STORMWATER MANAGEMENT

PERMIT APPLICATION AND REPORT

FOR

NAPER COMMONS

DUPAGE COUNTY, ILLINOIS

OCTOBER 16, 2020
SEPTEMBER 14, 2020

402.138

PROFESSIONAL ENGINEER'S CERTIFICATION

STATE OF ILLINOIS }
SS.
COUNTY OF DUPAGE }

I, CHRISTOPHER R. MORGART, A LICENSED PROFESSIONAL ENGINEER OF ILLINOIS, HEREBY CERTIFY THAT THIS TECHNICAL SUBMISSION WAS PREPARED ON BEHALF OF PULTE HOME COMPANY, LLC BY CEMCON, LTD. UNDER MY PERSONAL DIRECTION.

DATED THIS_____DAY OF_____, AD, 2020

_____
ILLINOIS LICENSED PROFESSIONAL ENGINEER NO. 062-055788

MY LICENSE EXPIRES ON NOVEMBER 30, 2021

PROFESSIONAL DESIGN FIRM LICENSE NO. 184-002937, EXPIRATION DATE IS APRIL 30, 2021

NOTE: UNLESS THIS DOCUMENT BEARS THE ORIGINAL SIGNATURE AND IMPRESSED SEAL OF THE DESIGN PROFESSIONAL ENGINEER, IT IS NOT A VALID TECHNICAL SUBMISSION.

PREPARED FOR:

PULTE HOME COMPANY, LLC
1900 E. GOLF ROAD, SUITE 300
SCHAUMBURG, IL 60195

847-230-5400

PREPARED BY:

CEMCON, LTD.
2280 WHITE OAK CIRCLE, SUITE 100
AURORA, IL 60504-9675

630-862-2100

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STORMWATER MANAGEMENT
PERMIT APPLICATION AND REPORT
FOR
NAPER COMMONS
DUPAGE COUNTY, ILLINOIS

1.0 PROJECT DESCRIPTION

The Naper Commons Subdivision proposed by Pulte Home Company, LLC is a 67.6± acre, 174 single family home and 70 townhome subdivision west of Naperville Road, North of W Lucent Lane in Naperville, DuPage County (refer to the project location map in Exhibit 1B). Site infrastructure improvements (see Engineering Plans) will include the construction of sanitary sewers, watermains, stormwater drainage and conveyance facilities, and stormwater management facilities which will be vegetatively stabilized for stormwater discharge control and best management practices.

The purpose of this Stormwater Management Analysis and Report is to summarize the hydrologic and hydraulic analyses performed for Existing and Proposed Conditions and to demonstrate that, when constructed, the development will comply with Naperville, County, State, and Federal laws and regulations and provide a significant drainage improvement and regional benefit for the watershed.

2.0 EXISTING "WITHOUT PROJECT" CONDITIONS

A. WATERSHED DESCRIPTION

The project site is part of the old Lucent Campus now owned by Nokia. A large portion of the property was previously mass graded and used as an overflow parking lot. In addition the north section is currently farmed and the remainder is open grass and trees.

There are four major hydraulic points of release on the site, all of which are tributary to Rott Creek (refer to the Existing Watershed Exhibit in Exhibit 2A). The first location of release

includes approximately 3.2 on-site acres (Subarea 001) which drain to the northwest to the DuPage County Forest Preserve. The second location of release includes approximately 14.2 on-site acres (Subareas 002) which drain to an existing wetland northeast of the site that encroaches onto the northeast corner of the property. Included with the 14.2 acres there is an additional 424.9 acres tributary to the existing wetland. The existing wetland drains to the east via a storm sewer under Naperville Road. The third location of release includes approximately 39.5 on-site acres (Subareas 003) which drain to the existing Nokia stormwater management facility (SWMF). In the existing condition, subarea 003 includes the north overflow parking lot expansion. Based on the Lucent Technologies Indian Hill Labortory Proposed Parking Lot stormwater report which was prepared by Roake and Associates, Inc. the impervious area of the parking lot requires approximately 13.7 ac-ft of stormwater storage which is currently provided for in the existing Nokia SWMF 012. The forth location of release includes approximately 7.7 on-site acres (Subareas 004) which drain to the existing 36" storm sewer that is Rott Creek tributary. Additionally upstream of the subarea 004 there is approximately 39.4 acres of offsite area that includes the Danada Woods Townhomes, Danada Professional Center, and Unincorporated single family development. The Danada Woods Townhomes SWMF drains through a 5.25" restrictor directly to a 36" storm sewer along Lucent Lane. The Danada Woods Townhome development was designed such that the 10 year high water level would stay within the Danada Woods development but the 100 year event would overflow and utilize existing storage on with the subject proposed development. Based on the Danada Woods Townhomes stormwater report which was prepared by Roake and Associates, Inc. 17.3 ac-ft of storage was provided on the Danada Woods property and subject property at a HWL of 736.26. Approximately 13.8 ac-ft of storage was provided on the Danada Woods development and an additional 3.5 ac-ft on the subject property. This required storage will be provided in the proposed stormwater facility adjacent to the Danada Woods basin.

B. METHODS

In accordance with the current DuPage County Countywide Stormwater & Floodplain Ordinance (Ordinance), a proposed site development which contains more than 25,000 sq-ft. of new impervious area requires stormwater management to protect downstream properties. The Ordinance requires that the proposed development attenuate flows to 0.1 cfs/ac. of development area or below existing conditions peak flows, whichever is more restrictive.

To develop rainfall vs. runoff relationships for the development, the Soil Conservation Service (SCS) method was utilized with the PondPack V8i software and employed the following methodology and procedures in determining the respective hydrologic and hydraulic parameters.

- **Runoff Curve Numbers –** The TR-55 Tables 2-2a *(urban areas)* and 2-2c *(agr. Lands)*, "DuPage County Soil Survey", and watershed land use data were utilized to calculate runoff curve numbers *(CN)* for input to the Pond Pack Model. A CN = 98 was used for all impervious surfaces and the area encompassed by the Stormwater Management Facility (SWMF), a CN = 82 was used for the general farmstead, and a CN = 74 (type C soils) was used for all other landscaped pervious surfaces. The CN documentation for the project site is provided in Exhibit 2B for Existing Conditions and Exhibit 2E for Proposed Conditions.

- **Time of Concentration -** The time of concentration *(T_c)* was calculated using SCS TR-55 methodology. The T_c calculations were performed for flow paths representing the travel from the hydraulically most distant point of the watershed to the point of interest. The T_c documentation for the project site is provided in Exhibit 2B for Existing Conditions and Exhibit 2E for Proposed Conditions.

- **Precipitation Data/Rainfall Distribution –** Updated Bulletin 70 northeast rainfall values (March 2019 revision) with Huff rainfall distributions were selected in accordance with Appendix E criteria and the "Technical Guidance" to the Ordinance. Storage volumes were evaluated based on the 100-year frequency 24-hour duration event measuring 8.57 inches of precipitation and the Huff 3rd quartile rainfall distribution. It should be noted that the rainfall data for events lower than the 2-year intensity have not been developed, so the old rainfall data will be used for storms lower than the 2-year events.

- **Stage vs. Storage and Stage vs. Discharge Relationships** - Stage vs. storage relationships for the SWMF were measured within AutoCAD at regular intervals corresponding to the level of potential inundation, and the volume was calculated by the method of average area times the incremental interval. For off-site areas, CEMCON Ltd. surveyed the upstream reservoirs' outlet control structures and supplemented the plans with County topography to develop stage-storage and stage-discharge relationships. Stage vs. discharge relationships were developed in PondPack for all possible combinations of headwater and tailwater. PondPack was then run dynamically to evaluate the headwater

and tailwater at each time step to determine the flow through each structure. Supporting documentation is provided in Exhibit 2B for Existing Conditions and Exhibit 2E for Proposed Conditions.

C. EXISTING CONDITIONS SUMMARY

The Existing Conditions model was run for the 2-year and 100-year 1-hour events through the 24-hour events. The **2-year 2-hour event** and **100-year 1-hour event** were determined to be the critical duration event leaving the site, generating the highest peak flow. The numerical results are summarized along with the proposed results in Table 2 in Section 4.0 below. Refer to Exhibit 2C for the PondPack Model input and output for key events.

3.0 FLOODPLAIN, WETLANDS AND BUFFER ASSESSMENT

During the project-planning phase, the subject site was evaluated for the presence of regulatory floodplains/floodways, wetland habitat, and buffers. This evaluation consisted of a detailed review of available topographic, wetland, and FEMA Maps. Following is an account of the sources referenced and procedures employed in conducting the assessment for the project.

A. FLOODPLAIN EVALUATION

The project site is ultimately tributary to the Rott Creek. The FEMA FIRM Panel 17043C0153J, effective August 1, 2019, shows a large Zone AE floodplain location at Hesterman Drain 3 within the northern section of the site. However based on discussions with DuPage County, the floodplain within the site was mapped incorrectly due to an error within the modeling. The County is in the process of revising the floodplain and is in to the Illinois State Water Survey for review and approval. The discussion with the County stated that the mapped BFE of 740.4 will be revised to an elevation of 738.9 assuming the model will be approved. Refer to Exhibit 1C for copies of the old effective floodplain maps. The revised regulatory floodplain will only encroach onto the north east corner of the site with the revised 738.9 elevation. Furthermore, there is an additional Zone AE floodplain that encroaches the site along northwest corner. The Zone AE floodplain location at Hesterman Drain 4 has a BFE of 739.5. Refer to Section 4.0C for the floodplain analysis.

B. BUFFER ASSESSMENT

The County Ordinance identifies riparian buffer environments as “vegetative areas along waterways within the limits of the regulatory floodplain”. The property as stated above does not contain regulatory floodplain. See the Wetland Delineation Report prepared by V3 Companies of Illinois, Ltd.

C. WETLANDS ASSESSMENT

According to the National Wetland Inventory GIS database, there are wetlands within the development limits. Refer to Exhibit 1E for a copy of the NWI map. A Wetland Delineation Report has been prepared for the site by V3 Companies of Illinois, Ltd. Refer to Exhibit 4A for additional information.

4.0 PROPOSED “WITH PROJECT” CONDITIONS

A. DESCRIPTION

In accordance with the City of Naperville and DuPage County Stormwater Management Ordinance, any proposed site development which would affect the discharge of stormwater requires stormwater management to protect downstream properties. In general, stormwater management facilities (SWMF) are configured to restrict site runoff for the 100-year event to 0.10 cfs/acre or to less than existing conditions, whichever is more restrictive.

Naper Commons will incorporate seven (7) SWMFs (refer to Exhibit 2D for the Proposed Conditions Watershed Exhibit). Proposed SWMF 001 and 007 are located at the northeast corner of the property, and will discharge directly the existing wetland northeast of the site. Proposed SWMF 002, 003 and 004 are located upstream of the existing Nokia SWMF 012. Based on discussions with the City of Naperville, the project will utilize the previously provide storage within the existing Nokia SWMF along with the additional proposed SWMFs. Approximately 13.7 ac/ft of storage was provided within the existing Nokia SWMF 012 for the parking lot on the existing site. Proposed SWMF 005 and 006 consists of two SWMFs with an equalizer pipe directly downstream of the existing Danada Woods SWMF. The existing Danada Woods SWMF restrictor and emergency overflow will remain. Furthermore the existing Danada Woods SWMF utilized approximately 3.5 ac/ft of storage on the proposed site. An onsite only

model has been included for SWMF 005 & 006. The proposed SWMF 005 & 006 will require approximately 3.5 ac/ft of storage and an additional 5.4 ac/ft of storage is provided at overflow to accommodate the required storage onsite for the Danada Woods development. The proposed SWMF 006 will discharge via a restrictor structure to the existing 36" storm sewer tributary to Rott Creek.

The Naper Commons development will require a total of 37.6± ac/ft of storage. The seven onsite SWMFs will provide a combined 26.6± ac/ft of storage and 13.7 ac/ft of storage within the existing Nokia SWMF 012. The site will provide 40.3 ac/ft of combined storage for the proposed site.

B. HYDROLOGIC ANALYSIS

As previously stated, the site runoff for the development has been documented to be in strict conformance with the Ordinance. The proposed condition Pondpack model which accounts for the construction of the proposed stormwater management facilities on the site and the proposed land use has been prepared. This stormwater management analysis was performed to quantify stormwater storage requirements and insure that the required release rates are met in the proposed condition. The proposed release rates were calculated by adding the onsite allowable release rates (0.10 cfs/ac. for the 100yr-24hr) to establish the allowable release rate for the site. Refer to Table 1 for the allowable release rate calculations. Refer to Table 2 for a comparison between the existing and proposed total peak flows for the 2-Year and 100-Year 1Hr through 24 Hour events. See Exhibit 2G for the "PROP" PondPack Model and Output.

Table 1: Allowable Release (100-year, 24 Hour Event)

	DURATION
100 Yr	**24 Hr**
Dev. Area Allowable Release (cfs/ac.)	0.10
Development Area (Ac.)	62.81
(A) Development Allowable Release (cfs)	6.28
(B) By-Pass Flow (Danada Woods O-13) (cfs)	1.89
(A+B) Total Allowable Release (cfs)	8.17
Prop. Release (O-1 NE + O-7 SE + O-13 SE + O-8 EX NOKIA012) (cfs)	8.11

Table 2: Total Peak Discharge (cfs) Summary

Event	1-Hr	2-Hr	3-Hr	6-Hr	12-Hr	18-Hr	24-Hr
100-Year							
Proposed Peak Discharge (cfs)	5.80	6.56	6.87	7.33	7.79	8.02	8.11
Existing Peak Discharge (cfs)	129.44	128.30	117.85	88.95	60.84	49.45	43.30
2-Year							
Proposed Peak Discharge (cfs)	2.16	2.70	2.94	3.77	4.30	4.57	4.69
Existing Peak Discharge (cfs)	19.26	20.48	19.68	17.30	14.59	13.65	11.63

As evidenced by the results, the proposed improvements significantly reduce peak flows leaving the site. The critical events in proposed conditions are now the **2-year 24-hour event** and the **100-year, 24-hour event**.

C. FLOODPLAIN ANALYSIS

The existing Hesterman Drain 4 is floodplain located onsite along the north west property line has a BFE of 739.5. The existing floodplain is within lots 135-139 these lots will require fill with in the floodplain to remove them from the floodplain. Per the Ordinance section 15.81.D.1, any placement of fill, structures, or other materials above grade in the floodplain shall require

compensatory storage equal to at least 1.5 times the volume of floodplain storage displacement. A proposed cut of 0.10 ac/ft versus a fill of 0.06 ac/ft yields a **1.7 cut to fill ratio**, satisfying the Ordinance requirements. Additionally the existing Hesterman Drain 3 floodplain located onsite along the northeast corner of the site will not include any fill within the floodplain with the proposed development. See Exhibit 3K for supporting documentation. A LOMR will be prepared and submitted to FEMA to re-map the floodplain on-site.

5.0 POST CONSTRUCTION BEST MANAGEMENT PRACTICES

In accordance with the Ordinance, this development will include Post-Construction Best Management Practices (PCBMP). The required PCBMP will be provided via naturalized wetland bottom stormwater management facilities with sediment pools.

SOIL EROSION AND SEDIMENTATION CONTROL PLAN

Soil erosion and sediment control measures will be proposed to protect downstream properties and the Special Management Areas from adverse effects of soil erosion and sedimentation. The proposed erosion and sediment control features will include:

- Storm sewer inlets protected with sediment trapping/filter control devices during.
- Silt fencing installed along the site perimeter and a double row of silt fence along wetland, buffer and floodplain areas.
- Construction entrance(s) will be implemented to minimize the impact to adjacent roadways.
- Temporary triangular silt dikes within the drainage swales.
- Disturbed areas permanently seeded and protected from soil erosion after final grading is accomplished.

7.0 SUMMARY

Pulte Home Company, LLC., proposes to develop a 67.6± acre parcel of land situated west of Naperville Road, North of W Lucent Lane in Naperville, DuPage County. The development will

consist of 174 single family homes and 70 townhome subdivision. Stormwater storage/management is required to control runoff from the site per the County Ordinance.

A hydrologic analysis was performed utilizing Pondpack to verify compliance with the County Ordinance. The stormwater management systems proposed meet and exceed the requirements of DuPage County. Additionally, as demonstrated by the PondPack model results, the proposed development will significantly reduce flows downstream and provide a net watershed benefit.

H:\402138\REPORTS\2020-10-16 REVISED Prelim SWM Report.doc

TAB 1

PROJECT OVERVIEW

EXHIBIT 1A

STORMWATER MANAGEMENT CERTIFICATION

DUPAGE COUNTY STORMWATER MANAGEMENT CERTIFICATION APPLICATION (1/2)

1. Community and Status	2. Date of Application	3. Stormwater Application No. (to be assigned by community)	4. DuPage County Tracking No.
Naperville ☐ Non ☑ Partial ☐ Complete		___ ___ ___ ___ ___ ___ ___	

5. Applicant:

Name: Ty Morris

Company Name: Pulte Home Company, LLC

Address: 1900 E. Golf Road, Suite 300

City, ST, Zip: Schaumburg, IL 60195

Phone: 630-201-3411

Email: Ty.Morris@Pulte.com

6. Owner:

Name: Ty Morris

Company Name: Pulte Home Company, LLC

Address: 1900 E. Golf Road, Suite 300

City, ST, Zip: Schaumburg, IL 60195

Phone: 630-201-3411

Email: Ty.Morris@Pulte.com

7. Description of Proposed Development: Development of a 67.6 Acre, 174-lot single-family and 70 mult-family subdivision in Naperville IL, DuPage County. Improvements include mass earthwork, underground utilities, and stormwater management and conveyance improvements.

8. Location of Development:

Address: W of Naperville Rd, N of W Lucent LN
Naperville, IL

Municipality: Naperville, DuPage County

Watershed Planning Area & Trib: Rott Creek

9. Legal Description

32 (¼ Section) 39N (Township) 10E (Range)

PIN 05 - 32 - 300 - 012

PIN 08 - 05 - 207 - 034

10. Check all of the conditions which apply:

☑ Flood Plain ☑ Stormwater Detention ☑ Best Management Practices ☑ Soil Erosion & Sediment Control

☑ Wetland ☑ Wetland Buffer ☐ Riparian Buffer

11. Acknowledgement of On-Site Infiltration PCBMPs

I acknowledge that I have used my best effort to identify zones for which on-site infiltration are prohibited for Post Construction Best Management Practices (PCBMPs) in accordance with the Ordinance (15-63.B)

Signature of Applicant | Ty Morris. (Print Name) | 9-14-20 (Date)

12. Freedom of Information Act (FOIA)

I acknowledge that all architects' drawings, engineers' technical submissions and other construction-related technical documents containing stormwater management information submitted with this application may be made available for inspection or copying by the County, notwithstanding 5 ILCS 140/7(1)(k), upon the written request for such materials. Such productions will be restricted to the following parties: i) the Applicant ii) any subsequent owner of the subject property; or iii) any governmental unit having planning or drainage jurisdiction within 1 and ½ mile of the subject property.

Signature of Applicant | Ty Morris. (Print Name) | 9-14-20 (Date)

Signature of Owner | Ty Morris (Print Name) | 9-14-20 (Date)

13. Statement of Opinion for Minimum Criteria for Stormwater Management

I am a Professional Engineer under the employment of the Applicant. It is my professional opinion that the development meets the minimum criteria for stormwater management in accordance with the Ordinance (15-36)

Signature of Professional Engineer | Christopher R. Morgart, P.E. (Print Name) | 9/14/20 (Date)

_____ Community Copy _____ DuPage County SM Copy _____ Applicant Copy

DUPAGE COUNTY STORMWATER MANAGEMENT CERTIFICATION APPLICATION (2/2)

Community Tracking No:	DuPage County Tracking No:
_ _ _ _ _ _ _ _ _ _	

14. Statement of Opinion for Presence of Flood Plain, Wetlands, and Buffers (15-47-A.5)

☑ I acknowledge the presence of flood plain. ☐ I deny the presence of flood plain.	☑ I acknowledge the presence of wetlands. ☐ I deny the presence of wetlands.	☑ I acknowledge the presence of buffers. ☐ I deny the presence of buffers.
Signature of Qualified Professional — Date: 9/14/20	Signature of Qualified Professional — Date: 9/14/20	Signature of Qualified Professional — Date: 9/14/20
Christopher R. Morgart, P.E. Printed Name	Christopher R. Morgart, P.E. Printed Name	Christopher R. Morgart, P.E. Printed Name

15. Soil Erosion & Sediment Control Submittal Requirements (15-50.B)
(For developments with less than 1 acre of land disturbance that are not part of a larger common plan)

I certify that the development meets the soil erosion and sediment control design criteria found in Article VII have been met.

Signature of Qualified Designer — Print Name: n/a — Date

16. Soil Erosion & Sediment Control Requirements (15-59.W) **(For developments with land disturbing activities greater than 1 acre)**

I acknowledge that the site complies with the IEPA NPDES ILR10 Permit.

Signature of Applicant — Print Name: Ty Morris — Date: 9-14-20

17. Acknowledgement of Required As-Built Plans (15-47.B)

I acknowledge that a record drawing signed by either a Professional Engineer or a Professional Land Surveyor depicting the as-constructed size, rim, and invert elevations of pipes, stormwater structures and culverts, and contours and flood storage volumes of all required basins of the major stormwater systems and minor stormwater systems shall be submitted for review and approval upon completion of the stormwater facilities.

Signature of Owner — Print Name: Ty Morris — Date: 9-14-20

18. Intentional Misrepresentation Under Penalty of Perjury

I declare that I have examined and/or made this application and rider, and it is true and correct to the best of my knowledge and belief. I realize that the information that I have affirmed hereon forms a basis for the issuance of the stormwater management certification(s) herein applied for and approval of plans in connection therewith shall not be construed to permit any construction upon said premises or use thereof in violation of any provision of any applicable ordinance or to excuse the owner or his successors in title from complying therewith. The Owner and Applicant each understand and agree to construct said improvement in compliance with all provisions of the applicable ordinances.

Signature of Applicant — Print Name: Ty Morris — Date: 9-14-20

Signature of Owner — Print Name: Ty Morris — Date: 9-14-20

DO NOTWRITE BELOW THIS LINE

19. Security (15-54)

Stormwater Facilities	$ _____
Wetlands/Natural Area	$ _____
SE/SC	$ _____
Total	$ _____

20. Stormwater Fees

Community Review	$ _____	
DCSM Review	$ _____	
Fee-in-Lieu	$ _____ Wetland	$ _____ BMP

Seal/Stamp
Certifications expire December 31st of the third year of Certification or Authorization, whichever is earlier.

21. Final Approvals (See Certification letter for special conditions and general conditions.)

Community Certification — Date _____ — Approved by/title _____

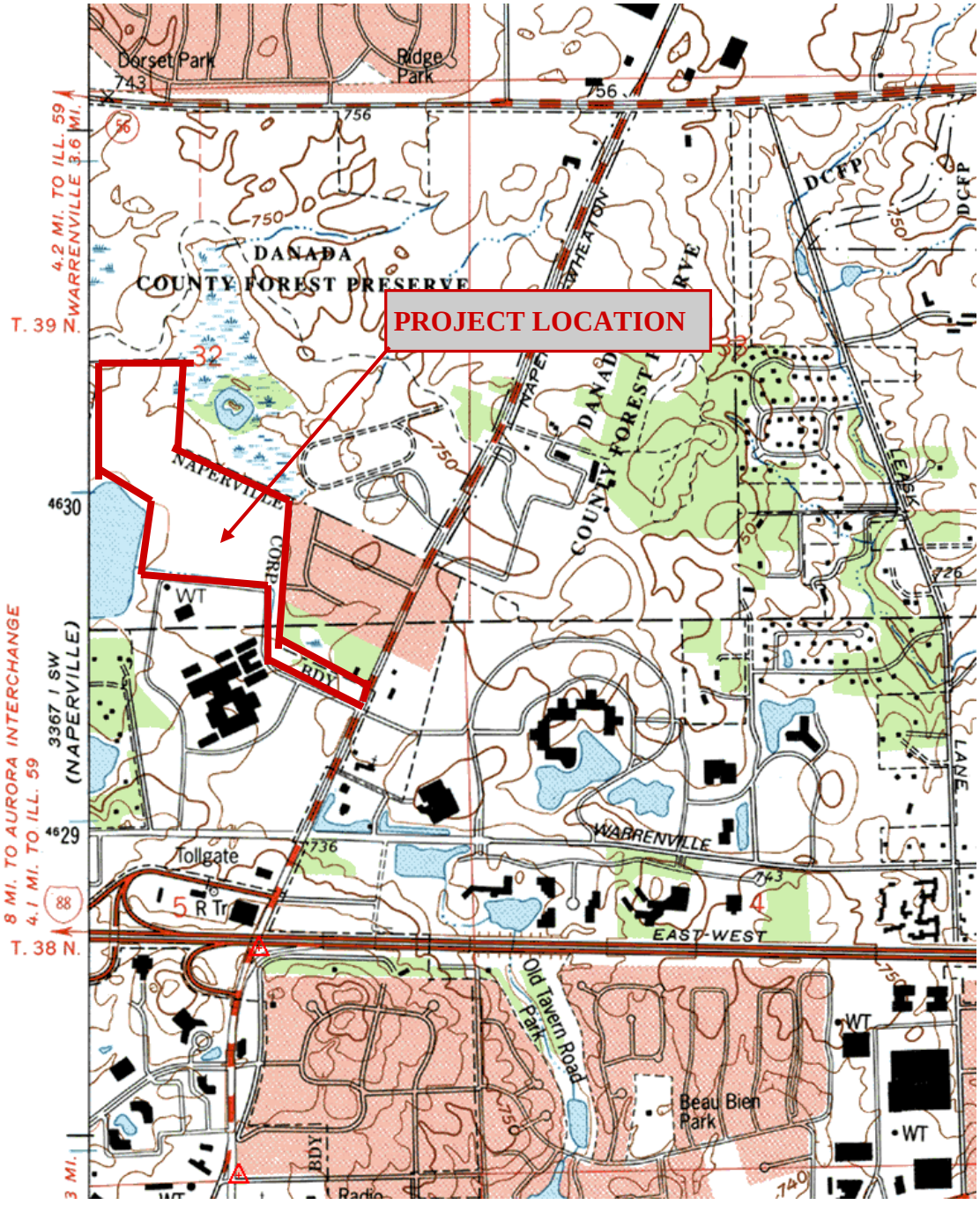
County Authorization — Date _____ — Approved by/title _____

_____ Community Copy _____ DuPage County SM Copy _____ Applicant Copy

EXHIBIT 1B

LOCATION MAP

Naper Commons
T39N, R10E, SEC. 32
WHEATON QUADRANGLE



CEMCON, Ltd.	PROJECT / CLIENT: Pulte Home Company, LLC 1900 E. Golf Road, Suite 300 Schaumburg, IL 60173 847-230-5400	DRAWN BY:	ARF 9/13/20
		CHECKED BY:	
		APPROVED:	
		SCALE: N.T.S.	

EXHIBIT 1C

FIRM PANEL FM17043C0153J

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. [illegible]

Coastal Base Flood Elevations [illegible]

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. [illegible]

[illegible]

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 16. The **horizontal datum** was NAD 83, GRS80 spheroid. [illegible]

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. [illegible]

[illegible]

Base map information shown on this FIRM was provided in digital format by the DuPage County Board of Commissioners. [illegible]

[illegible]

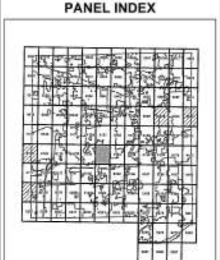
Corporate limits shown on this map are based on the best data available at the time of publication. [illegible]

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; [illegible]

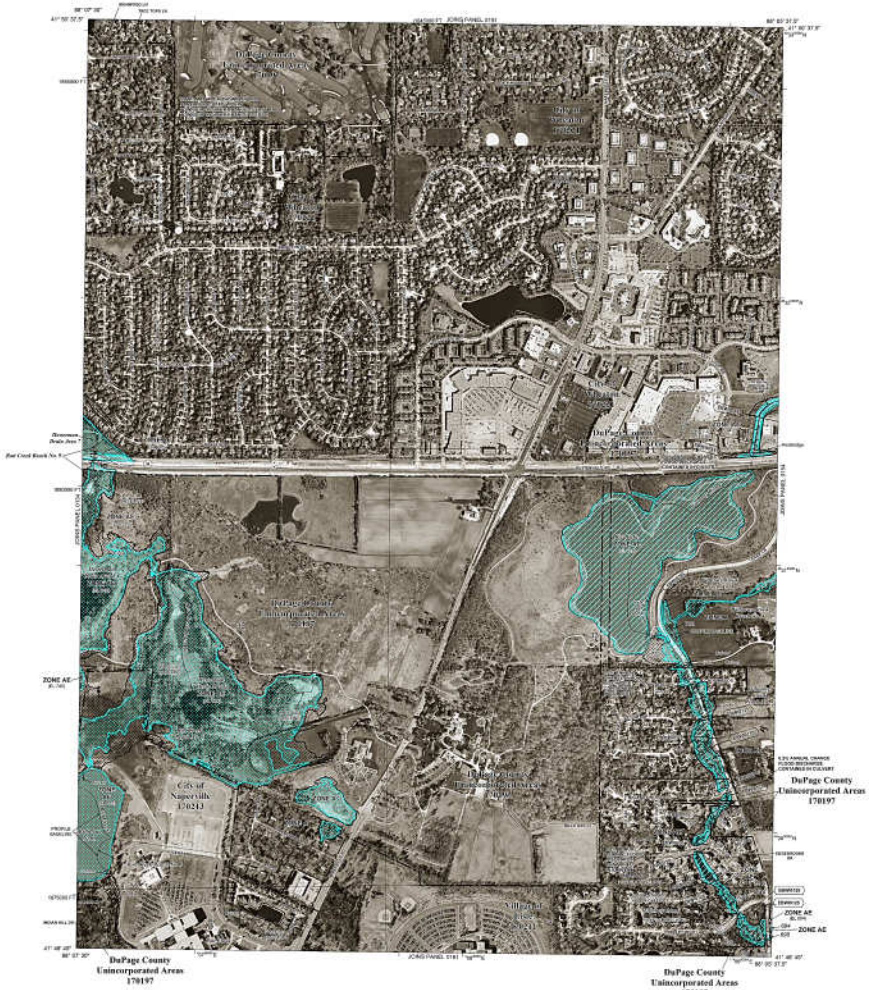
For information on available products associated with this FIRM visit the Map Service Center (MSC) website [illegible]

If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website [illegible]

PANEL INDEX



Panel Not Printed



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

[illegible]

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	[illegible]
ZONE AO	[illegible]
ZONE AR	[illegible]
ZONE A99	[illegible]
ZONE V	[illegible]
ZONE VE	[illegible]

FLOODWAY AREAS IN ZONE AE

[illegible]

OTHER FLOOD AREAS

ZONE X [illegible]

OTHER AREAS

ZONE X [illegible]

ZONE D [illegible]

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

[illegible]

MAP SCALE 1" = 500'

NFIP	PANEL 0153J

FIRM
FLOOD INSURANCE RATE MAP
DU PAGE COUNTY, ILLINOIS
AND INCORPORATED AREAS

PANEL 153 OF 287

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

NATIONAL FLOOD INSURANCE PROGRAM

MAP NUMBER
17043C0153J

MAP REVISED
AUGUST 1, 2019

Federal Emergency Management Agency

EXHIBIT 1D

DUPAGE COUNTY SOILS MAP

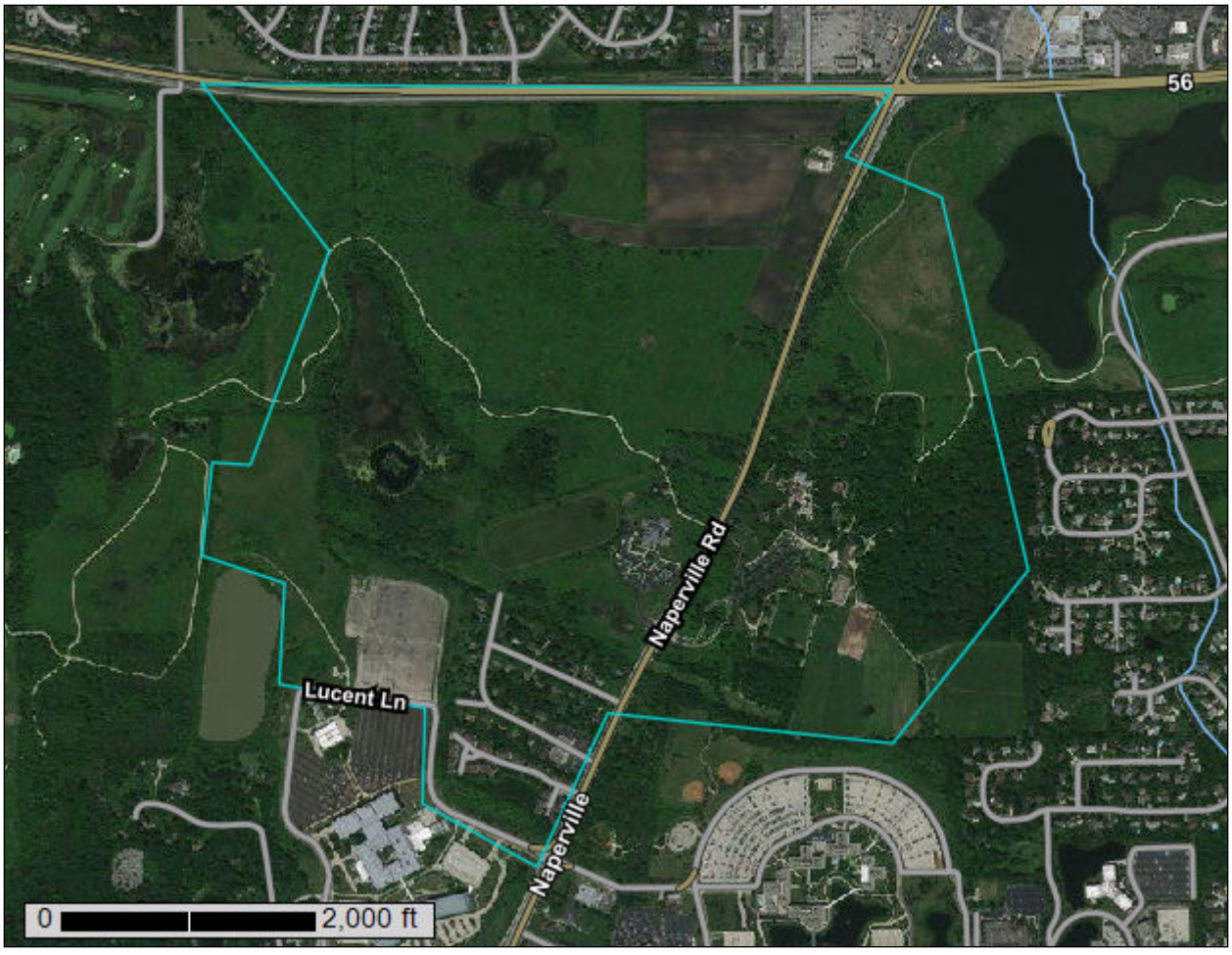
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for DuPage County, Illinois



September 2, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Map Scale: 1:4,630 if printed on D landscape (34" x 22") sheet.

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: DuPage County, Illinois
Survey Area Data: Version 16, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 10, 2016—Oct 8, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
69A	Milford silty clay loam, 0 to 2 percent slopes	34.3	5.3%
146A	Elliott silt loam, 0 to 2 percent slopes	64.0	9.9%
189A	Martinton silt loam, 0 to 2 percent slopes	40.5	6.3%
192A	Del Rey silt loam, 0 to 2 percent slopes	0.0	0.0%
223C2	Varna silt loam, 4 to 6 percent slopes, eroded	12.7	2.0%
232A	Ashkum silty clay loam, 0 to 2 percent slopes	105.0	16.2%
298A	Beecher silt loam, 0 to 2 percent slopes	24.7	3.8%
298B	Beecher silt loam, 2 to 4 percent slopes	1.6	0.2%
330A	Peotone silty clay loam, 0 to 2 percent slopes	39.5	6.1%
443B	Barrington silt loam, 2 to 4 percent slopes	7.8	1.2%
530B	Ozaukee silt loam, 2 to 4 percent slopes	1.0	0.2%
530C2	Ozaukee silt loam, 4 to 6 percent slopes, eroded	22.5	3.5%
530D2	Ozaukee silt loam, 6 to 12 percent slopes, eroded	3.1	0.5%
531B	Markham silt loam, 2 to 4 percent slopes	127.5	19.7%
531C2	Markham silt loam, 4 to 6 percent slopes, eroded	37.8	5.8%
614A	Chenoa silty clay loam, 0 to 2 percent slopes	0.2	0.0%
698B	Grays silt loam, 2 to 4 percent slopes	35.8	5.5%
805B	Orthents, clayey, undulating	49.8	7.7%
830	Landfills	10.3	1.6%
1903A	Muskego and Houghton mucks, undrained, 0 to 2 percent slopes	26.2	4.1%
W	Water	2.2	0.3%
Totals for Area of Interest		**646.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas

shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

DuPage County, Illinois

69A—Milford silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2smzk
Elevation: 510 to 930 feet
Mean annual precipitation: 34 to 40 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 155 to 190 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Milford, drained, and similar soils: 93 percent
Minor components: 7 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Milford, Drained

Setting

Landform: Depressions on lake plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Clayey lacustrine deposits

Typical profile

Ap - 0 to 9 inches: silty clay loam
A - 9 to 22 inches: silty clay
Bg - 22 to 50 inches: silty clay loam
Cg - 50 to 60 inches: stratified sandy loam to silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R110XY008IL - Wet Glacial Drift Upland Prairie
Hydric soil rating: Yes

Minor Components

Peotone, drained

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Urban land

Percent of map unit: 1 percent
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Orthents, clayey

Percent of map unit: 1 percent
Landform: Ground moraines, lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

146A—Elliott silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2sss0
Elevation: 570 to 930 feet
Mean annual precipitation: 33 to 42 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 150 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Elliott and similar soils: 94 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Elliott

Setting

Landform: Till plains, ground moraines
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Thin mantle of loess or other silty material over silty clay loam till

Typical profile

Ap - 0 to 6 inches: silt loam
A - 6 to 11 inches: silty clay loam
Bt1 - 11 to 16 inches: silty clay
2Bt2 - 16 to 41 inches: silty clay loam
2Cd - 41 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 29 to 45 inches to densic material
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C/D
Ecological site: R110XY007IL - Moist Glacial Drift Upland Prairie, R111DY012IN - Till Ridge Prairie
Hydric soil rating: No

Minor Components

Ashkum, drained

Percent of map unit: 4 percent
Landform: Ground moraines, till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Orthents, clayey

Percent of map unit: 1 percent
Landform: Ground moraines, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Urban land

Percent of map unit: 1 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve

Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

189A—Martinton silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 64sv
Elevation: 510 to 980 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Martinton and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Martinton

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Lacustrine deposits

Typical profile

H1 - 0 to 12 inches: silt loam
H2 - 12 to 39 inches: silty clay loam
H3 - 39 to 60 inches: stratified sandy loam to silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Available water capacity: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C/D

Ecological site: R110XY007IL - Moist Glacial Drift Upland Prairie
Hydric soil rating: No

Minor Components

Milford
Percent of map unit: 4 percent
Landform: Lake plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R110XY008IL - Wet Glacial Drift Upland Prairie
Hydric soil rating: Yes

Urban land
Percent of map unit: 2 percent
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Orthents, clayey
Percent of map unit: 2 percent
Landform: Ground moraines, lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

192A—Del Rey silt loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 64sz
Elevation: 510 to 980 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Del rey and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Del Rey

Setting
Landform: Lake plains
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Rise

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Lacustrine deposits

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 9 inches: silt loam
H3 - 9 to 33 inches: silty clay
H4 - 33 to 41 inches: silty clay loam
H5 - 41 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Available water capacity: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F110XY012IL - Moist Glacial Drift Upland Forest
Hydric soil rating: No

Minor Components

Orthents, clayey

Percent of map unit: 2 percent
Landform: Ground moraines, lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Milford

Percent of map unit: 2 percent
Landform: Lake plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R110XY008IL - Wet Glacial Drift Upland Prairie
Hydric soil rating: Yes

Montgomery

Percent of map unit: 2 percent
Landform: Swales
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf

Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY008IL - Wet Glacial Drift Upland Prairie
Hydric soil rating: Yes

Urban land

Percent of map unit: 2 percent
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

223C2—Varna silt loam, 4 to 6 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2yrqw
Elevation: 520 to 950 feet
Mean annual precipitation: 34 to 42 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 140 to 185 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Varna, eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Varna, Eroded

Setting

Landform: Ground moraines, end moraines
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over silty clay loam or clay loam till

Typical profile

Ap - 0 to 9 inches: silt loam
2Bt1 - 9 to 30 inches: silty clay loam
2Bt2 - 30 to 48 inches: silty clay loam
2Cd - 48 to 60 inches: silty clay loam

Properties and qualities

Slope: 4 to 6 percent
Depth to restrictive feature: 24 to 55 inches to densic material
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None

Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R110XY007IL - Moist Glacial Drift Upland Prairie, R108AY006IL - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Ashkum, drained

Percent of map unit: 6 percent
Landform: Ground moraines, end moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Orthents, clayey

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Urban land

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

232A—Ashkum silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2ssrw
Elevation: 520 to 930 feet
Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 160 to 190 days

Farmland classification: Prime farmland if drained

Map Unit Composition

Ashkum, drained, and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ashkum, Drained

Setting

Landform: Ground moraines, end moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Clayey colluvium over till

Typical profile

Ap - 0 to 12 inches: silty clay loam
Bg1 - 12 to 29 inches: silty clay
2Bg2 - 29 to 54 inches: silty clay loam
2Cg - 54 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Minor Components

Peotone, drained

Percent of map unit: 5 percent
Landform: Depressions on ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Orthents, clayey

Percent of map unit: 2 percent
Landform: Lake plains, ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Urban land

Percent of map unit: 1 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

298A—Beecher silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2ytq0
Elevation: 520 to 900 feet
Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 160 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Beecher and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Beecher

Setting

Landform: Ground moraines, end moraines
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over silty clay loam or clay loam till

Typical profile

Ap - 0 to 13 inches: silt loam
2Bt1 - 13 to 21 inches: silty clay loam
2Bt2 - 21 to 37 inches: silty clay loam
2Cd - 37 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 24 to 45 inches to densic material
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Ashkum, drained

Percent of map unit: 6 percent
Landform: End moraines, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Urban land

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Orthents, clayey

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

298B—Beecher silt loam, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: 2ytq1
Elevation: 520 to 960 feet
Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 160 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Beecher and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Beecher

Setting

Landform: Ground moraines, end moraines
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over silty clay loam or clay loam till

Typical profile

Ap - 0 to 13 inches: silt loam
2Bt1 - 13 to 21 inches: silty clay loam
2Bt2 - 21 to 37 inches: silty clay loam
2Cd - 37 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: 24 to 45 inches to densic material
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Ashkum, drained
Percent of map unit: 6 percent
Landform: End moraines, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Urban land
Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Orthents, clayey
Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

330A—Peotone silty clay loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 2sn05
Elevation: 500 to 1,020 feet
Mean annual precipitation: 33 to 43 inches
Mean annual air temperature: 46 to 55 degrees F
Frost-free period: 140 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Peotone, drained, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peotone, Drained

Setting
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip

Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty and clayey colluvium

Typical profile

Ap - 0 to 7 inches: silty clay loam
Bg1 - 7 to 27 inches: silty clay loam
Bg2 - 27 to 50 inches: silty clay
Cg - 50 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Minor Components

Peotone, long duration ponding

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

443B—Barrington silt loam, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: 64vm
Elevation: 510 to 1,020 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Barrington and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Barrington

Setting

Landform: Stream terraces, lake plains, outwash plains
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess or other silty material and in the underlying outwash

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 32 inches: silty clay loam
H3 - 32 to 42 inches: silt loam
H4 - 42 to 60 inches: stratified fine sand to silt loam

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Available water capacity: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R110XY007IL - Moist Glacial Drift Upland Prairie
Hydric soil rating: No

Minor Components

Drummer

Percent of map unit: 4 percent
Landform: Outwash plains, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108AY013IL - Wet Outwash Prairie, R110XY008IL - Wet Glacial Drift Upland Prairie
Hydric soil rating: Yes

Pella

Percent of map unit: 2 percent

Landform: Outwash plains, ground moraines, lake plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R110XY008IL - Wet Glacial Drift Upland Prairie
Hydric soil rating: Yes

Orthents, loamy

Percent of map unit: 1 percent
Landform: Outwash plains, ground moraines, lake plains
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Urban land

Percent of map unit: 1 percent
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

530B—Ozaukee silt loam, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: 2sn06
Elevation: 550 to 980 feet
Mean annual precipitation: 35 to 41 inches
Mean annual air temperature: 47 to 52 degrees F
Frost-free period: 140 to 185 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ozaukee and similar soils: 94 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ozaukee

Setting

Landform: End moraines, ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Thin mantle of loess over silty clay loam till

Typical profile

Ap - 0 to 4 inches: silt loam
BE - 4 to 10 inches: silt loam

2Bt1 - 10 to 21 inches: silty clay
2Bt2 - 21 to 39 inches: silty clay loam
2Cd - 39 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: 23 to 45 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F110XY012IL - Moist Glacial Drift Upland Forest
Hydric soil rating: No

Minor Components

Ashkum, drained

Percent of map unit: 4 percent
Landform: Ground moraines, end moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Urban land

Percent of map unit: 1 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Orthents, clayey

Percent of map unit: 1 percent
Landform: Ground moraines
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

530C2—Ozaukee silt loam, 4 to 6 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2sn07
Elevation: 540 to 980 feet
Mean annual precipitation: 35 to 42 inches
Mean annual air temperature: 47 to 53 degrees F
Frost-free period: 140 to 185 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ozaukee, eroded, and similar soils: 96 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ozaukee, Eroded

Setting

Landform: End moraines, ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin mantle of loess over silty and clayey till

Typical profile

Ap - 0 to 7 inches: silt loam
2Bt1 - 7 to 26 inches: silty clay
2Bt2 - 26 to 37 inches: silty clay loam
2Cd - 37 to 60 inches: silty clay loam

Properties and qualities

Slope: 4 to 6 percent
Depth to restrictive feature: 22 to 45 inches to densic material
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F110XY011IL - Dry Glacial Drift Upland Forest

Hydric soil rating: No

Minor Components

Orthents, clayey

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Urban land

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

530D2—Ozaukee silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2sn0j
Elevation: 520 to 1,000 feet
Mean annual precipitation: 31 to 42 inches
Mean annual air temperature: 46 to 53 degrees F
Frost-free period: 135 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ozaukee, eroded, and similar soils: 93 percent
Minor components: 7 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ozaukee, Eroded

Setting

Landform: End moraines, ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over wisconsinan age silty and clayey till

Typical profile

Ap - 0 to 7 inches: silt loam
Bt1 - 7 to 11 inches: silty clay loam
2Bt2 - 11 to 27 inches: silty clay

2BCt - 27 to 32 inches: silty clay loam
2Cd - 32 to 60 inches: silty clay loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 22 to 39 inches to densic material
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F110XY011IL - Dry Glacial Drift Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Blount, lake michigan lobe

Percent of map unit: 3 percent
Landform: End moraines, ground moraines
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F110XY012IL - Moist Glacial Drift Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Urban land

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Ozaukee, severely eroded

Percent of map unit: 2 percent
Landform: End moraines, ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F110XY012IL - Moist Glacial Drift Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

531B—Markham silt loam, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: 2ytpr
Elevation: 540 to 900 feet
Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 160 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Markham and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Markham

Setting

Landform: Ground moraines, end moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over silty clay loam till

Typical profile

Ap - 0 to 8 inches: silt loam
2Bt1 - 8 to 21 inches: silty clay loam
2Bt2 - 21 to 32 inches: silty clay loam
2Cd - 32 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: 20 to 55 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R110XY010IL - Moist Glacial Drift Upland Savanna

Hydric soil rating: No

Minor Components

Ashkum, drained

Percent of map unit: 6 percent
Landform: Ground moraines, end moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Orthents, clayey

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Urban land

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

531C2—Markham silt loam, 4 to 6 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2ytps
Elevation: 620 to 920 feet
Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 160 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Markham, eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Markham, Eroded

Setting

Landform: Ground moraines, end moraines

Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over silty clay loam till

Typical profile

Ap - 0 to 8 inches: silt loam
2Bt1 - 8 to 21 inches: silty clay loam
2Bt2 - 21 to 32 inches: silty clay loam
2Cd - 32 to 60 inches: silty clay loam

Properties and qualities

Slope: 4 to 6 percent
Depth to restrictive feature: 20 to 55 inches to densic material
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R110XY010IL - Moist Glacial Drift Upland Savanna
Hydric soil rating: No

Minor Components

Ashkum, drained

Percent of map unit: 6 percent
Landform: Ground moraines, end moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Orthents, clayey

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Urban land

Percent of map unit: 2 percent
Landform: Ground moraines

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

614A—Chenoa silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t706
Elevation: 590 to 800 feet
Mean annual precipitation: 34 to 40 inches
Mean annual air temperature: 48 to 53 degrees F
Frost-free period: 155 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Chenoa and similar soils: 94 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chenoa

Setting

Landform: Ground moraines, end moraines
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over till

Typical profile

Ap - 0 to 12 inches: silty clay loam
Btg - 12 to 32 inches: silty clay loam
2Bt - 32 to 36 inches: silty clay loam
2C - 36 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R110XY007IL - Moist Glacial Drift Upland Prairie, R108AY006IL - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Elpaso, drained

Percent of map unit: 3 percent
Landform: Ground moraines, swales
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R108AY007IL - Wet Loess Upland Prairie, R108AY008IL - Ponded Loess Sedge Meadow, R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Ashkum, drained

Percent of map unit: 3 percent
Landform: Ground moraines, swales
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

698B—Grays silt loam, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: 64wn
Elevation: 510 to 1,020 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Grays and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Grays

Setting

Landform: Outwash plains, stream terraces, lake plains

Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess or other silty material and in the underlying outwash

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 11 inches: silt loam
H3 - 11 to 34 inches: silty clay loam
H4 - 34 to 42 inches: loam
H5 - 42 to 60 inches: stratified loamy sand to silt loam

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Available water capacity: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R110XY010IL - Moist Glacial Drift Upland Savanna
Hydric soil rating: No

Minor Components

Urban land

Percent of map unit: 2 percent
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Drummer

Percent of map unit: 2 percent
Landform: Outwash plains, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108AY013IL - Wet Outwash Prairie, R110XY008IL - Wet Glacial Drift Upland Prairie
Hydric soil rating: Yes

Pella

Percent of map unit: 2 percent
Landform: Outwash plains, ground moraines, lake plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf

Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R110XY008IL - Wet Glacial Drift Upland Prairie
Hydric soil rating: Yes

Orthents, loamy

Percent of map unit: 2 percent
Landform: Outwash plains, ground moraines, lake plains
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

805B—Orthents, clayey, undulating

Map Unit Setting

National map unit symbol: 64wv
Elevation: 510 to 980 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 140 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Orthents, clayey, undulating, and similar soils: 91 percent
Minor components: 9 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Orthents, Clayey, Undulating

Setting

Landform: Lake plains, ground moraines
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Earthy fill

Typical profile

H1 - 0 to 7 inches: silty clay
H2 - 7 to 60 inches: silty clay

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: 4 to 10 inches to densic material
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 24 to 42 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water capacity: Very low (about 0.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Ashkum

Percent of map unit: 3 percent
Landform: Ground moraines, end moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY008IL - Wet Glacial Drift Upland Prairie
Hydric soil rating: Yes

Urban land

Percent of map unit: 3 percent
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bryce

Percent of map unit: 2 percent
Landform: Glacial lakes (relict), ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY008IL - Wet Glacial Drift Upland Prairie
Hydric soil rating: Yes

Aquents, clayey

Percent of map unit: 1 percent
Landform: Lake plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

830—Landfills

Map Unit Setting

National map unit symbol: 64s5
Elevation: 680 to 1,020 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Orthents, landfill: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Orthents, Landfill

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: Unranked

1903A—Muskego and Houghton mucks, undrained, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 64sx
Elevation: 510 to 930 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Muskego and similar soils: 50 percent
Houghton and similar soils: 45 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Muskego

Setting

Landform: Ground moraines, outwash plains, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave

Across-slope shape: Concave
Parent material: Herbaceous organic material over coprogenic material

Typical profile
O1 - 0 to 5 inches: muck
O2 - 5 to 27 inches: muck
L3 - 27 to 60 inches: coprogenous silt loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 60 percent
Available water capacity: Very high (about 17.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: R110XY021IL - Ponded Organic Alkaline Peatland, R110XY024IL - Ponded Depressional Sedge Meadow, R110XY020IL - Ponded Organic Acidic Peatland
Hydric soil rating: Yes

Description of Houghton

Setting
Landform: Depressions, ground moraines, outwash plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material

Typical profile
O1 - 0 to 19 inches: muck
O2 - 19 to 60 inches: muck

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: Very high (about 23.9 inches)

Interpretive groups
Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Ecological site: R110XY021IL - Ponded Organic Alkaline Peatland, R110XY024IL - Ponded Depressional Sedge Meadow, R110XY020IL - Ponded Organic Acidic Peatland
Hydric soil rating: Yes

Minor Components

Drummer
Percent of map unit: 5 percent
Landform: Outwash plains, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R110XY008IL - Wet Glacial Drift Upland Prairie
Hydric soil rating: Yes

W—Water

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydric soil rating: Unranked

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EXHIBIT 1E

NATIONAL WETLANDS INVENTORY MAP

U.S. Fish and Wildlife Service
National Wetlands Inventory

Nokia Site

November 9, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

EXHIBIT 1F

RELEVANT PERMITS

Illinois Department of
Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
http://dnr.state.il.us

JB Pritzker, Governor

Colleen Callahan, Director

May 01, 2019

Alicia Metzger
V3 Companies
7325 Janes Ave.
Woodridge, IL 60517

RE: 1960 & 2000 Lucent Ln and Vacant Prop to NW
Project Number(s): 1910300 [19112]
County: DuPage

Dear Applicant:

This letter is in reference to the project you recently submitted for consultation. The natural resource review provided by EcoCAT identified protected resources that may be in the vicinity of the proposed action. The Department has evaluated this information and concluded that adverse effects are unlikely. Therefore, consultation under 17 Ill. Adm. Code Part 1075 is terminated.

This consultation is valid for two years unless new information becomes available that was not previously considered; the proposed action is modified; or additional species, essential habitat, or Natural Areas are identified in the vicinity. If the project has not been implemented within two years of the date of this letter, or any of the above listed conditions develop, a new consultation is necessary.

The natural resource review reflects the information existing in the Illinois Natural Heritage Database at the time of the project submittal, and should not be regarded as a final statement on the site being considered, nor should it be a substitute for detailed site surveys or field surveys required for environmental assessments. If additional protected resources are encountered during the project's implementation, you must comply with the applicable statutes and regulations. Also, note that termination does not imply IDNR's authorization or endorsement of the proposed action.

Please contact me if you have questions regarding this review.

Justin Dillard
Division of Ecosystems and Environment
217-785-5500

TAB 2

STORMWATER SUBMITTAL

EXHIBIT 2A

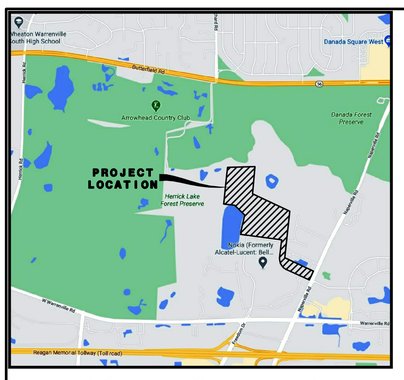
EXISTING CONDITIONS

WATERSHED EXHIBIT

EXISTING WATERSHED EXHIBIT

FOR

NAPER COMMONS



LOCATION MAP

N

100 50 0 100

SCALE: 1 INCH = 100 FEET

SUBAREA 001
3.22 Ac.
CN = 69.5
Tc = 0.605

SUBAREA 002
14.23 Ac.
CN = 71.0
Tc = 0.681

SUBAREA 003
39.53 Ac.
CN = 81.8
Tc = 0.625

SUBAREA 010
39.37 Ac.
CN = 82.7
Tc = 0.471

SUBAREA 004
7.68 Ac.
CN = 67.5
Tc = 0.482

LEGEND

WATERSHED BOUNDARY

OVERLAND DRAINAGE ARROW

PREPARED FOR:

PULTE HOME COMPANY, LLC
1900 E. GOLF ROAD, SUITE 300
SCHAUMBURG, IL 60173
(847) 230-5400

PREPARED BY:

CEMCON, Ltd.
Consulting Engineers, Land Surveyors & Planners
2280 White Oak Circle, Suite 100
Aurora, Illinois 60502-9675
PH: 630.862.2100 FAX: 630.862.2199
E-Mail: cadd@cemcon.com Website: www.cemcon.com

DISC NO.: 402138 FILE NAME: WATERSHED
DRAWN BY: LAL FLD. BK. / PG. NO.: NOTES
COMPLETION DATE: 09-14-20 JOB NO.: 402.138
XREF : TOPO PROJECT MANAGER : CRM

EXISTING WATERSHED EXHIBIT FOR NAPER COMMONS
CITY OF NAPERVILLE PROJECT NO., XX-XXXXXXXX

SHEET 1 OF 1

PLOT FILE CREATED: 9/14/2020 BY: LESLIE LUNDBERG DRAWING PATH: P:\402138\ENGR\LND\DRAWINGS\EXHIBITS\WATERSHED.DWG

EXHIBIT 2B

EXISTING CONDITIONS

SUPPORTING DOCUMENTATION

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/9/2020
Location DuPage County, IL Checked Date

Circle one: (Present) Developed SUBAREA 001

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Meadow	71			1.40	99.4
C	Brush (good condition)	65			0.57	37.05
C	Woods (good condition)	70			1.25	87.5
1/ Use only one CN source per line.			Totals =		3.22	223.950

CN (weighted) = Total Product / Total Area = 223.950 / 3.220 = 69.550

Use CN = 69.5

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/9/2020
Location DuPage County, IL Checked Date

Circle one: (Present) Developed SUBAREA 002

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Meadow	71			2.22	157.62
C	Brush (good condition)	65			3.95	256.75
C	Open Space (good condition)	74			8.06	596.44
1/ Use only one CN source per line.			Totals =		14.23	1010.810

CN (weighted) = Total Product / Total Area = 1010.810 / 14.230 = 71.034

Use CN = 71.0

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/9/2020
Location DuPage County, IL Checked Date

Circle one: (Present) Developed SUBAREA 003

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Impervious Area (Paving, gravel)	98			15.09	1478.82
C	Brush (good condition)	65			6.13	398.45
C	Open Space (good condition)	74			18.31	1354.94
1/ Use only one CN source per line.			Totals =		39.53	3232.210

CN (weighted) = Total Product / Total Area = 3232.210 / 39.530 = 81.766

Use CN = 81.8

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/9/2020
Location DuPage County, IL Checked Date

Circle one: (Present) Developed SUBAREA 004

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Brush (good condition)	65			5.51	358.15
C	Open Space (good condition)	74			2.17	160.58
1/ Use only one CN source per line.			Totals =		7.68	518.730

CN (weighted) = Total Product / Total Area = 518.730 / 7.680 = 67.543

Use CN = 67.5

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/9/2020
Location DuPage County, IL Checked Date

Circle one: (Present) Developed SUBAREA 005

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Impervious Area (Paving, gravel)	98			1.10	107.8
C	Open Space (good condition)	74			0.33	24.42
1/ Use only one CN source per line.			Totals =		1.43	132.220

CN (weighted) = Total Product / Total Area = 132.220 / 1.430 = 92.462

Use CN = 92.5

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/9/2020
Location DuPage County, IL Checked Date

Circle one: (Present) Developed SUBAREA 006

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Impervious Area (Paving, gravel)	98			0.87	85.26
C	Open Space (good condition)	74			0.49	36.26
1/ Use only one CN source per line.			Totals =		1.36	121.520

CN (weighted) = Total Product / Total Area = 121.520 / 1.360 = 89.353

Use CN = 89.4

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/9/2020
Location DuPage County, IL Checked Date

Circle one: (Present) Developed SUBAREA 010

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Woods - Grass Combination (good condition)	72			2.89	208.08
C	Brush (good condition)	65			82.00	5330
C	Residential District: 1/8 Ac. Lots (townhomes)	90			8.32	748.8
C	Residential District: 1/2 Ac. Lots (single-family)	80			23.22	1857.6
C	Impervious Area (paving, standing water)	98			3.65	357.7
1/ Use only one CN source per line.			Totals =		120.08	8502.180

CN (weighted) = Total Product / Total Area = 8502.180 / 120.080 = 70.804

Use CN = 70.8

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/4/2020
Location DuPage County, IL Checked Date

Circle one: (Present) Developed SUBAREA 011

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Impervious Area (Paving, gravel)	98			7.51	735.98
C	Open Space (good condition)	74			1.18	87.32
1/ Use only one CN source per line.			Totals =		8.69	823.300

CN (weighted) = Total Product / Total Area = 823.300 / 8.690 = 94.741

Use CN = 94.7

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Project	NOKIA SITE	By	JMH	Date	9/4/2020
Location	DUPAGE COUNTY, IL	Checked		Date	

Check one: ☑ Present ☐ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 001

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Grass			
2. Manning's roughness coeff., n (Table 3-1)			0.24			
3. Flow length, L (total L ≤ 300 ft)		ft	100			
4. Two-yr 24-hr rainfall, P_2		in	3.34			
5. Land slope, s		ft/ft	0.002			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$		hr	0.585	+	=	0.585

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L			100			
9. Watercourse slope, s			0.007			
10. Average velocity, V (figure 3-1)			1.36			
11. $T_t = \frac{L}{3600\, V}$		hr	0.020	+	=	0.020

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw	compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\, r^{2/3}\, s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft				
19. $T_t = \frac{L}{3600\, V}$		hr		+	=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.605
	min	36

Project	NOKIA SITE		By	JMH	Date	9/4/2020
Location	DUPAGE COUNTY, IL		Checked		Date	

Check one: ☑ Present ☐ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 002

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Grass			
2. Manning's roughness coeff., n (Table 3-1)			0.24			
3. Flow length, L (total L ≤ 300 ft)		ft	100			
4. Two-yr 24-hr rainfall, P_2		in	3.34			
5. Land slope, s		ft/ft	0.004			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$		hr	0.443	+	=	0.443

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L			760			
9. Watercourse slope, s			0.003			
10. Average velocity, V (figure 3-1)			0.89			
11. $T_t = \frac{L}{3600\,V}$		hr	0.238	+	=	0.238

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw	compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\,r^{2/3}\,s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft				
19. $T_t = \frac{L}{3600\,V}$		hr		+	=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.681
	min	41

Project	NOKIA SITE	By	JMH	Date	9/4/2020
Location	DUPAGE COUNTY, IL	Checked		Date	

Check one: ☑ Present ☐ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 003

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Grass			
2. Manning's roughness coeff., n (Table 3-1)			0.24			
3. Flow length, L (total L ≤ 300 ft)		ft	100			
4. Two-yr 24-hr rainfall, P_2		in	3.34			
5. Land slope, s		ft/ft	0.004			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$		hr	0.443	+	=	0.443

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L			580			
9. Watercourse slope, s			0.003			
10. Average velocity, V (figure 3-1)			0.89			
11. $T_t = \frac{L}{3600\, V}$		hr	0.181	+	=	0.181

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw	compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\, r^{2/3}\, s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft				
19. $T_t = \frac{L}{3600\, V}$		hr		+	=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.625
	min	37

Project	NOKIA SITE	By	JMH	Date	9/4/2020
Location	DUPAGE COUNTY, IL	Checked		Date	

Check one: ☑ Present ☐ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 004

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Grass			
2. Manning's roughness coeff., n (Table 3-1)			0.24			
3. Flow length, L (total L ≤ 300 ft)		ft	100			
4. Two-yr 24-hr rainfall, P_2		in	3.34			
5. Land slope, s		ft/ft	0.01			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$		hr	0.307	+	=	0.307

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L			560			
9. Watercourse slope, s			0.003			
10. Average velocity, V (figure 3-1)			0.89			
11. $T_t = \frac{L}{3600\,V}$		hr	0.175	+	=	0.175

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw	compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\,r^{2/3}\,s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft				
19. $T_t = \frac{L}{3600\,V}$		hr		+	=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.482
	min	29

Project	NOKIA SITE		By	JMH	Date	9/4/2020
Location	DUPAGE COUNTY, IL		Checked		Date	

Check one: ☑ Present ☐ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 005

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Asphalt			
2. Manning's roughness coeff., n (Table 3-1)			0.011			
3. Flow length, L (total L ≤ 300 ft)		ft	75			
4. Two-yr 24-hr rainfall, P_2		in	3.34			
5. Land slope, s		ft/ft	0.005			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$		hr	0.027	+	=	0.027

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L						
9. Watercourse slope, s			0.002			
10. Average velocity, V (figure 3-1)			0.72			
11. $T_t = \frac{L}{3600\,V}$		hr		+	=	

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw compute r		ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\,r^{2/3}\,s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft	1020			
19. $T_t = \frac{L}{3600\,V}$		hr	0.0944	+	=	0.094

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.122
	min	7

Project	NOKIA SITE	By	JMH	Date	9/4/2020
Location	DUPAGE COUNTY, IL	Checked		Date	

Check one: ☑ Present ☐ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 006

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Asphalt			
2. Manning's roughness coeff., n (Table 3-1)			0.011			
3. Flow length, L (total L ≤ 300 ft)		ft	52			
4. Two-yr 24-hr rainfall, P_2		in	3.34			
5. Land slope, s		ft/ft	0.002			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$		hr	0.029	+	=	0.029

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L						
9. Watercourse slope, s			0.002			
10. Average velocity, V (figure 3-1)			0.72			
11. $T_t = \frac{L}{3600\,V}$		hr		+	=	

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw compute r		ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\,r^{2/3}\,s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft	765			
19. $T_t = \frac{L}{3600\,V}$		hr	0.0708	+	=	0.071

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.100
	min	6

Project	NOKIA SITE	By	JMH	Date	9/4/2020
Location	DUPAGE COUNTY, IL	Checked		Date	

Check one: ☑ Present ☐ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 010

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Grass			
2. Manning's roughness coeff., n (Table 3-1)			0.024			
3. Flow length, L (total L ≤ 300 ft)		ft	100			
4. Two-yr 24-hr rainfall, P_2		in	3.34			
5. Land slope, s		ft/ft	0.02			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$		hr	0.037	+	=	0.037

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L			1500			
9. Watercourse slope, s			0.005			
10. Average velocity, V (figure 3-1)			1.15			
11. $T_t = \frac{L}{3600\, V}$		hr	0.363	+	=	0.363

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw	compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\, r^{2/3}\, s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft	765			
19. $T_t = \frac{L}{3600\, V}$		hr	0.0708	+	=	0.071

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.471
	min	28

Project	NOKIA SITE	By	JMH	Date	9/4/2020
Location	DUPAGE COUNTY, IL	Checked		Date	

Check one: ☑ Present ☐ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 011

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Asphalt			
2. Manning's roughness coeff., n (Table 3-1)			0.011			
3. Flow length, L (total L ≤ 300 ft)		ft	100			
4. Two-yr 24-hr rainfall, P_2		in	3.34			
5. Land slope, s		ft/ft	0.007			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$		hr	0.030	+	=	0.030

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L			380			
9. Watercourse slope, s			0.007			
10. Average velocity, V (figure 3-1)			1.36			
11. $T_t = \frac{L}{3600\,V}$		hr	0.078	+	=	0.078

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw	compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\,r^{2/3}\,s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft	765			
19. $T_t = \frac{L}{3600\,V}$		hr	0.0708	+	=	0.071

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.179
	min	11

Job #: 402138
Project: Nokia Site

Date: September 4, 2020
Revised:
By: JMH

STORMWATER MANAGEMENT FACILITY 010				
EXISTING DANADA WOODS TOWNHOMES				
ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**
726.87	43020	0.988	0.000	**0.000**
727.0	43870	1.007	0.130	**0.130**
728.0	48150	1.105	1.056	**1.186**
729.0	52590	1.207	1.156	**2.342**
730.0	57050	1.310	1.258	**3.601**
731.0	63560	1.459	1.384	**4.985**
732.0	68900	1.582	1.520	**6.506**
733.0	82230	1.888	1.735	**8.240**
734.0	114950	2.639	2.263	**10.504**
735.0	172860	3.968	3.304	**13.807**
736.00	226320	5.196	4.582	**18.389**
736.39	278900	6.403	2.262	**20.651**
737.0	342150	7.855	4.348	**24.999**

DANADA WOODS TOWNHOMES

NAPERVILLE, ILLINOIS

FINAL STORM WATER MANAGEMENT PLAN
DESIGN NARRATIVE

FEBRUARY 24, 1997

Prepared For:

Century Homes
199 South Addison Rd., Suite 100
Addison, Illinois 60191-1978
Tel. (630)787-0873

Prepared By:

Roake and Associates, Inc.
1887 High Grove Lane
Naperville, Illinois 60540
Tel. (630).355-3232

Based on the 57.9 acre catchment, the peak release rate is 0.13 cfs/acre, which exceeds the ordinance mandated 0.10 cfs/ acre peak discharge. Of the 10.10 acre-feet of depressional storage below el. 736.26, approximately 4.53 acre-feet is proposed to be filled within the limits of this project, although this volume will be replaced at a ratio of 1.5:1.

Proposed Conditions

The depressional area within the subject site was reconfigured to permit the additional storage for the site development to be included without an increase in flood elevation above the existing flood elevation of 736.26. Due to the depth of the 36" storm sewer, it was possible to increase the depth of the basin to increase storage capacity. The bottom elevation has been established at el. 727.6, which is slightly (0.9') above the invert of the 36" pipe. Discharge from the depression will be regulated by a plate orifice located in the downstream manhole prior to discharge into the 36" pipe. The required storage volume, as dictated by Mr. Steffen's memo of February 14, 1997, shall be the sum of the existing storage volume of 10.10 acre-feet; the compensatory storage volume required as a result of filling of fifty percent of the fill volume of 4.53 acre-feet, or 2.27 acre-feet; and the development storage volume as determined by Mr. Steffen using an 85 percent hydraulically connected impervious factor (as recommended in the documentation for Commercial/Industrial development and not 50 percent as recommended for multi-family development) of 0.51 acre-feet per acre multiplied by the gross project area of 9.66 acres, or 4.93 acre-feet; for a total storage requirement of 17.30 acre-feet. The site was designed to accommodate a total of at least 17.30 acre-feet at a design elevation of 736.26, the estimated existing design flood stage. To achieve the desired storage volume of 17.30 acre-feet at an elevation of 736.26, a plate-type orifice with a diameter of 5.25" was utilized in the downstream manhole. It was assumed that the maximum storage volume or minimum release rate from the site occurs when the receiving 36" storm sewer is operating at maximum capacity, or a depth of flow of 0.94 times the diameter of the storm sewer. The orifice was then checked for the minimum flow condition in the 36" storm sewer. This condition was assumed to be the peak discharge from the site with no other contributing flows in the storm sewer, which created a depth of flow in the 36" pipe of 0.57 feet for 2.5 cfs. The peak discharge (36" empty) was determined to be 2.9 cfs, or 0.05 cfs per acre for the entire tributary watershed. (The County Ordinance requirement is 0.10 cfs per acre from the development site only). Due to the excessive restriction imposed at the outlet to develop the storage required by Mr. Steffen, the drain-down time is estimated to be about four days for the design event.

PROVIDED STORAGE WITHIN DANADA WOODS BASIN 13.80 ACFT (SEE ATTACHED AS-BUILT)

17.30 - 13.80 = 3.5 ACFT REQUIRED ONSITE NAPER COMMONS

DANADA CT.

DANADA COURT

DANADA COURT

SEE SHEET 3 FOR FENCE DET.

NWS = 727.60
DHW = 736.26
DHW-10 = 733.36

PROPOSED STAGE STORAGE (DESIGN)

ELEV.	CUM.VOL.
727.60	0.14
728.0	1.23
729.0	2.46
730.0	3.84
731.0	5.37
732.0	7.09
733.0	7.79
733.36	8.98
734.0	11.00
735.0	13.19
736.0	13.79
736.26	

ASBUILT STAGE STORAGE

ELEV.	CUM.VOL.
727.38	0.639
728.0	1.729
729.0	2.942
730.0	4.284
731.0	5.761
732.0	7.380
733.0	7.998
733.36	9.150
734.0	11.096
735.0	13.221
736.0	13.805
736.26	

RECORD PLAN FOR:		
TYPE	DATE	P.E. INITIALS
~~WATERMAIN~~ ~~SANITARY SEWER~~ ~~STORM SEWER~~		
STORMWATER MANAGEMENT		
~~GUTTER~~ ~~LIGHTING~~		

ROAKE AND ASSOCIATES, INC.
CONSULTING ENGINEERS • LAND SURVEYORS • PLANNERS
1887 HIGH GROVE LN • NAPERVILLE IL 60540 • (708) 355-9232

PREPARED FOR:
CENTURY MANAGEMENT AND DEVELOPMENT COMPANY
199 SOUTH ADDISON ROAD, SUITE 100
WOODDALE, ILLINOIS 60191
(630) 787-0873

REVISIONS

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
1.	1/26/00	REVISE STAGE STORAGE TO DHW			
2.	8/28/00	NO REV. THIS SHEET			

DANADA WOODS TOWNHOMES

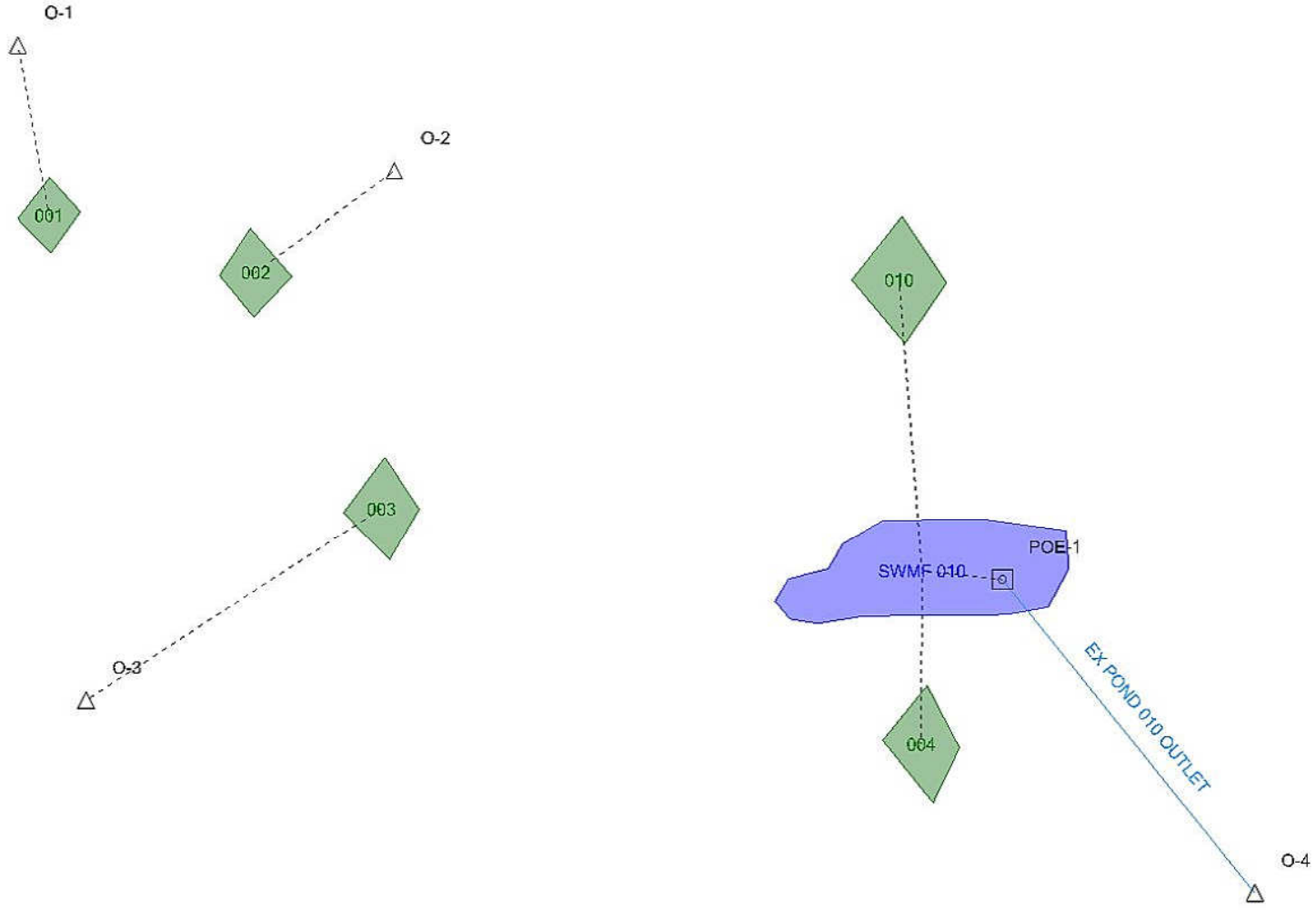
GRADING AND EROSION CONTROL PLAN-RECORD DRAWING

DRN/CKD BY: SPM/SAR	DISC NO.: AB4821GR	FLD. BK./PG. 87/1	SHEET NO. 4 OF 16
SCALE: 1"=30'	DATE: 11-29-99	JOB NO.: 482.001	

EXHIBIT 2C

“EXIST” EXISTING CONDITIONS

PONDPACK MODEL


O-1
O-2
001
002
003
O-3
010
POE-1
SWMF 010
004
EX POND 010 OUTLET
O-4

Scenario Calculation Summary

Scenario Summary	
ID	1
Label	100Yr 24Hr
Notes	
Active Topology	Base Active Topology
Hydrology	Base Hydrology
Rainfall Runoff	100Yr 24Hr
Physical	Base Physical
Initial Condition	Base Initial Condition
Boundary Condition	Base Boundary Condition
Infiltration and Inflow	Base Infiltration and Inflow
Output	Base Output
User Data Extensions	Base User Data Extensions
PondPack Engine Calculation Options	72Hr

Output Summary			
Output Increment	0.050 hours	Duration	72.000 hours

Rainfall Summary			
Return Event Tag	100	Rainfall Type	Time-Depth Curve
Total Depth	8.6 in	Storm Event	100YR-24HR

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
001	100Yr 24Hr	100	None	1.314	16.150	1.91	(N/A)	(N/A)
002	100Yr 24Hr	100	None	6.022	16.150	8.62	(N/A)	(N/A)
003	100Yr 24Hr	100	None	21.011	16.050	27.59	(N/A)	(N/A)
004	100Yr 24Hr	100	None	2.981	16.100	4.41	(N/A)	(N/A)
010	100Yr 24Hr	100	None	21.283	16.050	27.78	(N/A)	(N/A)
O-1	100Yr 24Hr	100	None	1.314	16.150	1.91	(N/A)	(N/A)
O-2	100Yr 24Hr	100	None	6.022	16.150	8.62	(N/A)	(N/A)
O-3	100Yr 24Hr	100	None	21.011	16.050	27.59	(N/A)	(N/A)
O-4	100Yr 24Hr	100	None	10.317	24.100	5.18	(N/A)	(N/A)
O-4	100Yr 24Hr	100	None	-0.424	3.700	-1.12	(N/A)	(N/A)
SWMF 010 (IN)	100Yr 24Hr	100	None	24.264	16.050	32.18	(N/A)	(N/A)
SWMF 010 (OUT)	100Yr 24Hr	100	None	10.317	24.100	5.18	736.58	22.005
SWMF 010 (Reverse)	100Yr 24Hr	100	None	-0.424	3.700	-1.12	(N/A)	(N/A)

Executive Summary (Links)

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
EX POND 010 OUTLET	Pond Outlet	Upstream	24.264	16.050	32.18	SWMF 010	Pond Inflow
EX POND 010 OUTLET	Pond Outlet	Outflow	10.317	24.100	5.18	SWMF 010	Pond Outflow
EX POND 010 OUTLET	Negative Flow	Outflow	-0.424	3.700	-1.12	SWMF 010	Pond Outflow
EX POND 010 OUTLET	Pond Outlet	Link	10.317	24.100	5.18		
EX POND 010 OUTLET	Negative Flow	Link	-0.424	3.700	-1.12		
EX POND 010 OUTLET	Pond Outlet	Downstream	10.317	24.100	5.18	O-4	
EX POND 010 OUTLET	Negative Flow	Downstream	-0.424	3.700	-1.12	O-4	

Scenario Calculation Summary

Scenario Summary	
ID	47
Label	100Yr 1Hr
Notes	
Active Topology	<I> Base Active Topology
Hydrology	<I> Base Hydrology
Rainfall Runoff	100Yr 1Hr
Physical	<I> Base Physical
Initial Condition	<I> Base Initial Condition
Boundary Condition	<I> Base Boundary Condition
Infiltration and Inflow	<I> Base Infiltration and Inflow
Output	<I> Base Output
User Data Extensions	<I> Base User Data Extensions
PondPack Engine Calculation Options	24Hr

Output Summary			
Output Increment	0.050 hours	Duration	24.000 hours

Rainfall Summary			
Return Event Tag	100	Rainfall Type	Time-Depth Curve
Total Depth	4.0 in	Storm Event	100YR- 1HR

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
001	100Yr 1Hr	100	None	0.354	0.800	4.87	(N/A)	(N/A)
002	100Yr 1Hr	100	None	1.678	0.800	21.94	(N/A)	(N/A)
003	100Yr 1Hr	100	None	7.287	0.700	101.26	(N/A)	(N/A)
004	100Yr 1Hr	100	None	0.764	0.650	11.50	(N/A)	(N/A)
010	100Yr 1Hr	100	None	7.503	0.550	120.23	(N/A)	(N/A)
O-1	100Yr 1Hr	100	None	0.354	0.800	4.87	(N/A)	(N/A)
O-2	100Yr 1Hr	100	None	1.678	0.800	21.94	(N/A)	(N/A)
O-3	100Yr 1Hr	100	None	7.287	0.700	101.26	(N/A)	(N/A)
O-4	100Yr 1Hr	100	None	2.374	1.900	1.37	(N/A)	(N/A)
O-4	100Yr 1Hr	100	None	-0.028	0.250	-1.11	(N/A)	(N/A)
SWMF 010 (IN)	100Yr 1Hr	100	None	8.266	0.600	130.98	(N/A)	(N/A)
SWMF 010 (OUT)	100Yr 1Hr	100	None	2.374	1.900	1.37	732.95	8.151
SWMF 010 (Reverse)	100Yr 1Hr	100	None	-0.028	0.250	-1.11	(N/A)	(N/A)

Executive Summary (Links)

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
EX POND 010 OUTLET	Pond Outlet	Upstream	8.266	0.600	130.98	SWMF 010	Pond Inflow
EX POND 010 OUTLET	Pond Outlet	Outflow	2.374	1.900	1.37	SWMF 010	Pond Outflow
EX POND 010 OUTLET	Negative Flow	Outflow	-0.028	0.250	-1.11	SWMF 010	Pond Outflow
EX POND 010 OUTLET	Pond Outlet	Link	2.374	1.900	1.37		
EX POND 010 OUTLET	Negative Flow	Link	-0.028	0.250	-1.11		
EX POND 010 OUTLET	Pond Outlet	Downstream	2.374	1.900	1.37	O-4	
EX POND 010 OUTLET	Negative Flow	Downstream	-0.028	0.250	-1.11	O-4	

Scenario Calculation Summary

Scenario Summary	
ID	67
Label	2Yr 2Hr
Notes	
Active Topology	<I> Base Active Topology
Hydrology	<I> Base Hydrology
Rainfall Runoff	2Yr 2Hr
Physical	<I> Base Physical
Initial Condition	<I> Base Initial Condition
Boundary Condition	<I> Base Boundary Condition
Infiltration and Inflow	<I> Base Infiltration and Inflow
Output	<I> Base Output
User Data Extensions	<I> Base User Data Extensions
PondPack Engine Calculation Options	24Hr

Output Summary			
Output Increment	0.050 hours	Duration	24.000 hours

Rainfall Summary			
Return Event Tag	2	Rainfall Type	Time-Depth Curve
Total Depth	1.9 in	Storm Event	2YR- 2HR

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
001	2Yr 2Hr	2	None	0.056	1.450	0.48	(N/A)	(N/A)
002	2Yr 2Hr	2	None	0.287	1.450	2.39	(N/A)	(N/A)
003	2Yr 2Hr	2	None	1.979	1.000	17.61	(N/A)	(N/A)
004	2Yr 2Hr	2	None	0.105	1.400	0.97	(N/A)	(N/A)
010	2Yr 2Hr	2	None	2.102	0.850	20.97	(N/A)	(N/A)
O-1	2Yr 2Hr	2	None	0.056	1.450	0.48	(N/A)	(N/A)
O-2	2Yr 2Hr	2	None	0.287	1.450	2.39	(N/A)	(N/A)
O-3	2Yr 2Hr	2	None	1.979	1.000	17.61	(N/A)	(N/A)
O-4	2Yr 2Hr	2	None	0.000	0.000	0.00	(N/A)	(N/A)
O-4	2Yr 2Hr	2	None	-0.567	0.600	-1.11	(N/A)	(N/A)
SWMF 010 (IN)	2Yr 2Hr	2	None	2.208	0.850	21.48	(N/A)	(N/A)
SWMF 010 (OUT)	2Yr 2Hr	2	None	0.000	0.000	0.00	729.34	2.775
SWMF 010 (Reverse)	2Yr 2Hr	2	None	-0.567	0.600	-1.11	(N/A)	(N/A)

Executive Summary (Links)

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
EX POND 010 OUTLET	Pond Outlet	Upstream	2.208	0.850	21.48	SWMF 010	Pond Inflow
EX POND 010 OUTLET	Pond Outlet	Outflow	0.000	0.000	0.00	SWMF 010	Pond Outflow
EX POND 010 OUTLET	Negative Flow	Outflow	-0.567	0.600	-1.11	SWMF 010	Pond Outflow
EX POND 010 OUTLET	Pond Outlet	Link	0.000	0.000	0.00		
EX POND 010 OUTLET	Negative Flow	Link	-0.567	0.600	-1.11		
EX POND 010 OUTLET	Pond Outlet	Downstream	0.000	0.000	0.00	O-4	
EX POND 010 OUTLET	Negative Flow	Downstream	-0.567	0.600	-1.11	O-4	

Table of Contents

Subsection: Time-Depth Curve
Label: UPDATED 100YR 12HR-48HR

Return Event: 100 years
Storm Event: 100YR-24HR

Time-Depth Curve: 100YR-24HR	
Label	100YR-24HR
Start Time	0.000 hours
Increment	1.000 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 1.000 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.2	0.4	0.6	0.8
5.000	1.0	1.2	1.4	1.7	2.0
10.000	2.3	2.7	3.1	3.8	4.5
15.000	5.2	6.0	6.7	7.3	7.7
20.000	8.0	8.2	8.3	8.4	8.6

Storm Event	100YR-24HR
Return Event	100 years
Duration	72.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.605 hours
Area (User Defined)	3.220 acres

Computational Time Increment	0.081 hours
Time to Peak (Computed)	16.133 hours
Flow (Peak, Computed)	1.91 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.150 hours
Flow (Peak Interpolated Output)	1.91 ft³/s

Drainage Area	
SCS CN (Composite)	69.500
Area (User Defined)	3.220 acres
Maximum Retention (Pervious)	4.4 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.9 in
Runoff Volume (Pervious)	1.314 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.314 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.605 hours
Computational Time Increment	0.081 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	6.03 ft³/s
Unit peak time, Tp	0.403 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.613 hours
Total unit time, Tb	2.017 hours

Storm Event	100YR-24HR
Return Event	100 years
Duration	72.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.681 hours
Area (User Defined)	14.230 acres

Computational Time Increment	0.091 hours
Time to Peak (Computed)	16.162 hours
Flow (Peak, Computed)	8.62 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.150 hours
Flow (Peak Interpolated Output)	8.62 ft³/s

Drainage Area	
SCS CN (Composite)	71.000
Area (User Defined)	14.230 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.1 in
Runoff Volume (Pervious)	6.022 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	6.022 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.681 hours
Computational Time Increment	0.091 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	23.68 ft³/s
Unit peak time, Tp	0.454 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.816 hours
Total unit time, Tb	2.270 hours

Storm Event	100YR-24HR
Return Event	100 years
Duration	72.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.625 hours
Area (User Defined)	39.530 acres

Computational Time Increment	0.083 hours
Time to Peak (Computed)	16.083 hours
Flow (Peak, Computed)	27.60 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.050 hours
Flow (Peak Interpolated Output)	27.59 ft³/s

Drainage Area	
SCS CN (Composite)	81.800
Area (User Defined)	39.530 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.4 in
Runoff Volume (Pervious)	21.011 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	21.011 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.625 hours
Computational Time Increment	0.083 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	71.66 ft³/s
Unit peak time, Tp	0.417 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.667 hours
Total unit time, Tb	2.083 hours

Storm Event	100YR-24HR
Return Event	100 years
Duration	72.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.482 hours
Area (User Defined)	7.680 acres

Computational Time Increment	0.064 hours
Time to Peak (Computed)	16.131 hours
Flow (Peak, Computed)	4.41 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.100 hours
Flow (Peak Interpolated Output)	4.41 ft³/s

Drainage Area	
SCS CN (Composite)	67.500
Area (User Defined)	7.680 acres
Maximum Retention (Pervious)	4.8 in
Maximum Retention (Pervious, 20 percent)	1.0 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.7 in
Runoff Volume (Pervious)	2.981 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.981 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.482 hours
Computational Time Increment	0.064 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	18.05 ft³/s
Unit peak time, Tp	0.321 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.285 hours
Total unit time, Tb	1.607 hours

Storm Event	100YR-24HR
Return Event	100 years
Duration	72.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.471 hours
Area (User Defined)	39.370 acres

Computational Time Increment	0.063 hours
Time to Peak (Computed)	16.014 hours
Flow (Peak, Computed)	27.78 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.050 hours
Flow (Peak Interpolated Output)	27.78 ft³/s

Drainage Area	
SCS CN (Composite)	82.700
Area (User Defined)	39.370 acres
Maximum Retention (Pervious)	2.1 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.5 in
Runoff Volume (Pervious)	21.283 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	21.283 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.471 hours
Computational Time Increment	0.063 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	94.71 ft³/s
Unit peak time, Tp	0.314 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.256 hours
Total unit time, Tb	1.570 hours

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
726.87	0.000
727.00	0.130
728.00	1.186
729.00	2.342
730.00	3.601
731.00	4.985
732.00	6.506
733.00	8.240
734.00	10.504
735.00	13.807
736.00	18.389
736.39	20.651
737.00	24.999

Requested Pond Water Surface Elevations	
Minimum (Headwater)	726.87 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	737.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward + Reverse	TW	726.88	737.00
Irregular Weir	Weir - 1	Forward + Reverse	TW	736.39	737.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	726.67 ft
Orifice Diameter	5.25 in
Orifice Coefficient	0.600

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	737.00
48.90	736.70
92.90	736.39
98.90	736.55
145.30	736.88
168.70	737.00

Lowest Elevation	736.39 ft
Weir Coefficient	3.00 (ft^0.5)/s

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EXHIBIT 2D

PROPOSED CONDITIONS

WATERSHED EXHIBIT

PROPOSED WATERSHED EXHIBIT

FOR

NAPER COMMONS

LOCATION MAP

N

100 50 0 100

SCALE: 1 INCH = 100 FEET

SUBAREA 001
3.01 Ac.
CN = 89.2
Tc = 0.25 Hr

SUBAREA 002
21.22 Ac.
CN = 87.7
Tc = 0.34 Hr

SUBAREA 003
27.87 Ac.
CN = 89.0
Tc = 0.33 Hr

SUBAREA 004
3.18 Ac.
CN = 88.1
Tc = 0.271 Hr

SUBAREA 005
4.23 Ac.
CN = 89.4
Tc = 0.377 Hr

SUBAREA 007
1.01 Ac.
CN = 89.2
Tc = 0.25 Hr

SUBAREA 008
0.68 Ac.
CN = 90.0
Tc = 0.083 Hr

ROAD A
ROAD B
ROAD C
ROAD D
ROAD E
ROAD F
ROAD G
ROAD H
LUCENT LANE
LUCENT COURT

LEGEND

WATERSHED BOUNDARY

OVERLAND DRAINAGE ARROW

PREPARED FOR:

PULTE HOME COMPANY, LLC
1900 E. GOLF ROAD, SUITE 300
SCHAUMBURG, IL 60173
(847) 230-5400

PREPARED BY:

CEMCON, Ltd.
Consulting Engineers, Land Surveyors & Planners
2280 White Oak Circle, Suite 100
Aurora, Illinois 60502-9675
PH: 630.862.2100 FAX: 630.862.2199
E-Mail: cadd@cemcon.com Website: www.cemcon.com

DISC NO.: 402138 FILE NAME: WATERSHED
DRAWN BY: LAL FLD. BK. / PG. NO.: NOTES
COMPLETION DATE: 09-14-20 JOB NO.: 402.138
XREF : TOPO PROJECT MANAGER : CRM
1 10-16-20/LAL: REVISED PER 2020-10-05 CITY COMMENTS

WATERSHED EXHIBIT FOR NAPER COMMONS
CITY OF NAPERVILLE PROJECT NO., 20-10000086

SHEET 1 OF 1

PLOT FILE CREATED: 10/16/2020 BY: LESLIE LUNDBERG DRAWING PATH: P:\402138\ENGINEERING\DRAWINGS\EXHIBITS\WATERSHED.DWG

EXHIBIT 2E

PROPOSED CONDITIONS

SUPPORTING DOCUMENTATION

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/9/2020
Location DuPage County, IL Checked Date

Circle one: Present Developed SUBAREA 001

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Single Family, 1/5 Ac. Lots (assumed 50% impervious)	86			1.15	98.9
C	Open Space	74			0.53	39.22
C	SWMF	98			0.59	57.82
C	Impervious Area (NWL)	98			0.74	72.52
1/ Use only one CN source per line.			Totals =		3.01	268.460

CN (weighted) = Total Product / Total Area = 268.460 / 3.010 = 89.189

Use CN = 89.2

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/9/2020
Location DuPage County, IL Checked Date

Circle one: Present Developed SUBAREA 002

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Single Family, 1/5 Ac. Lots (assumed 50% impervious)	86			11.52	990.72
C	Open Space	74			0.74	54.76
C	SWMF	98			0.67	65.66
C	Impervious Area (NWL, paving)	98			0.6	58.8
C	Single Family, 1/8 Ac. Lots (assumed 65% impervious)	90			7.69	692.1
1/ Use only one CN source per line.			Totals =		21.22	1862.040

CN (weighted) = Total Product / Total Area = 1862.040 / 21.220 = 87.749

Use CN = 87.7

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/9/2020
Location DuPage County, IL Checked Date

Circle one: Present Developed SUBAREA 003

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Townhomes (assumed 65% impervious)	90			2.35	211.5
C	Open Space	74			3.52	260.48
C	SWMF	98			1.65	161.7
C	Impervious Area (NWL, paving)	98			2.06	201.88
C	Single Family, 1/8 Ac. Lots (assumed 65% impervious)	90			18.29	1646.1
1/ Use only one CN source per line.			Totals =		27.87	2481.660

CN (weighted) = Total Product / Total Area = 2481.660 / 27.870 = 89.044

Use CN = 89.0

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/8/2020
Location DuPage County, IL Checked Date

Circle one: Present Developed SUBAREA 005

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Townhomes (assumed 65% impervious)	90			1.82	163.8
C	Open Space	74			0.61	45.14
C	SWMF	98			0.73	71.54
C	Impervious Area (NWL, paving)	98			0.19	18.62
C	Single Family, 1/8 Ac. Lots (assumed 65% impervious)	90			0.88	79.2
1/ Use only one CN source per line.			Totals =		4.23	378.300

CN (weighted) = Total Product / Total Area = 378.300 / 4.230 = 89.433

Use CN = 89.4

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/8/2020
Location DuPage County, IL Checked Date

Circle one: Present (Developed)

SUBAREA 006

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Townhomes (assumed 65% impervious)	90			1.28	115.2
C	Open Space	74			0.88	65.12
C	SWMF	98			0.56	54.88
C	Impervious Area (NWL, paving)	98			0.46	45.08
1/ Use only one CN source per line.			Totals =		3.18	280.280

CN (weighted) = Total Product / Total Area = 280.280 / 3.180 = 88.138

Use CN = 88.1

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/8/2020
Location DuPage County, IL Checked Date

Circle one: Present Developed SUBAREA 007

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Single Family, 1/8 Ac. Lots (assumed 65% impervious)	90			0.57	51.3
C	Open Space	74			0.18	13.32
C	SWMF	98			0.19	18.62
C	Impervious Area (NWL, paving)	98			0.07	6.86
1/ Use only one CN source per line.			Totals =		1.01	90.100

CN (weighted) = Total Product / Total Area = 90.100 / 1.010 = 89.208

Use CN = 89.2

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Worksheet 2: Runoff Curve Number and Runoff

Project Nokia Site By JMH Date 9/8/2020
Location DuPage County, IL Checked Date

Circle one: Present Developed SUBAREA 008

1. Runoff curve number (CN)

Soil Name and Hydroogic Group	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area _X_ acres __mi2 __%	Product of CN x Area
C	Townhomes (assumed 65% impervious)	90			0.68	61.2
1/ Use only one CN source per line.			Totals =		0.68	61.200

CN (weighted) = Total Product / Total Area = 61.200 / 0.680 = 90.000

Use CN = 90.0

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr			
Rainfall	in			
Runoff, Q	in			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Project	NOKIA SITE		By	JMH	Date	9/8/2020
Location	DUPAGE COUNTY, IL		Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 001

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)

		Segment ID				
1.	Surface Description (Table 3-1)		Grass			
2.	Manning's roughness coeff., n (Table 3-1)		0.24			
3.	Flow length, L (total L ≤ 300 ft)	ft	100			
4.	Two-yr 24-hr rainfall, P_2	in	3.34			
5.	Land slope, s	ft/ft	0.02			
6.	$Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$	hr	0.233	+	=	0.233

Shallow Concentrated Flow

		Segment ID				
7.	Surface description (paved or unpaved)		unpaved			
8.	Flow length, L		130			
9.	Watercourse slope, s		0.02			
10.	Average velocity, V (figure 3-1)		2.30			
11.	$T_t = \frac{L}{3600\, V}$	hr	0.016	+	=	0.016

Channel Flow

		Segment ID				
12.	Cross sectional flow area, a	ft^2				
13.	Wetted perimeter, pw	ft				
14.	Hydraulic radius, r= a/pw compute r	ft				
15.	Channel Slope, s	ft/ft				
16.	Manning's roughness coeff., n					
17.	$V = 1.49\, r^{2/3}\, s^{1/2} / n$	ft/s	3			
18.	Flow length, L	ft				
19.	$T_t = \frac{L}{3600\, V}$	hr		+	=	

20.	Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.248	
		min	15	

Project	NOKIA SITE	By	JMH	Date	9/8/2020
Location	DUPAGE COUNTY, IL	Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 002

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Grass			
2. Manning's roughness coeff., n (Table 3-1)			0.24			
3. Flow length, L (total L ≤ 300 ft)		ft	100			
4. Two-yr 24-hr rainfall, P_2		in	3.34			
5. Land slope, s		ft/ft	0.02			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$		hr	0.233	+	=	0.233

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L			280			
9. Watercourse slope, s			0.02			
10. Average velocity, V (figure 3-1)			2.30			
11. $T_t = \frac{L}{3600\, V}$		hr	0.034	+	=	0.034

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw compute r		ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\, r^{2/3}\, s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft	800			
19. $T_t = \frac{L}{3600\, V}$		hr	0.0741	+	=	0.074

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.341
	min	20

Project	NOKIA SITE	By	JMH	Date	9/8/2020
Location	DUPAGE COUNTY, IL	Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 003

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)

		Segment ID				
1.	Surface Description (Table 3-1)		Grass			
2.	Manning's roughness coeff., n (Table 3-1)		0.24			
3.	Flow length, L (total L ≤ 300 ft)	ft	100			
4.	Two-yr 24-hr rainfall, P_2	in	3.34			
5.	Land slope, s	ft/ft	0.02			
6.	$Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$	hr	0.233	+	=	0.233

Shallow Concentrated Flow

		Segment ID				
7.	Surface description (paved or unpaved)		unpaved	paved		
8.	Flow length, L		360	120		
9.	Watercourse slope, s		0.02	0.01		
10.	Average velocity, V (figure 3-1)		2.30	2.07		
11.	$T_t = \frac{L}{3600\, V}$	hr	0.043	+ 0.016	=	0.059

Channel Flow

		Segment ID				
12.	Cross sectional flow area, a	ft^2				
13.	Wetted perimeter, pw	ft				
14.	Hydraulic radius, r= a/pw compute r	ft				
15.	Channel Slope, s	ft/ft				
16.	Manning's roughness coeff., n					
17.	$V = 1.49\, r^{2/3}\, s^{1/2} / n$	ft/s	3			
18.	Flow length, L	ft	440			
19.	$T_t = \frac{L}{3600\, V}$	hr	0.0407	+	=	0.041

20.	Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.333
		min	20

Project	NOKIA SITE	By	JMH	Date	9/8/2020
Location	DUPAGE COUNTY, IL	Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 005

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Grass			
2. Manning's roughness coeff., n (Table 3-1)			0.24			
3. Flow length, L (total L ≤ 300 ft)		ft	100			
4. Two-yr 24-hr rainfall, P_2		in	3.34			
5. Land slope, s		ft/ft	0.02			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$		hr	0.233	+	=	0.233

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L			1200			
9. Watercourse slope, s			0.02			
10. Average velocity, V (figure 3-1)			2.30			
11. $T_t = \frac{L}{3600\, V}$		hr	0.145	+	=	0.145

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw	compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\, r^{2/3}\, s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft				
19. $T_t = \frac{L}{3600\, V}$		hr		+	=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.377
	min	23

Project	NOKIA SITE	By	JMH	Date	9/8/2020
Location	DUPAGE COUNTY, IL	Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 006

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)		Segment ID				
1. Surface Description (Table 3-1)			Grass			
2. Manning's roughness coeff., n (Table 3-1)			0.24			
3. Flow length, L (total L ≤ 300 ft)		ft	100			
4. Two-yr 24-hr rainfall, P_2		in	3.34			
5. Land slope, s		ft/ft	0.02			
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$		hr	0.233	+	=	0.233

Shallow Concentrated Flow		Segment ID				
7. Surface description (paved or unpaved)			unpaved			
8. Flow length, L			320			
9. Watercourse slope, s			0.02			
10. Average velocity, V (figure 3-1)			2.30			
11. $T_t = \frac{L}{3600\, V}$		hr	0.039	+	=	0.039

Channel Flow		Segment ID				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r= a/pw	compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. $V = 1.49\, r^{2/3}\, s^{1/2} / n$		ft/s	3			
18. Flow length, L		ft				
19. $T_t = \frac{L}{3600\, V}$		hr		+	=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.271
	min	16

Project	NOKIA SITE		By	JMH	Date	9/9/2020
Location	DUPAGE COUNTY, IL		Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 007

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)

	Segment ID					
1. Surface Description (Table 3-1)		Grass				
2. Manning's roughness coeff., n (Table 3-1)		0.24				
3. Flow length, L (total L ≤ 300 ft)	ft	100				
4. Two-yr 24-hr rainfall, P_2	in	3.34				
5. Land slope, s	ft/ft	0.02				
6. $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$	hr	0.233	+		=	0.233

Shallow Concentrated Flow

	Segment ID					
7. Surface description (paved or unpaved)		unpaved				
8. Flow length, L		100				
9. Watercourse slope, s		0.02				
10. Average velocity, V (figure 3-1)		2.30				
11. $T_t = \frac{L}{3600\, V}$	hr	0.012	+		=	0.012

Channel Flow

	Segment ID					
12. Cross sectional flow area, a	ft^2					
13. Wetted perimeter, pw	ft					
14. Hydraulic radius, r= a/pw compute r	ft					
15. Channel Slope, s	ft/ft					
16. Manning's roughness coeff., n						
17. $V = 1.49\, r^{2/3}\, s^{1/2} / n$	ft/s	3				
18. Flow length, L	ft					
19. $T_t = \frac{L}{3600\, V}$	hr		+		=	

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.245
	min	15

Project	NOKIA SITE	By	JMH	Date	9/9/2020
Location	DUPAGE COUNTY, IL	Checked		Date	

Check one: ☐ Present ☑ Developed

Check one: ☑ Tc ☐ Tt

SUBAREA 008

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map. schematic, or description of flow segments.

Sheet Flow (Applicable to Tc only)

		Segment ID				
1.	Surface Description (Table 3-1)		Grass			
2.	Manning's roughness coeff., n (Table 3-1)		0.24			
3.	Flow length, L (total L ≤ 300 ft)	ft	25			
4.	Two-yr 24-hr rainfall, P_2	in	3.34			
5.	Land slope, s	ft/ft	0.02			
6.	$Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$	hr	0.077	+	=	0.077

Shallow Concentrated Flow

		Segment ID				
7.	Surface description (paved or unpaved)		unpaved			
8.	Flow length, L					
9.	Watercourse slope, s					
10.	Average velocity, V (figure 3-1)					
11.	$T_t = \frac{L}{3600\, V}$	hr		+	=	

Channel Flow

		Segment ID				
12.	Cross sectional flow area, a	ft^2				
13.	Wetted perimeter, pw	ft				
14.	Hydraulic radius, r= a/pw compute r	ft				
15.	Channel Slope, s	ft/ft				
16.	Manning's roughness coeff., n					
17.	$V = 1.49\, r^{2/3}\, s^{1/2} / n$	ft/s	3			
18.	Flow length, L	ft				
19.	$T_t = \frac{L}{3600\, V}$	hr		+	=	

20.	Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr	0.077
		min	5

*This subarea is assumed to have the PondPack minimum Tc of 0.083 Hr.

Job #: 402138
Project: Nokia Site

Date: September 7, 2020
Revised: October 12, 2020
By: ARF

PROP SWMF-001				
STAGE/ STORAGE RELATIONSHIP				
ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**
737.5	29850	0.685	0.000	**0.000**
738.0	35250	0.809	0.374	**0.374**
739.0	54800	1.258	1.034	**1.407**
739.5	63460	1.457	0.679	**2.086**
740.0	69860	1.604	0.765	**2.851**
741.0	75260	1.728	1.666	**4.517**

Job #: 402138
Project: Nokia Site

Date: September 7, 2020
Revised: October 12, 2020
By: ARF

PROP SWMF-002				
STAGE/ STORAGE RELATIONSHIP				
ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**
732.0	17740	0.407	0.000	**0.000**
733.0	21570	0.495	0.451	**0.451**
734.0	25850	0.593	0.544	**0.996**
735.0	30510	0.700	0.647	**1.642**
736.0	35530	0.816	0.758	**2.400**
737.0	41020	0.942	0.879	**3.279**
738.0	46740	1.073	1.007	**4.287**
739.0	52820	1.213	1.143	**5.429**

Job #: 402138
Project: Nokia Site

Date: September 7, 2020
Revised: October 12, 2020
By: ARF

PROP SWMF-003				
STAGE/ STORAGE RELATIONSHIP				
ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**
732.0	41810	0.960	0.000	**0.000**
733.0	53020	1.217	1.088	**1.088**
734.0	64520	1.481	1.349	**2.438**
735.0	76740	1.762	1.621	**4.059**
736.0	93090	2.137	1.949	**6.008**
737.0	111640	2.563	2.350	**8.358**
738.0	130780	3.002	2.783	**11.141**
739.0	150400	3.453	3.228	**14.369**

Job #: 402138
Project: Nokia Site

Date: September 7, 2020
Revised:
By: ARF

PROP SWMF-005				
STAGE/ STORAGE RELATIONSHIP				
ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**
729.0	8430	0.194	0.000	**0.000**
730.0	10950	0.251	0.222	**0.222**
731.0	13790	0.317	0.284	**0.506**
732.0	17190	0.395	0.356	**0.862**
733.0	22080	0.507	0.451	**1.313**
734.0	28230	0.648	0.577	**1.890**
735.0	34150	0.784	0.716	**2.606**
736.0	40320	0.926	0.855	**3.461**
737.0	46720	1.073	0.999	**4.460**

Job #: 402138
Project: Nokia Site

Date: September 7, 2020
Revised:
By: ARF

PROP SWMF-006				
STAGE/ STORAGE RELATIONSHIP				
ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**
729.0	14770	0.339	0.000	**0.000**
730.0	17790	0.408	0.374	**0.374**
731.0	21090	0.484	0.446	**0.820**
732.0	24640	0.566	0.525	**1.345**
733.0	28490	0.654	0.610	**1.955**
734.0	32570	0.748	0.701	**2.656**
735.0	36890	0.847	0.797	**3.453**
736.0	41450	0.952	0.899	**4.352**
737.0	46240	1.062	1.007	**5.359**

Job #: 402138
Project: Nokia Site

Date: September 7, 2020
Revised: October 12, 2020
By: ARF

PROP SWMF-007				
STAGE/ STORAGE RELATIONSHIP				
ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**
739.0	11730	0.269	0.000	**0.000**
739.5	14850	0.341	0.153	**0.153**
740.0	17970	0.413	0.188	**0.341**
741.0	24480	0.562	0.487	**0.828**

Job #: 402138
Project: Nokia Site

Date: September 7, 2020
Revised:
By: ARF

PROP SWMF-EX NOKIA 012				
STAGE/ STORAGE RELATIONSHIP				
ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**
730.0	59870	1.374	0.000	**0.000**
731.0	67790	1.556	1.465	**1.465**
732.0	83920	1.927	1.741	**3.207**
733.0	100410	2.305	2.116	**5.323**
734.0	117220	2.691	2.498	**7.821**
735.0	134590	3.090	2.890	**10.711**
735.9	152170	3.493	2.962	**13.673**
736.0	161140	3.699	0.360	**14.033**
736.5	170160	3.906	1.901	**15.934**

Job #: 402138
Project: Nokia Site

Date: September 4, 2020
Revised:
By: JMH

STORMWATER MANAGEMENT FACILITY 010				
EXISTING DANADA WOODS TOWNHOMES				
ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**
726.87	43020	0.988	0.000	**0.000**
727.0	43870	1.007	0.130	**0.130**
728.0	48150	1.105	1.056	**1.186**
729.0	52590	1.207	1.156	**2.342**
730.0	57050	1.310	1.258	**3.601**
731.0	63560	1.459	1.384	**4.985**
732.0	68900	1.582	1.520	**6.506**
733.0	75500	1.733	1.657	**8.163**
734.0	82490	1.894	1.813	**9.977**
735.0	90470	2.077	1.985	**11.962**
736.00	101600	2.332	2.205	**14.167**
736.39	104640	2.402	0.923	**15.090**
737.0	114910	2.638	1.537	**16.627**

Lucent Technologies

Indian Hill Laboratory
Proposed Parking Lot

Naperville, Illinois

Storm Water Management Plan

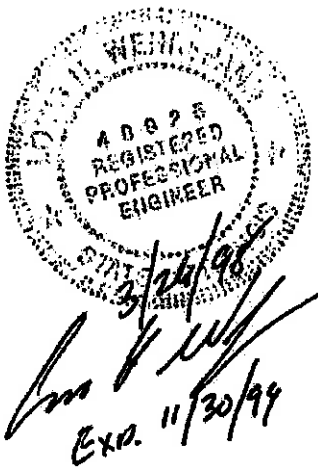
March, 1998

Prepared For:

Lucent Technologies
1200 Warrenville Road, Room 1A149
Naperville, Illinois 60563
(630) 979-1337

Prepared By:

Roake and Associates, Inc.
1887 High Grove Lane
Naperville, Illinois 60540
(630) 355-3232



the drainage areas on the Lucent Technologies site were also modified to reflect current conditions.

The modifications to the STS report included the following:

- The size of Area 1A was increased from 142-acres to 168-acres by removing area from Area 1B and Area 3. The increase reflects modifications to the original STS drainage area to correctly mirror the current drainage pattern of the Lucent Technologies site and provide for the proposed parking lot. Also, the CN for Area 1A was increased from 85.2 to 86.2 due to the increased impervious area.

- The size of Area 3 was decreased from 465-acres to 458-acres due to the proposed parking lot in area 1A.

- Area 1C was created within the previous limits of Area 1B based on the construction of the Danada Woods project. Please see the Danada Woods Townhomes Storm Water Management Plan by Roake and Associates, Inc., dated, February 1997, for more information.

- The size of Area 1B was decreased from 142-acres to 63-acres to reflect the drainage area that was moved to Area 1A and the drainage area that was incorporated into the creation of Area 1C. Additionally, the CN was increased from 85.2 to 88.8 to reflect a higher concentration of impervious area and the time of concentration was decreased from 1.0-hours to 0.7-hours

This revised TR-20 watershed model was used to determine the peak runoff and to evaluate if the existing detention basin located in Area 1A contained sufficient storage for the proposed parking lot addition. These values were also compared to the original STS model to determine the effect on the watershed.

It was determined that the existing Lucent Technologies detention basin located in area 1A does contain sufficient existing storage volume to accommodate the proposed parking lot. The original STS storm water model concluded that during the 100-year 24-hour storm event the high water level of this basin was 735.1. Under the proposed conditions the high water level increased to 735.9, which is below the basin's overflow elevation of 736.5.

The peak runoff volume for this watershed was also calculated. The original STS storm water model determined that the peak runoff of 195-cfs occurred during the 100-year 1-

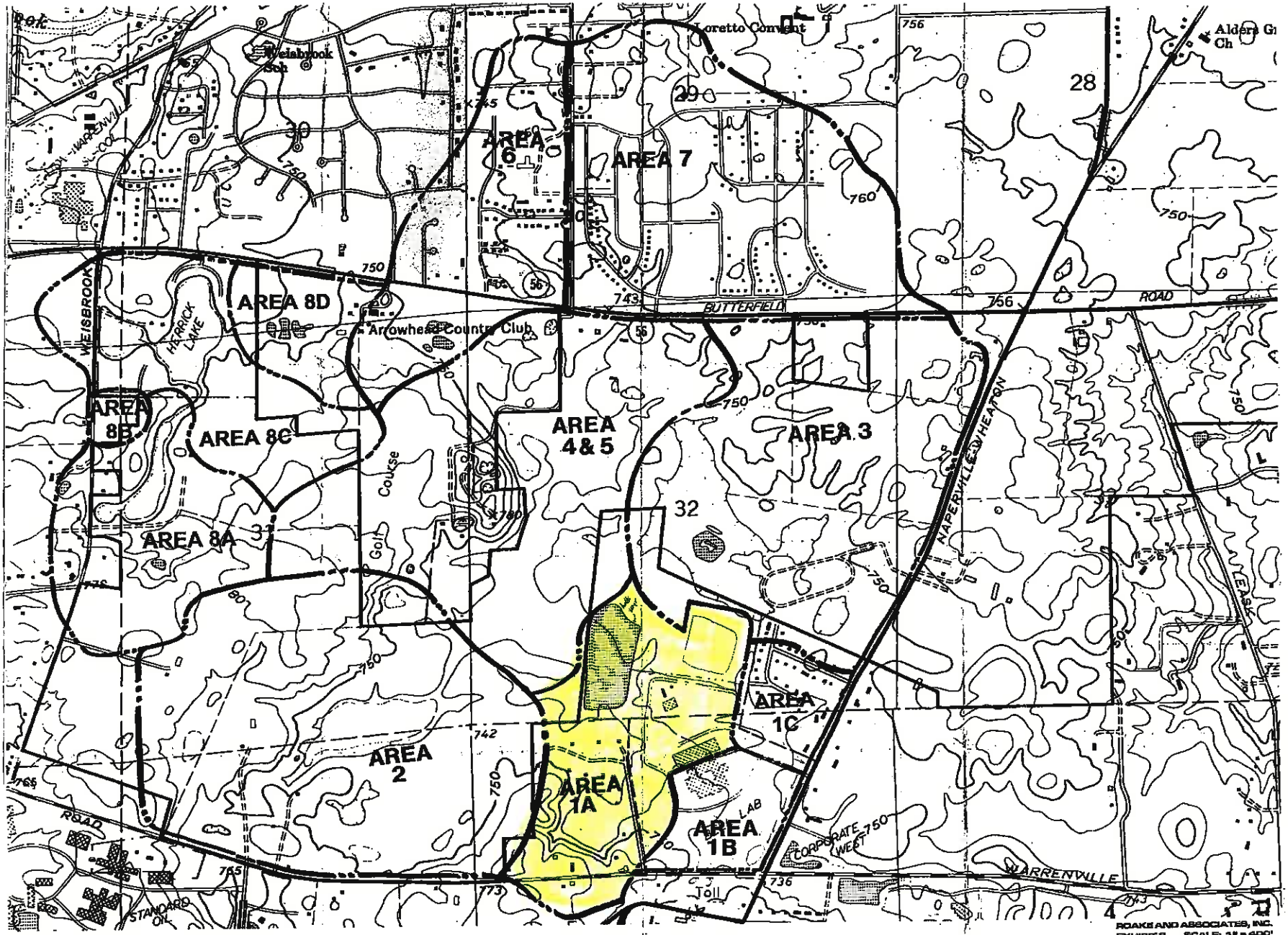
```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********
 8                          736.3        4.0          7.8          4
 8                          736.5        9.0          8.5
 8                          737.0       16.8         12.0
 8                          737.9       21.0         22.8
 8                          740.6       23.0         87.0
 9 ENDTBL
 3 STRUCT       07                                              B
 8                          734.5        0.0          0.0         A
 8                          735.0        1.4          4.0         S
 8                          735.5        1.9         10.0         I
 8                          736.0        2.1         16.0         N
 8                          736.5        2.3         27.5         3
 8                          737.0        2.5         39.0
 8                          737.5        2.8         55.5
 8                          738.0        3.0         72.0
 8                          738.5        3.3         90.0
 8                          739.0        3.5        118.0
 8                          739.5        3.7        147.5
 8                          740.0        3.9        177.0
 9 ENDTBL
 3 STRUCT       08                                              B
 8                          727.5        0.0          0.0         A
 8                          728.0        0.0          5.9         S
 8                          728.5        0.0         12.1         I
 8                          729.0        0.0         18.6         N
 8                          729.5        0.0         25.4         1
 8                          730.0        0.1         32.0         A
 8                          730.5        0.2         38.0
 8                          731.0        0.3         46.0
 8                          731.5        0.4         54.0
 8                          732.0        0.5         61.5
 8                          732.5        5.5         69.0
 8                          733.0       16.0         76.0
 8                          733.5       17.8         84.0
 8                          734.0       19.2         91.5
 8                          734.5       20.8         99.0
 8                          735.0       21.8        106.0
 8                          735.5       22.8        115.0
 8                          736.0       23.7        123.0
 8                          736.5       24.2        129.0
 9 ENDTBL
 3 STRUCT       09                                              B
 8                          725.5        0.0         0.00         A
 8                          727.1        2.0         0.02         S
 8                          728.4       10.0         0.03         I
 8                          728.6       25.0         0.10         N
```

STORAGE AT 735.1 = 107.8 AcFT

STORAGE AT 735.9 = 121.4 AcFT

121.4 AcFT
− 107.8 AcFT
13.6 AcFT

PROVIDED/REQUIRED FOR PARKING Lot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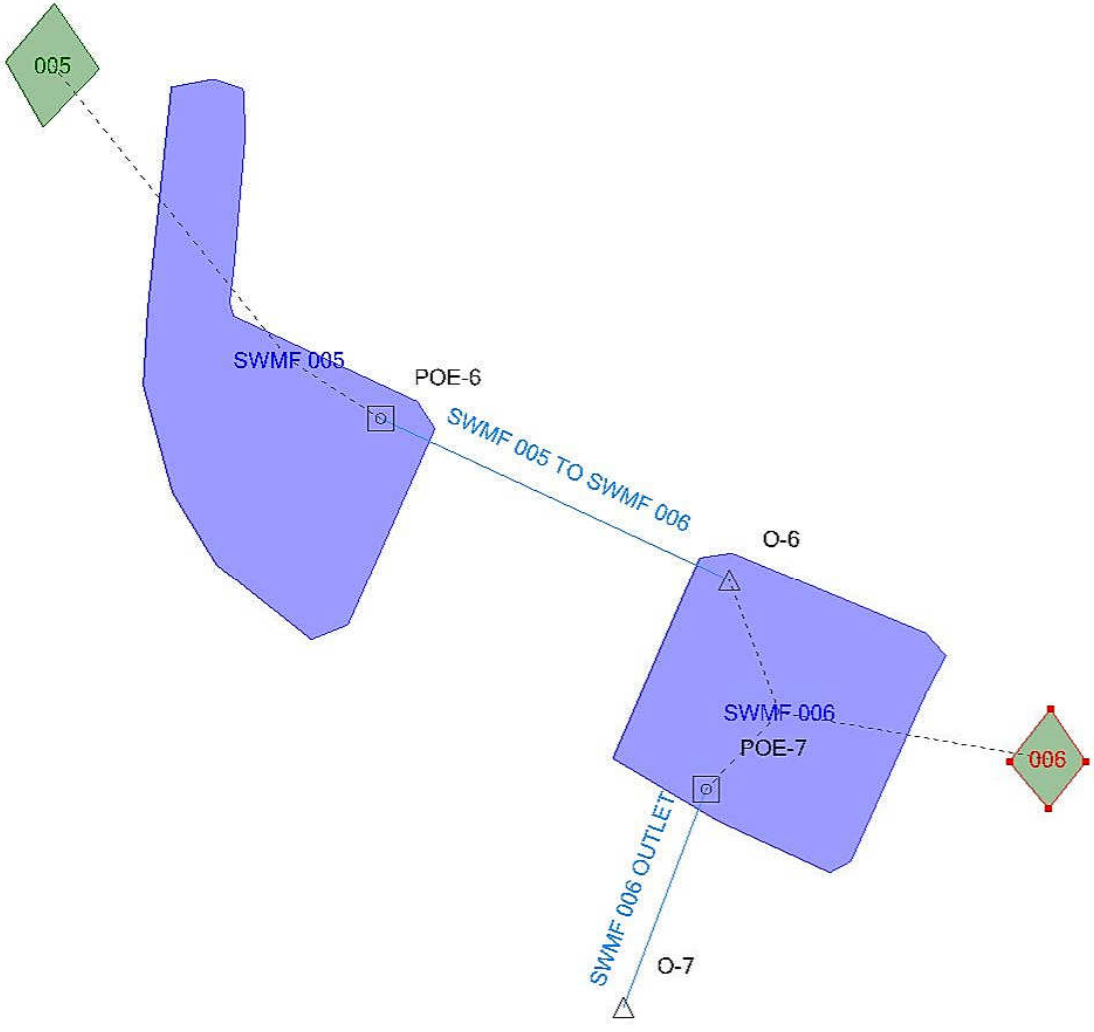
AREA 7
AREA 8D
AREA 8B
AREA 8C
AREA 8A
AREA 4&5
AREA 3
AREA 2
AREA 1A
AREA 1B
AREA 1C
Arrowhead Country Club
BUTTERFIELD ROAD
WARRENVILLE
NAPERVILLE-WHEATON
CORPORATE WEST
WEISBROOK
HERRICK LANE
Golf Course
LAB
Toll
STANDARD OIL
ROAD
Loretto Convent
Weisbrook Sch
ROAKE AND ASSOCIATES, INC.
EXHIBIT 2 SCALE: 1" = 400'

EXHIBIT 2F

“ONSITE” PROPOSED CONDITIONS

PONDPACK MODEL & OUTPUT


005
SWMF 005
POE-6
SWMF 005 TO SWMF 006
O-6
SWMF 006
POE-7
006
SWMF 006 OUTLET
O-7

Scenario Calculation Summary

Scenario Summary	
ID	1
Label	100Yr 24Hr
Notes	
Active Topology	Base Active Topology
Hydrology	Base Hydrology
Rainfall Runoff	100Yr 24Hr
Physical	Base Physical
Initial Condition	Base Initial Condition
Boundary Condition	Base Boundary Condition
Infiltration and Inflow	Base Infiltration and Inflow
Output	Base Output
User Data Extensions	Base User Data Extensions
PondPack Engine Calculation Options	Base Calculation Options

Output Summary			
Output Increment	0.050 hours	Duration	24.000 hours

Rainfall Summary			
Return Event Tag	100	Rainfall Type	Time-Depth Curve
Total Depth	8.6 in	Storm Event	100YR-24HR

ICPM Output Summary			
Target Convergence	0.00 ft³/s	ICPM Time Step	0.050 hours
Maximum Iterations	35		

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
005	100Yr 24Hr	100	None	2.559	16.000	3.14	(N/A)	(N/A)
006	100Yr 24Hr	100	None	1.885	16.000	2.35	(N/A)	(N/A)
O-7	100Yr 24Hr	100	None	1.007	24.000	0.84	(N/A)	(N/A)
SWMF 005 (IN)	100Yr 24Hr	100	None	2.559	16.000	3.14	(N/A)	(N/A)
SWMF 005 (OUT)	100Yr 24Hr	100	None	1.160	15.600	1.29	733.15	1.397
SWMF 006 (IN)	100Yr 24Hr	100	None	3.045	15.600	3.63	(N/A)	(N/A)
SWMF 006 (OUT)	100Yr 24Hr	100	None	1.007	24.000	0.84	733.12	2.037

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft³/s)	End Point	Node Flow Direction

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
SWMF 005 TO SWMF 006	Pond Outlet	Upstream	2.559	16.000	3.14	SWMF 005	Pond Inflow
SWMF 005 TO SWMF 006	Pond Outlet	Outflow	1.160	15.600	1.29	SWMF 005	Pond Outflow
SWMF 005 TO SWMF 006	Pond Outlet	Link	1.160	15.600	1.29		
SWMF 005 TO SWMF 006	Pond Outlet	Downstream	3.045	15.600	3.63	SWMF 006	
SWMF 006 OUTLET	Pond Outlet	Upstream	3.045	15.600	3.63	SWMF 006	Pond Inflow
SWMF 006 OUTLET	Pond Outlet	Outflow	1.007	24.000	0.84	SWMF 006	Pond Outflow
SWMF 006 OUTLET	Pond Outlet	Link	1.007	24.000	0.84		
SWMF 006 OUTLET	Pond Outlet	Downstream	1.007	24.000	0.84	O-7	

Messages

Message Id	6
Scenario	(N/A)
Element Type	(N/A)
Element Id	-2
Label	(N/A)
Time	(N/A)
Message	There are user notifications available. Double-click this message to load these messages.
Source	Project File

Table of Contents

Subsection: Time-Depth Curve
Label: UPDATED 100YR 12HR-48HR

Return Event: 100 years
Storm Event: 100YR-24HR

Time-Depth Curve: 100YR-24HR	
Label	100YR-24HR
Start Time	0.000 hours
Increment	1.000 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 1.000 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.2	0.4	0.6	0.8
5.000	1.0	1.2	1.4	1.7	2.0
10.000	2.3	2.7	3.1	3.8	4.5
15.000	5.2	6.0	6.7	7.3	7.7
20.000	8.0	8.2	8.3	8.4	8.6

Storm Event	100YR-24HR
Return Event	100 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.380 hours
Area (User Defined)	4.230 acres

Computational Time Increment	0.051 hours
Time to Peak (Computed)	16.011 hours
Flow (Peak, Computed)	3.14 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.000 hours
Flow (Peak Interpolated Output)	3.14 ft³/s

Drainage Area	
SCS CN (Composite)	89.400
Area (User Defined)	4.230 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.3 in
Runoff Volume (Pervious)	2.571 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.559 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.380 hours
Computational Time Increment	0.051 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	12.61 ft³/s
Unit peak time, Tp	0.253 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.013 hours
Total unit time, Tb	1.267 hours

Storm Event	100YR-24HR
Return Event	100 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.270 hours
Area (User Defined)	3.180 acres

Computational Time Increment	0.036 hours
Time to Peak (Computed)	15.984 hours
Flow (Peak, Computed)	2.35 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.000 hours
Flow (Peak Interpolated Output)	2.35 ft³/s

Drainage Area	
SCS CN (Composite)	88.100
Area (User Defined)	3.180 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.1 in
Runoff Volume (Pervious)	1.892 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.885 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.270 hours
Computational Time Increment	0.036 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.34 ft³/s
Unit peak time, Tp	0.180 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.720 hours
Total unit time, Tb	0.900 hours

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
729.00	0.000
730.00	0.222
731.00	0.506
732.00	0.862
733.00	1.313
734.00	1.890
735.00	2.606
736.00	3.461
737.00	4.460

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
729.00	0.000
730.00	0.374
731.00	0.820
732.00	1.345
733.00	1.955
734.00	2.656
735.00	3.453
736.00	4.352
737.00	5.359

Requested Pond Water Surface Elevations	
Minimum (Headwater)	729.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	737.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	Culvert - 1	Forward + Reverse	TW	729.00	737.00
Rectangular Weir	Weir - 1	Forward + Reverse	TW	736.00	737.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	736.00 ft
Weir Length	40.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.0 in
Length	330.00 ft
Length (Computed Barrel)	330.00 ft
Slope (Computed)	0.000 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.018
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	0.000
T2 ratio (HW/D)	1.197
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	729.00 ft	T1 Flow	7.58 ft³/s
T2 Elevation	730.80 ft	T2 Flow	8.66 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	729.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	737.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	TW	729.01	737.00
Rectangular Weir	Weir - 1	Forward	TW	736.00	737.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	728.50 ft
Orifice Diameter	3.9 in
Orifice Coefficient	0.600

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	736.00 ft
Weir Length	40.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

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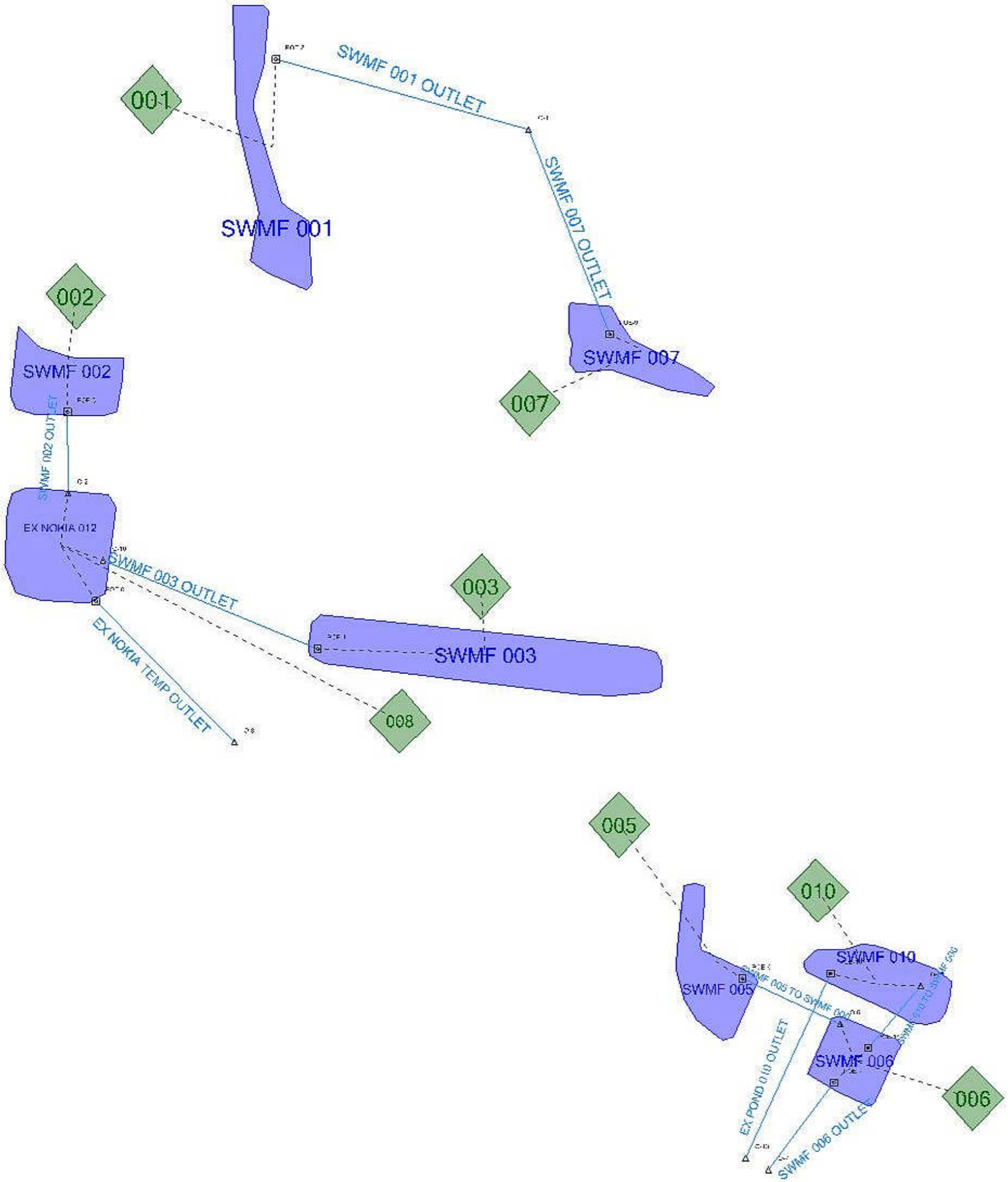
EXHIBIT 2G

“PROP” PROPOSED CONDITIONS

PONDPACK MODEL & OUTPUT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007
002
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SWMF 002 OUTLET
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SWMF 003 OUTLET
EX NOKIA TEMP OUTLET
003
SWMF 003
008
005
010
SWMF 010
SWMF 005
SWMF 005 TO SWMF 006
SWMF 010 TO SWMF 006
EX POND 010 OUTLET
SWMF 006
006
SWMF 006 OUTLET

Scenario Calculation Summary

Scenario Summary	
ID	1
Label	100Yr 24Hr
Notes	
Active Topology	Base Active Topology
Hydrology	Base Hydrology
Rainfall Runoff	100Yr 24Hr
Physical	Base Physical
Initial Condition	Base Initial Condition
Boundary Condition	Base Boundary Condition
Infiltration and Inflow	Base Infiltration and Inflow
Output	Base Output
User Data Extensions	Base User Data Extensions
PondPack Engine Calculation Options	Base Calculation Options

Output Summary			
Output Increment	0.050 hours	Duration	24.000 hours

Rainfall Summary			
Return Event Tag	100	Rainfall Type	Time-Depth Curve
Total Depth	8.6 in	Storm Event	100YR-24HR

ICPM Output Summary			
Target Convergence	0.00 ft³/s	ICPM Time Step	0.020 hours
Maximum Iterations	35		

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
001	100Yr 24Hr	100	None	1.818	16.000	2.24	(N/A)	(N/A)
002	100Yr 24Hr	100	None	12.501	16.000	15.62	(N/A)	(N/A)
003	100Yr 24Hr	100	None	16.757	16.000	20.67	(N/A)	(N/A)
005	100Yr 24Hr	100	None	2.559	16.000	3.14	(N/A)	(N/A)
006	100Yr 24Hr	100	None	1.885	16.000	2.35	(N/A)	(N/A)
007	100Yr 24Hr	100	None	0.610	16.000	0.75	(N/A)	(N/A)
008	100Yr 24Hr	100	None	0.417	16.000	0.51	(N/A)	(N/A)
010	100Yr 24Hr	100	None	21.138	16.050	27.78	(N/A)	(N/A)
EX NOKIA 012 (IN)	100Yr 24Hr	100	None	17.407	17.000	16.05	(N/A)	(N/A)
EX NOKIA 012 (OUT)	100Yr 24Hr	100	None	4.726	24.000	4.60	735.60	12.678
O-1	100Yr 24Hr	100	None	0.500	18.200	0.52	(N/A)	(N/A)
O-13	100Yr 24Hr	100	None	1.680	24.000	1.89	(N/A)	(N/A)
O-7	100Yr 24Hr	100	None	1.180	24.000	1.10	(N/A)	(N/A)
O-8	100Yr 24Hr	100	None	4.726	24.000	4.60	(N/A)	(N/A)

Scenario Calculation Summary

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
SWMF 001 (IN)	100Yr 24Hr	100	None	1.818	16.000	2.24	(N/A)	(N/A)
SWMF 001 (OUT)	100Yr 24Hr	100	None	0.038	24.000	0.03	739.27	1.780
SWMF 002 (IN)	100Yr 24Hr	100	None	12.501	16.000	15.62	(N/A)	(N/A)
SWMF 002 (OUT)	100Yr 24Hr	100	None	10.259	17.200	10.17	736.79	3.094
SWMF 003 (IN)	100Yr 24Hr	100	None	16.757	16.000	20.67	(N/A)	(N/A)
SWMF 003 (OUT)	100Yr 24Hr	100	None	6.731	17.300	5.43	737.68	10.241
SWMF 005 (IN)	100Yr 24Hr	100	None	2.559	16.000	3.14	(N/A)	(N/A)
SWMF 005 (OUT)	100Yr 24Hr	100	None	0.500	14.000	1.13	736.20	3.659
SWMF 005 (Reverse)	100Yr 24Hr	100	None	-1.599	14.800	-4.72	(N/A)	(N/A)
SWMF 006 (IN)	100Yr 24Hr	100	None	1.388	14.000	3.24	(N/A)	(N/A)
SWMF 006 (Reverse)	100Yr 24Hr	100	None	-0.603	14.800	-2.39	(N/A)	(N/A)
SWMF 006 (OUT)	100Yr 24Hr	100	None	0.405	23.200	1.09	736.20	4.555
SWMF 006 (Reverse)	100Yr 24Hr	100	None	-3.996	14.700	-23.88	(N/A)	(N/A)
SWMF 007 (IN)	100Yr 24Hr	100	None	0.610	16.000	0.75	(N/A)	(N/A)
SWMF 007 (OUT)	100Yr 24Hr	100	None	0.462	18.200	0.48	739.75	0.248
SWMF 010 (IN)	100Yr 24Hr	100	None	16.297	13.950	24.25	(N/A)	(N/A)
SWMF 010 (Reverse)	100Yr 24Hr	100	None	0.000	19.600	-0.38	(N/A)	(N/A)
SWMF 010 (OUT)	100Yr 24Hr	100	None	1.680	24.000	1.89	736.21	14.672

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
EX NOKIA TEMP OUTLET	Pond Outlet	Upstream	17.407	17.000	16.05	EX NOKIA 012	Pond Inflow

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
EX NOKIA TEMP OUTLET	Pond Outlet	Outflow	4.726	24.000	4.60	EX NOKIA 012	Pond Outflow
EX NOKIA TEMP OUTLET	Pond Outlet	Link	4.726	24.000	4.60		
EX NOKIA TEMP OUTLET	Pond Outlet	Downstream	4.726	24.000	4.60	O-8	
EX POND 010 OUTLET	Pond Outlet	Upstream	16.297	13.950	24.25	SWMF 010	Pond Inflow
EX POND 010 OUTLET	Negative Flow	Upstream	0.000	19.600	-0.38	SWMF 010	Pond Inflow
EX POND 010 OUTLET	Pond Outlet	Outflow	1.680	24.000	1.89	SWMF 010	Pond Outflow
EX POND 010 OUTLET	Pond Outlet	Link	1.680	24.000	1.89		
EX POND 010 OUTLET	Pond Outlet	Downstream	1.680	24.000	1.89	O-13	
SWMF 001 OUTLET	Pond Outlet	Upstream	1.818	16.000	2.24	SWMF 001	Pond Inflow
SWMF 001 OUTLET	Pond Outlet	Outflow	0.038	24.000	0.03	SWMF 001	Pond Outflow
SWMF 001 OUTLET	Pond Outlet	Link	0.038	24.000	0.03		
SWMF 001 OUTLET	Pond Outlet	Downstream	0.500	18.200	0.52	O-1	
SWMF 002 OUTLET	Pond Outlet	Upstream	12.501	16.000	15.62	SWMF 002	Pond Inflow
SWMF 002 OUTLET	Pond Outlet	Outflow	10.259	17.200	10.17	SWMF 002	Pond Outflow
SWMF 002 OUTLET	Pond Outlet	Link	10.259	17.200	10.17		
SWMF 002 OUTLET	Pond Outlet	Downstream	17.407	17.000	16.05	EX NOKIA 012	
SWMF 003 OUTLET	Pond Outlet	Upstream	16.757	16.000	20.67	SWMF 003	Pond Inflow
SWMF 003 OUTLET	Pond Outlet	Outflow	6.731	17.300	5.43	SWMF 003	Pond Outflow
SWMF 003 OUTLET	Pond Outlet	Link	6.713	17.300	5.43		
SWMF 003 OUTLET	Pond Outlet	Downstream	17.407	17.000	16.05	EX NOKIA 012	
SWMF 005 TO SWMF 006	Pond Outlet	Upstream	2.559	16.000	3.14	SWMF 005	Pond Inflow
SWMF 005 TO SWMF 006	Pond Outlet	Outflow	0.500	14.000	1.13	SWMF 005	Pond Outflow

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
SWMF 005 TO SWMF 006	Negative Flow	Outflow	-1.599	14.800	-4.72	SWMF 005	Pond Outflow
SWMF 005 TO SWMF 006	Pond Outlet	Link	0.500	14.000	1.13		
SWMF 005 TO SWMF 006	Negative Flow	Link	-1.599	14.800	-4.72		
SWMF 005 TO SWMF 006	Pond Outlet	Downstream	1.388	14.000	3.24	SWMF 006	
SWMF 005 TO SWMF 006	Negative Flow	Downstream	-0.603	14.800	-2.39	SWMF 006	
SWMF 006 OUTLET	Pond Outlet	Upstream	1.388	14.000	3.24	SWMF 006	Pond Inflow
SWMF 006 OUTLET	Negative Flow	Upstream	-0.603	14.800	-2.39	SWMF 006	Pond Inflow
SWMF 006 OUTLET	Pond Outlet	Outflow	0.405	23.200	1.09	SWMF 006	Pond Outflow
SWMF 006 OUTLET	Negative Flow	Outflow	-3.996	14.700	-23.88	SWMF 006	Pond Outflow
SWMF 006 OUTLET	Pond Outlet	Link	1.180	24.000	1.10		
SWMF 006 OUTLET	Pond Outlet	Downstream	1.180	24.000	1.10	O-7	
SWMF 007 OUTLET	Pond Outlet	Upstream	0.610	16.000	0.75	SWMF 007	Pond Inflow
SWMF 007 OUTLET	Pond Outlet	Outflow	0.462	18.200	0.48	SWMF 007	Pond Outflow
SWMF 007 OUTLET	Pond Outlet	Link	0.462	18.200	0.48		
SWMF 007 OUTLET	Pond Outlet	Downstream	0.500	18.200	0.52	O-1	
SWMF 010 TO SWMF 006	Pond Outlet	Upstream	1.388	14.000	3.24	SWMF 006	Pond Inflow
SWMF 010 TO SWMF 006	Negative Flow	Upstream	-0.603	14.800	-2.39	SWMF 006	Pond Inflow
SWMF 010 TO SWMF 006	Pond Outlet	Outflow	0.405	23.200	1.09	SWMF 006	Pond Outflow
SWMF 010 TO SWMF 006	Negative Flow	Outflow	-3.996	14.700	-23.88	SWMF 006	Pond Outflow
SWMF 010 TO SWMF 006	Pond Outlet	Link	1,315.255	24.000	2,750.56		

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
SWMF 010 TO SWMF 006	Pond Outlet	Downstream	16.297	13.950	24.25	SWMF 010	
SWMF 010 TO SWMF 006	Negative Flow	Downstream	0.000	19.600	-0.38	SWMF 010	

Messages

Message Id	6
Scenario	(N/A)
Element Type	(N/A)
Element Id	-2
Label	(N/A)
Time	(N/A)
Message	There are user notifications available. Double-click this message to load these messages.
Source	Project File

Scenario Calculation Summary

Scenario Summary	
ID	116
Label	2YR-24HR
Notes	
Active Topology	Base Active Topology
Hydrology	Base Hydrology
Rainfall Runoff	2YR-24HR
Physical	Base Physical
Initial Condition	Base Initial Condition
Boundary Condition	Base Boundary Condition
Infiltration and Inflow	Base Infiltration and Inflow
Output	Base Output
User Data Extensions	Base User Data Extensions
PondPack Engine Calculation Options	Base Calculation Options

Output Summary			
Output Increment	0.050 hours	Duration	24.000 hours

Rainfall Summary			
Return Event Tag	2	Rainfall Type	Time-Depth Curve
Total Depth	3.3 in	Storm Event	2YR-24HR

ICPM Output Summary			
Target Convergence	0.00 ft³/s	ICPM Time Step	0.020 hours
Maximum Iterations	35		

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
001	2YR-24HR	2	None	0.556	16.000	0.77	(N/A)	(N/A)
002	2YR-24HR	2	None	3.704	16.050	5.26	(N/A)	(N/A)
003	2YR-24HR	2	None	5.105	16.050	7.11	(N/A)	(N/A)
005	2YR-24HR	2	None	0.787	16.050	1.09	(N/A)	(N/A)
006	2YR-24HR	2	None	0.562	16.000	0.79	(N/A)	(N/A)
007	2YR-24HR	2	None	0.187	16.000	0.26	(N/A)	(N/A)
008	2YR-24HR	2	None	0.130	16.000	0.18	(N/A)	(N/A)
010	2YR-24HR	2	None	5.537	16.100	8.39	(N/A)	(N/A)
EX NOKIA 012 (IN)	2YR-24HR	2	None	6.982	17.200	8.94	(N/A)	(N/A)
EX NOKIA 012 (OUT)	2YR-24HR	2	None	2.364	24.000	3.05	732.67	4.616
O-1	2YR-24HR	2	None	0.139	18.200	0.19	(N/A)	(N/A)
O-13	2YR-24HR	2	None	0.502	24.000	0.93	(N/A)	(N/A)
O-7	2YR-24HR	2	None	0.528	20.600	0.52	(N/A)	(N/A)
O-8	2YR-24HR	2	None	2.364	24.000	3.05	(N/A)	(N/A)

Scenario Calculation Summary

Executive Summary (Nodes)

Label	Scenario	Return Event (years)	Truncation	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
SWMF 001 (IN)	2YR-24HR	2	None	0.556	16.000	0.77	(N/A)	(N/A)
SWMF 001 (OUT)	2YR-24HR	2	None	0.019	24.000	0.02	738.16	0.538
SWMF 002 (IN)	2YR-24HR	2	None	3.704	16.050	5.26	(N/A)	(N/A)
SWMF 002 (OUT)	2YR-24HR	2	None	3.364	17.100	5.01	733.10	0.505
SWMF 003 (IN)	2YR-24HR	2	None	5.105	16.000	7.11	(N/A)	(N/A)
SWMF 003 (OUT)	2YR-24HR	2	None	3.488	18.600	3.96	733.81	2.187
SWMF 005 (IN)	2YR-24HR	2	None	0.787	16.050	1.09	(N/A)	(N/A)
SWMF 005 (OUT)	2YR-24HR	2	None	0.474	14.450	0.69	730.37	0.327
SWMF 006 (IN)	2YR-24HR	2	None	1.037	14.900	1.45	(N/A)	(N/A)
SWMF 006 (OUT)	2YR-24HR	2	None	0.528	20.650	0.52	730.35	0.530
SWMF 007 (IN)	2YR-24HR	2	None	0.187	16.000	0.26	(N/A)	(N/A)
SWMF 007 (OUT)	2YR-24HR	2	None	0.121	18.200	0.17	739.30	0.093
SWMF 010 (IN)	2YR-24HR	2	None	5.537	16.100	8.39	(N/A)	(N/A)
SWMF 010 (OUT)	2YR-24HR	2	None	0.502	24.000	0.93	731.03	5.034

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
EX NOKIA TEMP OUTLET	Pond Outlet	Upstream	6.982	17.200	8.94	EX NOKIA 012	Pond Inflow
EX NOKIA TEMP OUTLET	Pond Outlet	Outflow	2.364	24.000	3.05	EX NOKIA 012	Pond Outflow
EX NOKIA TEMP OUTLET	Pond Outlet	Link	2.364	24.000	3.05		
EX NOKIA TEMP OUTLET	Pond Outlet	Downstream	2.364	24.000	3.05	O-8	

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
EX POND 010 OUTLET	Pond Outlet	Upstream	5.537	16.100	8.39	SWMF 010	Pond Inflow
EX POND 010 OUTLET	Pond Outlet	Outflow	0.502	24.000	0.93	SWMF 010	Pond Outflow
EX POND 010 OUTLET	Pond Outlet	Link	0.502	24.000	0.93		
EX POND 010 OUTLET	Pond Outlet	Downstream	0.502	24.000	0.93	O-13	
SWMF 001 OUTLET	Pond Outlet	Upstream	0.556	16.000	0.77	SWMF 001	Pond Inflow
SWMF 001 OUTLET	Pond Outlet	Outflow	0.019	24.000	0.02	SWMF 001	Pond Outflow
SWMF 001 OUTLET	Pond Outlet	Link	0.019	24.000	0.02		
SWMF 001 OUTLET	Pond Outlet	Downstream	0.139	18.200	0.19	O-1	
SWMF 002 OUTLET	Pond Outlet	Upstream	3.704	16.050	5.26	SWMF 002	Pond Inflow
SWMF 002 OUTLET	Pond Outlet	Outflow	3.364	17.100	5.01	SWMF 002	Pond Outflow
SWMF 002 OUTLET	Pond Outlet	Link	3.364	17.100	5.01		
SWMF 002 OUTLET	Pond Outlet	Downstream	6.982	17.200	8.94	EX NOKIA 012	
SWMF 003 OUTLET	Pond Outlet	Upstream	5.105	16.000	7.11	SWMF 003	Pond Inflow
SWMF 003 OUTLET	Pond Outlet	Outflow	3.488	18.600	3.96	SWMF 003	Pond Outflow
SWMF 003 OUTLET	Pond Outlet	Link	3.488	18.600	3.96		
SWMF 003 OUTLET	Pond Outlet	Downstream	6.982	17.200	8.94	EX NOKIA 012	
SWMF 005 TO SWMF 006	Pond Outlet	Upstream	0.787	16.050	1.09	SWMF 005	Pond Inflow
SWMF 005 TO SWMF 006	Pond Outlet	Outflow	0.474	14.450	0.69	SWMF 005	Pond Outflow
SWMF 005 TO SWMF 006	Pond Outlet	Link	0.474	14.450	0.69		
SWMF 005 TO SWMF 006	Pond Outlet	Downstream	1.037	14.900	1.45	SWMF 006	
SWMF 006 OUTLET	Pond Outlet	Upstream	1.037	14.900	1.45	SWMF 006	Pond Inflow
SWMF 006 OUTLET	Pond Outlet	Outflow	0.528	20.650	0.52	SWMF 006	Pond Outflow

Scenario Calculation Summary

Executive Summary (Links)

Label	Type	Location	Hydrograph Volume (ac-ft)	Peak Time (hours)	Peak Flow (ft^3/s)	End Point	Node Flow Direction
SWMF 006 OUTLET	Pond Outlet	Link	0.528	20.600	0.52		
SWMF 006 OUTLET	Pond Outlet	Downstream	0.528	20.600	0.52	O-7	
SWMF 007 OUTLET	Pond Outlet	Upstream	0.187	16.000	0.26	SWMF 007	Pond Inflow
SWMF 007 OUTLET	Pond Outlet	Outflow	0.121	18.200	0.17	SWMF 007	Pond Outflow
SWMF 007 OUTLET	Pond Outlet	Link	0.121	18.200	0.17		
SWMF 007 OUTLET	Pond Outlet	Downstream	0.139	18.200	0.19	O-1	
SWMF 010 TO SWMF 006	Pond Outlet	Upstream	1.037	14.900	1.45	SWMF 006	Pond Inflow
SWMF 010 TO SWMF 006	Pond Outlet	Outflow	0.528	20.650	0.52	SWMF 006	Pond Outflow
SWMF 010 TO SWMF 006	Pond Outlet	Link	0.000	0.000	0.00		
SWMF 010 TO SWMF 006	Pond Outlet	Downstream	5.537	16.100	8.39	SWMF 010	

Messages

Message Id	6
Scenario	(N/A)
Element Type	(N/A)
Element Id	-2
Label	(N/A)
Time	(N/A)
Message	There are user notifications available. Double-click this message to load these messages.
Source	Project File

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Subsection: Time-Depth Curve
Label: UPDATED 100YR 12HR-48HR

Return Event: 100 years
Storm Event: 100YR-24HR

Time-Depth Curve: 100YR-24HR	
Label	100YR-24HR
Start Time	0.000 hours
Increment	1.000 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 1.000 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.2	0.4	0.6	0.8
5.000	1.0	1.2	1.4	1.7	2.0
10.000	2.3	2.7	3.1	3.8	4.5
15.000	5.2	6.0	6.7	7.3	7.7
20.000	8.0	8.2	8.3	8.4	8.6

Storm Event	100YR-24HR
Return Event	100 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.250 hours
Area (User Defined)	3.010 acres

Computational Time Increment	0.033 hours
Time to Peak (Computed)	16.000 hours
Flow (Peak, Computed)	2.24 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.000 hours
Flow (Peak Interpolated Output)	2.24 ft³/s

Drainage Area	
SCS CN (Composite)	89.200
Area (User Defined)	3.010 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.3 in
Runoff Volume (Pervious)	1.824 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.818 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.250 hours
Computational Time Increment	0.033 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.64 ft³/s
Unit peak time, Tp	0.167 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.667 hours
Total unit time, Tb	0.833 hours

Storm Event	100YR-24HR
Return Event	100 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.340 hours
Area (User Defined)	21.220 acres

Computational Time Increment	0.045 hours
Time to Peak (Computed)	16.003 hours
Flow (Peak, Computed)	15.62 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.000 hours
Flow (Peak Interpolated Output)	15.62 ft³/s

Drainage Area	
SCS CN (Composite)	87.800
Area (User Defined)	21.220 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.1 in
Runoff Volume (Pervious)	12.559 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	12.501 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.340 hours
Computational Time Increment	0.045 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	70.72 ft³/s
Unit peak time, Tp	0.227 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.907 hours
Total unit time, Tb	1.133 hours

Storm Event	100YR-24HR
Return Event	100 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.330 hours
Area (User Defined)	27.870 acres

Computational Time Increment	0.044 hours
Time to Peak (Computed)	15.972 hours
Flow (Peak, Computed)	20.67 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.000 hours
Flow (Peak Interpolated Output)	20.67 ft³/s

Drainage Area	
SCS CN (Composite)	89.000
Area (User Defined)	27.870 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.2 in
Runoff Volume (Pervious)	16.830 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	16.757 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.330 hours
Computational Time Increment	0.044 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	95.69 ft³/s
Unit peak time, Tp	0.220 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.880 hours
Total unit time, Tb	1.100 hours

Storm Event	100YR-24HR
Return Event	100 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.380 hours
Area (User Defined)	4.230 acres

Computational Time Increment	0.051 hours
Time to Peak (Computed)	16.011 hours
Flow (Peak, Computed)	3.14 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.000 hours
Flow (Peak Interpolated Output)	3.14 ft³/s

Drainage Area	
SCS CN (Composite)	89.400
Area (User Defined)	4.230 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.3 in
Runoff Volume (Pervious)	2.571 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.559 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.380 hours
Computational Time Increment	0.051 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	12.61 ft³/s
Unit peak time, Tp	0.253 hours

Subsection: Unit Hydrograph Summary
Label: 005

Return Event: 100 years
Storm Event: 100YR-24HR

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.013 hours
Total unit time, Tb	1.267 hours

Storm Event	100YR-24HR
Return Event	100 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.270 hours
Area (User Defined)	3.180 acres

Computational Time Increment	0.036 hours
Time to Peak (Computed)	15.984 hours
Flow (Peak, Computed)	2.35 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.000 hours
Flow (Peak Interpolated Output)	2.35 ft³/s

Drainage Area	
SCS CN (Composite)	88.100
Area (User Defined)	3.180 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.1 in
Runoff Volume (Pervious)	1.892 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.885 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.270 hours
Computational Time Increment	0.036 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.34 ft³/s
Unit peak time, Tp	0.180 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.720 hours
Total unit time, Tb	0.900 hours

Storm Event	100YR-24HR
Return Event	100 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.250 hours
Area (User Defined)	1.010 acres

Computational Time Increment	0.033 hours
Time to Peak (Computed)	16.000 hours
Flow (Peak, Computed)	0.75 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.000 hours
Flow (Peak Interpolated Output)	0.75 ft³/s

Drainage Area	
SCS CN (Composite)	89.200
Area (User Defined)	1.010 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.3 in
Runoff Volume (Pervious)	0.612 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.610 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.250 hours
Computational Time Increment	0.033 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	4.58 ft³/s
Unit peak time, Tp	0.167 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.667 hours
Total unit time, Tb	0.833 hours

Storm Event	100YR-24HR
Return Event	100 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.680 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	16.000 hours
Flow (Peak, Computed)	0.51 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.000 hours
Flow (Peak Interpolated Output)	0.51 ft³/s

Drainage Area	
SCS CN (Composite)	90.000
Area (User Defined)	0.680 acres
Maximum Retention (Pervious)	1.1 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.4 in
Runoff Volume (Pervious)	0.417 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.417 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	9.25 ft³/s
Unit peak time, Tp	0.056 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	100YR-24HR
Return Event	100 years
Duration	24.000 hours
Depth	8.6 in
Time of Concentration (Composite)	0.470 hours
Area (User Defined)	39.370 acres

Computational Time Increment	0.063 hours
Time to Peak (Computed)	16.043 hours
Flow (Peak, Computed)	27.78 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	16.050 hours
Flow (Peak Interpolated Output)	27.78 ft³/s

Drainage Area	
SCS CN (Composite)	82.700
Area (User Defined)	39.370 acres
Maximum Retention (Pervious)	2.1 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.5 in
Runoff Volume (Pervious)	21.283 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	21.138 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.470 hours
Computational Time Increment	0.063 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	94.91 ft³/s
Unit peak time, Tp	0.313 hours

SCS Unit Hydrograph Parameters	
Unit receding limb, Tr	1.253 hours
Total unit time, Tb	1.567 hours

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
730.00	0.000
731.00	1.465
732.00	3.207
733.00	5.323
734.00	7.821
735.00	10.711
735.90	13.673
736.00	14.033
736.50	15.934

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
737.50	0.000
738.00	0.374
739.00	1.407
739.50	2.086
740.00	2.851
741.00	4.517

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
732.00	0.000
733.00	0.451
734.00	0.996
735.00	1.642
736.00	2.400
737.00	3.279
738.00	4.287
739.00	5.429

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
732.00	0.000
733.00	1.088
734.00	2.438
735.00	4.059
736.00	6.008
737.00	8.358
738.00	11.141
739.00	14.369

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
729.00	0.000
730.00	0.222
731.00	0.506
732.00	0.862
733.00	1.313
734.00	1.890
735.00	2.606
736.00	3.461
737.00	4.460

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
729.00	0.000
730.00	0.374
731.00	0.820
732.00	1.345
733.00	1.955
734.00	2.656
735.00	3.453
736.00	4.352
737.00	5.359

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
739.00	0.000
739.50	0.153
740.00	0.341
741.00	0.828

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ac-ft)
726.87	0.000
727.00	0.130
728.00	1.186
729.00	2.342
730.00	3.601
731.00	4.985
732.00	6.506
733.00	8.163
734.00	9.977
735.00	11.962
736.00	14.167
736.39	15.090
737.00	16.627

Requested Pond Water Surface Elevations	
Minimum (Headwater)	730.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	736.50 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	TW	730.00	736.50
Rectangular Weir	Weir - 1	Forward	TW	735.90	736.50
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	730.00 ft
Orifice Diameter	8.8 in
Orifice Coefficient	0.600

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	735.90 ft
Weir Length	40.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	726.87 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	737.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward + Reverse	TW	726.88	737.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	726.67 ft
Orifice Diameter	5.3 in
Orifice Coefficient	0.600

Requested Pond Water Surface Elevations	
Minimum (Headwater)	737.50 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	741.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	TW	737.50	741.00
Rectangular Weir	Weir - 1	Forward	TW	740.00	741.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	737.50 ft
Orifice Diameter	1.0 in
Orifice Coefficient	0.600

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	740.00 ft
Weir Length	40.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	732.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	739.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward + Reverse	TW	732.01	739.00
Rectangular Weir	Weir - 1	Forward + Reverse	TW	738.00	739.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	731.80 ft
Orifice Diameter	15.8 in
Orifice Coefficient	0.600

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	738.00 ft
Weir Length	40.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	732.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	739.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward + Reverse	TW	732.01	739.00
Rectangular Weir	Weir - 1	Forward + Reverse	TW	738.00	739.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	731.80 ft
Orifice Diameter	11.0 in
Orifice Coefficient	0.600

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	738.00 ft
Weir Length	40.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	729.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	737.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	Culvert - 1	Forward + Reverse	TW	729.00	737.00
Rectangular Weir	Weir - 1	Forward + Reverse	TW	736.00	737.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	736.00 ft
Weir Length	40.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.0 in
Length	330.00 ft
Length (Computed Barrel)	330.00 ft
Slope (Computed)	0.000 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.018
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.095
T2 ratio (HW/D)	1.197
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	730.64 ft	T1 Flow	7.58 ft³/s
T2 Elevation	730.80 ft	T2 Flow	8.66 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	729.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	737.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	TW	729.01	737.00
Irregular Weir	Weir - 1	Forward	TW	736.39	737.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	728.50 ft
Orifice Diameter	3.9 in
Orifice Coefficient	0.600

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	737.00
48.90	736.70
92.90	736.39
98.90	736.55
145.30	736.88
168.70	737.00

Lowest Elevation	736.39 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	739.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	741.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	TW	739.00	741.00
Rectangular Weir	Weir - 1	Forward	TW	740.00	741.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	739.00 ft
Orifice Diameter	5.0 in
Orifice Coefficient	0.600

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	740.00 ft
Weir Length	20.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	729.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	737.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Irregular Weir	Weir - 1	Forward + Reverse	TW	732.70	737.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	737.00
1.00	736.00
2.00	735.00
7.00	734.00
14.00	733.00
59.00	732.70
93.00	733.00
160.00	734.00
198.00	735.00
211.00	736.00
220.00	737.00

Lowest Elevation	732.70 ft
Weir Coefficient	3.00 (ft^0.5)/s

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TAB 3

FLOODPLAIN SUBMITTAL

EXHIBIT 3A

FLOODPLAIN FILL & CUT CALCULATIONS

Job #: 402138
Project: Naper Commons - Naperville

Date: October 13, 2020
Revised:
By: ARF

FLOODPLAIN FILL CALCULATIONS

ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**	
737.6	0	0.000	0.000	**0.000**	<- Ex. 10-yr BFE
738.0	820	0.019	0.004	**0.004**	
739.0	1640	0.038	0.028	**0.032**	
739.5	2410	0.055	0.023	**0.055**	<- Ex. 100-yr BFE

Job #: 402138
Project: Naper Commons - Naperville

Date: October 13, 2020
Revised:
By: ARF

FLOODPLAIN CUT CALCULATIONS

ELEV.	AREA (S.F.)	AREA (AC.)	INCREM. VOLUME (AC. Ft.)	**CUMULATIVE VOLUME (Ac-Ft)**	
737.6	0	0.000	0.000	**0.000**	<- Ex. 10-yr BFE
738.0	1900	0.044	0.009	**0.009**	
739.0	2730	0.063	0.053	**0.062**	
739.5	3190	0.073	0.034	**0.096**	<- Ex. 100-yr BFE

Job #: 402138 Date: October 13, 2020
Project: Naper Commons - Naperville By: ARF

Floodplain Compensatory Storage Summary - Naper Commons

	10-Year WSEL	**0-10 Vol. Filled (Ac-ft)**	100-Year WSEL	**10-100 Vol. Filled (Ac-ft)**	10-Year WSEL	**0-10 Vol. Cut (Ac-ft)**	100-Year WSEL	**10-100 Vol. Cut (Ac-ft)**
EXIST	737.6	**0.000**	739.5	**0.055**	737.6	**0.000**	739.5	**0.096**
PROP	-		-					

Total 0-10 Floodplain Fill from Project (Ac-ft): **0.000**
Total 10-100 Floodplain Fill from Project (Ac-ft): **0.055**

Total 100-Year Floodplain Fill from Project (Ac-ft): **0.055**

Total 0-10 Floodplain Cut from Project (Ac-ft): **0.000**
Total 10-100 Floodplain Cut from Project (Ac-ft): **0.096**

Total 100-Year Floodplain Cut from Project (Ac-ft): **0.096**

10-100 Year Cut/Fill Ratio Required: **1.0**
10-100 Year Cut/Fill Ratio Provided: **1.7**

Total 100-Year Cut/Fill Ratio Required: **1.5**
Total 100-Year Cut/Fill Ratio Provided: **1.7**

TAB 4

WETLAND ASSESSMENT

EXHIBIT 4A

WETLAND DELINEATION &

ASSESSMENT REPORT

BY V3 COMPANIES OF ILLINOIS, LTD.

(UNDER SEPARATE COVER)

ELECTRONIC COPIES OF PONDPACK MODELS