pond (depth below water level, soil borings, etc.) and may require significant undercuts to remove entirely.

Comment 7: Can the 29 acre feet stormwater detention pond be moved to the west to help square the buildable area?

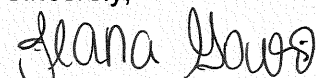
Response 7: Yes, the stormwater detention was shown on the exhibits schematically to cover the approximate surface area we anticipate given the stormwater detention is located above ground. The location will vary from what is shown on our exhibits and we would anticipate that a land planner would divide up and place the stormwater detention within the net buildable area as necessary to accommodate the land plan.

Comment 8: Can a bridge be built to the west or the east of the confluence of Buffalo Creek?

Response 8: Yes, it would likely need to span the floodway of Buffalo Creek.

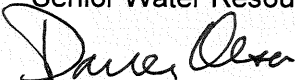
If you have any questions, please do not hesitate to contact me.

Sincerely,



Jeana Gowin, PE

Senior Water Resources Engineer



Darren T. Olson, PE

Senior Water Resources Project Manager

DTO/sll

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