# STORMWATER MANAGEMENT

# PERMIT APPLICATION AND REPORT

# FOR

# NAPER COMMONS

# DUPAGE COUNTY, ILLINOIS

**REVISED FEBRUARY 24, 2021**
**REVISED JANUARY 20, 2021**
**OCTOBER 16, 2020**
**SEPTEMBER 14, 2020**

**402.138**

**PROFESSIONAL ENGINEER'S CERTIFICATION**

**STATE OF ILLINOIS }**
**SS.**
**COUNTY OF DUPAGE }**

CHRISTOPHER R. MORGART
062-055788
LICENSED PROFESSIONAL ENGINEER OF ILLINOIS

**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** 24th **DAY OF** FEBRUARY**, AD, 2021**

**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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# DUPAGE COUNTY, ILLINOIS

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**ELECTRONIC COPIES OF THE PONDPACK MODELS**

# 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, 161 single family home and 66 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 3$^{rd}$ 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. Refer to Exhibit C for the FEMA Firm panel 1704343C0153J letter of map revision determination document effective April 26, 2021. The revised regulatory floodplain will only encroach onto the north east corner of the sire with the revised 738.9 elevation. Furthermore, there is an additional Zone AE floodplain that encroaches the site along the northeast corner. The zone AE floodplain location at Hesterman Drain has a bfe of 739.5. The proposed project will not include any work within the flood plain limits.

### 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 six (6) 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 and 003 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 3.9 ac-ft of storage and an additional 5.2 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 38.3± ac-ft of storage. The seven onsite SWMFs will provide a combined 28.8± ac-ft of storage and 13.7 ac-ft of storage within the existing Nokia SWMF 012. The site will provide 42.5 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.) | 61.71 |
| (A) Development Allowable Release (cfs) | 6.17 |
| (B) By-Pass Flow (Danada Woods O-13) (cfs) | 1.91 |
| **(A+B) Total Allowable Release (cfs)** | 8.08 |
| **Prop. Release (O-1 NE + O-7 SE + O-13 SE + O-8 EX NOKIA012) (cfs)** | 7.76 |

**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) | 5.22 | 6.12 | 6.50 | 7.02 | 7.51 | 7.75 | 7.76 |
| Existing Peak Discharge (cfs) | 129.44 | 128.30 | 117.85 | 88.95 | 60.84 | 49.09 | 42.57 |
| **2-Year** | | | | | | | |
| Proposed Peak Discharge (cfs) | 0.53 | 1.37 | 1.70 | 2.11 | 2.99 | 3.39 | 3.56 |
| Existing Peak Discharge (cfs) | 19.26 | 20.48 | 19.62 | 17.26 | 14.55 | 13.58 | 11.55 |

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**.

## 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

## 6.0 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 161 single family homes and 66 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.

# 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<br>☐ 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 | 39N | 10E |
|---|---|---|
| ¼ Section | Township | 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.<br>☐ I deny the presence of flood plain. | ☑ I acknowledge the presence of wetlands.<br>☐ I deny the presence of wetlands. | ☑ I acknowledge the presence of buffers.<br>☐ 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.<br>Printed Name | Christopher R. Morgart, P.E.<br>Printed Name | Christopher R. Morgart, P.E.<br>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 | Date |
|---|---|---|
| | n/a | |

**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 | Date |
|---|---|---|
| | Ty Morris | 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 | Date |
|---|---|---|
| | Ty Morris | 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 | Ty Morris<br>Print Name | 9-14-20<br>Date |
| Signature of Owner | Ty Morris<br>Print Name | 9-14-20<br>Date |

**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.)

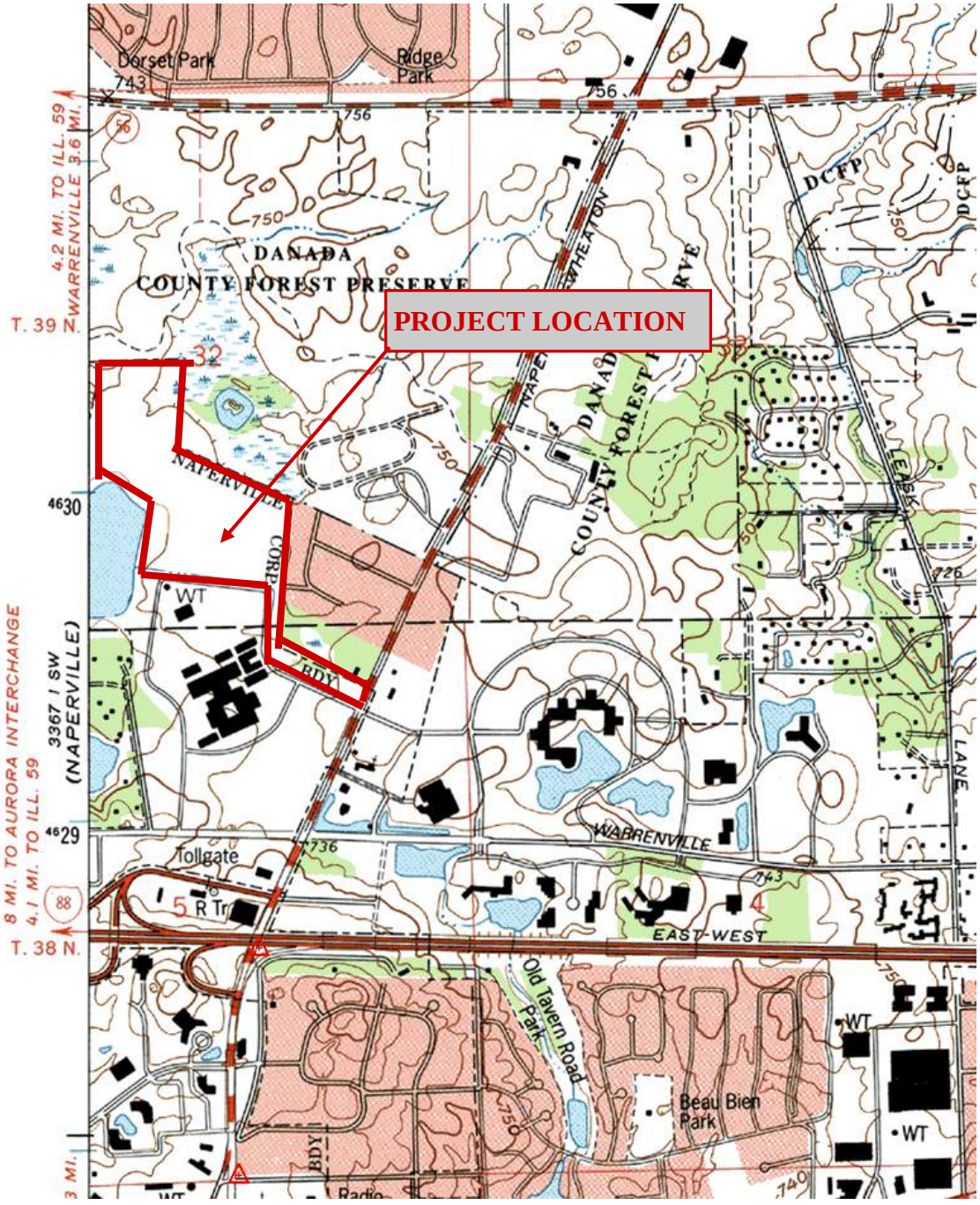
| | Date | Approved by/title |
|---|---|---|
| Community Certification | | |
| County Authorization | | |

_____ Community Copy _____ DuPage County SM Copy _____ Applicant Copy

# EXHIBIT 1B

# LOCATION MAP

# Naper Commons
## T39N, R10E, SEC. 32
## WHEATON QUADRANGLE




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

# EXHIBIT 1C

# FIRM PANEL FM17043C0153J

# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP REVISION DETERMINATION DOCUMENT

| COMMUNITY AND REVISION INFORMATION | | PROJECT DESCRIPTION | BASIS OF REQUEST |
|---|---|---|---|
| COMMUNITY | City of Wheaton<br>DuPage County<br>Illinois | NO PROJECT | HYDRAULIC ANALYSIS<br>UPDATED TOPOGRAPHIC DATA |
| | COMMUNITY NO.: 170221 | | |
| IDENTIFIER | Rott Creek | APPROXIMATE LATITUDE & LONGITUDE: 41.823, -88.121<br>SOURCE: Other DATUM: NAD 83 | |

| ANNOTATED MAPPING ENCLOSURES | ANNOTATED STUDY ENCLOSURES |
|---|---|
| TYPE: FIRM* NO.: 17043C0134J DATE: August 1, 2019<br>TYPE: FIRM NO.: 17043C0153J DATE: August 1, 2019 | DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 01, 2019<br>STILLWATER ELEVATION TABLE: 9 |

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map

**FLOODING SOURCE(S) & REVISED REACH(ES)** See Page 2 for Additional Flooding Sources

Hesterman Drain Area 3 - Approximately 2,000 feet south of Route 56 and approximately 2,000 feet west of Naperville Road

**SUMMARY OF REVISIONS**

| Flooding Source | Effective Flooding | Revised Flooding | Increases | Decreases |
|---|---|---|---|---|
| Hesterman Drain Area 3 | BFEs* | BFEs | NONE | YES |
| | Zone AE | Zone AE | NONE | YES |
| | Zone X (shaded) | Zone X (shaded) | NONE | YES |

* BFEs - Base Flood Elevations

## DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at http://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

# LETTER OF MAP REVISION
# DETERMINATION DOCUMENT (CONTINUED)

## OTHER FLOODING SOURCES AFFECTED BY THIS REVISION

**FLOODING SOURCE(S) & REVISED REACH(ES)**

Hesterman Drain Area 7 - Approximately 200 feet north of Route 56 and approximately 200 feet east of Orchard Road

**SUMMARY OF REVISIONS**

| Flooding Source | Effective Flooding | Revised Flooding | Increases | Decreases |
|---|---|---|---|---|
| Hesterman Drain Area 7 | Zone X (shaded) | Zone X (shaded) | YES | YES |
| | Zone AE | Zone AE | YES | NONE |
| | BFEs | BFEs | YES | NONE |

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at http://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP REVISION
## DETERMINATION DOCUMENT (CONTINUED)

### OTHER COMMUNITIES AFFECTED BY THIS REVISION

**CID Number:** 170197 **Name:** DuPage County, Illinois

| AFFECTED MAP PANELS | AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT |
|---|---|
| TYPE: FIRM NO.: 17043C0134J DATE: August 1, 2019<br>TYPE: FIRM NO.: 17043C0153J DATE: August 1, 2019 | DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 1, 2019<br>STILLWATER ELEVATION TABLE: 9 |

**CID Number:** 170213 **Name:** City of Naperville, Illinois

| AFFECTED MAP PANELS | AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT |
|---|---|
| TYPE: FIRM NO.: 17043C0134J DATE: August 1, 2019<br>TYPE: FIRM NO.: 17043C0153J DATE: August 1, 2019 | DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 1, 2019<br>STILLWATER ELEVATION TABLE: 9 |

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at http://www.fema.gov/flood-insurance.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

# LETTER OF MAP REVISION
# DETERMINATION DOCUMENT (CONTINUED)

## COMMUNITY INFORMATION

### APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

### COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at http://www.fema.gov/flood-insurance.

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Federal Insurance and Mitigation Administration

# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP REVISION
## DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Mary Beth Caruso
Director, Mitigation Division
Federal Emergency Management Agency, Region V
536 South Clark Street, Sixth Floor
Chicago, IL 60605
(312) 408-5500

**STATUS OF THE COMMUNITY NFIP MAPS**

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at http://www.fema.gov/flood-insurance.

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# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP REVISION
## DETERMINATION DOCUMENT (CONTINUED)

### PUBLIC NOTIFICATION OF REVISION

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below, and through FEMA's Flood Hazard Mapping website at https://www.floodmaps.fema.gov/fhm/bfe_status/bfe_main.asp

LOCAL NEWSPAPER

Name: *Wheaton Suburban Life*

Dates: December 18, 2020 and December 25, 2020

Within 90 days of the second publication in the local newspaper, any interested party may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised flood hazard determination presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Mapping and Insurance eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue, Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at http://www.fema.gov/flood-insurance.

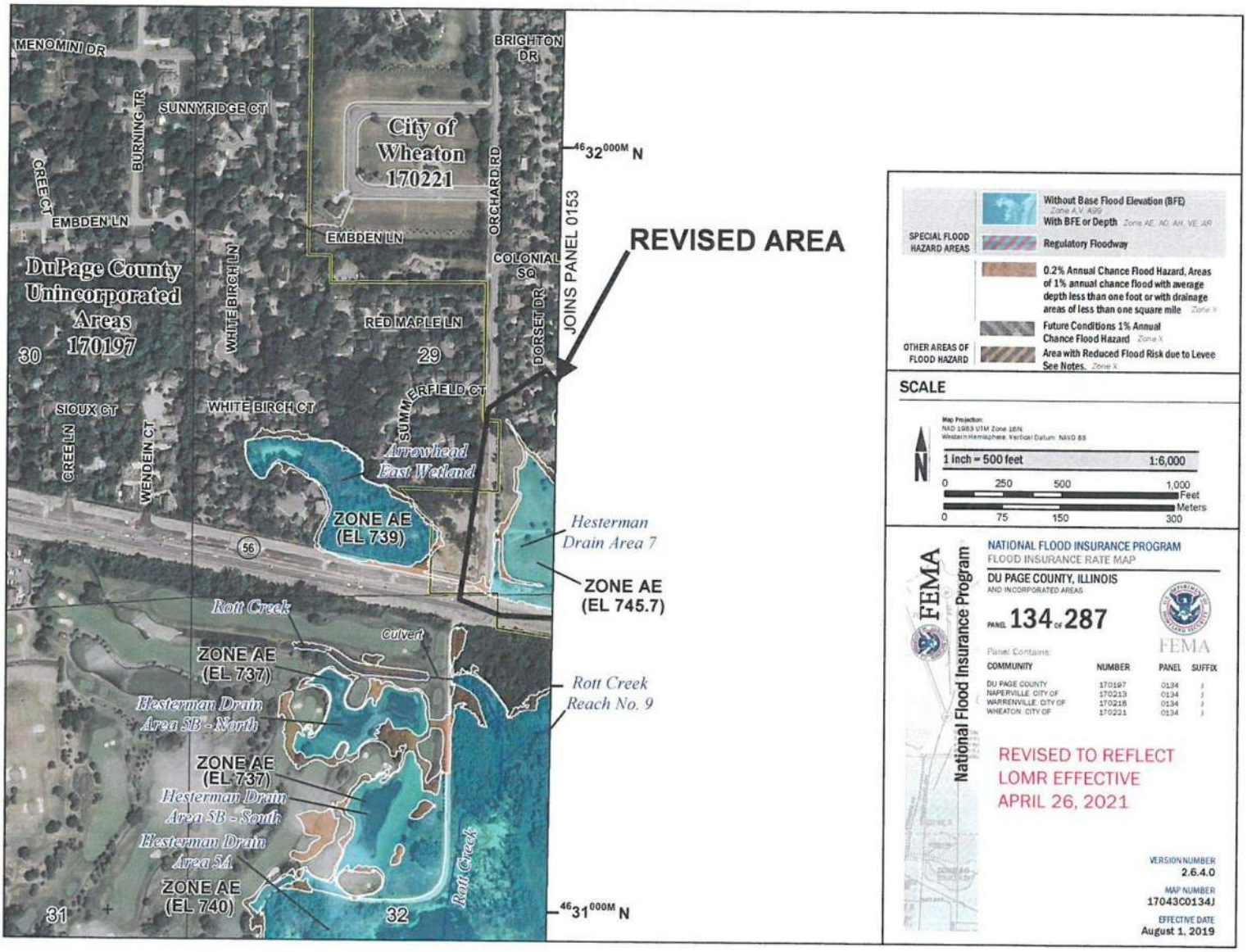
Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

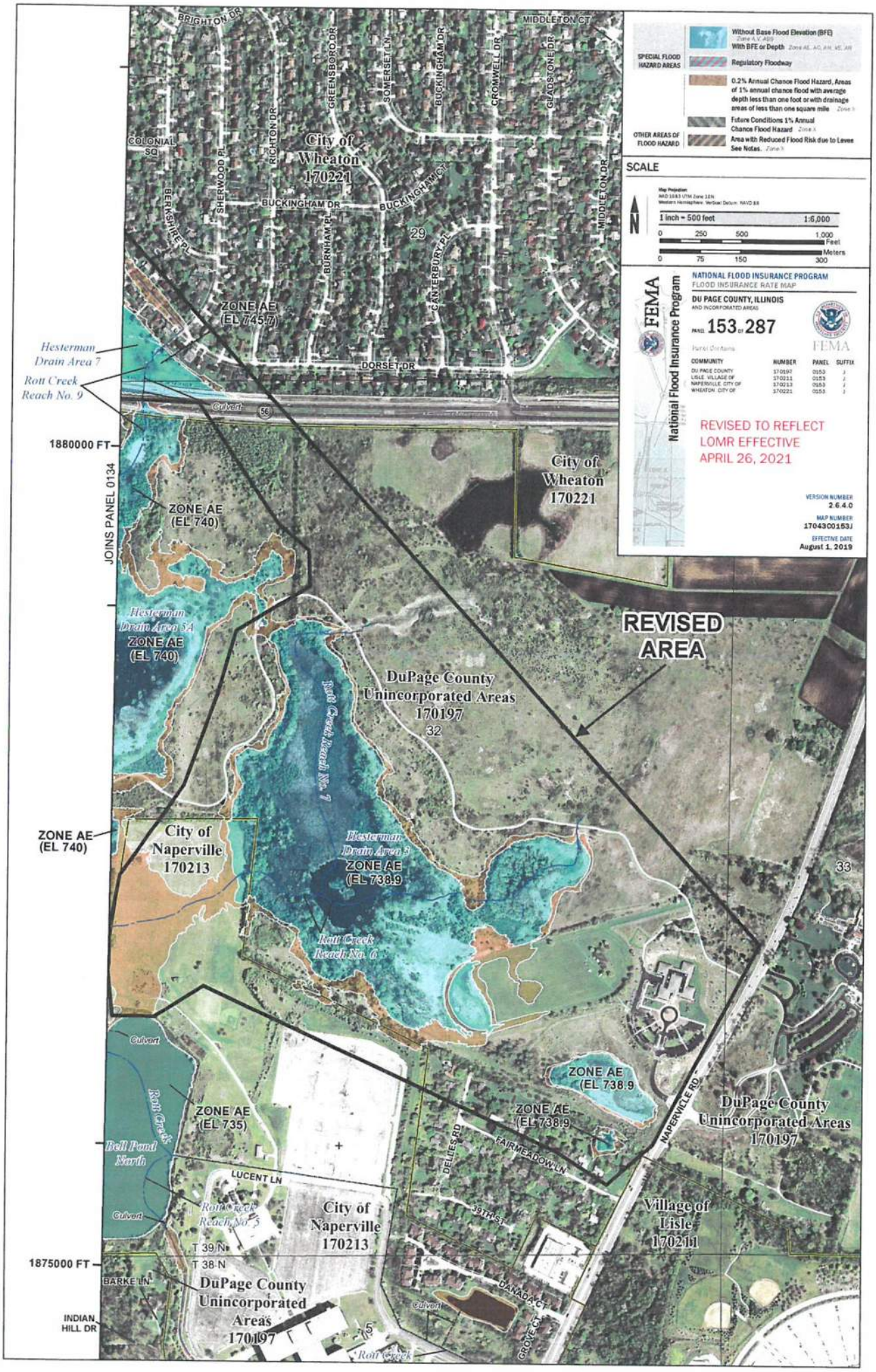
## Table 9 - Summary of Stillwater Elevations - continued

| *Location* at Flooding Source | *Elevation (feet NAVD 88)* 10-Percent-Annual-Chance | 2-Percent-Annual-Chance | 1-Percent-Annual-Chance | 0.2-Percent-Annual-Chance |
|---|---|---|---|---|
| **East Branch DuPage River Watershed (EB) - continued** | | | | |
| **Rott Creek (EBRC) - continued** | | | | |
| *Upper Rott Creek Watershed* | | | | |
| At Arrowhead East Wetland | 737.5 | 738.3 | 739.0 | 740.0 |
| At Bell Pond North | 733.5 | * | 735.3 | 736.3 |
| At Bell Pond South | 733.5 | * | 735.3 | 736.3 |
| At Hesterman Drain Area 2 | * | * | 740.3 | 741.3 |
| At Hesterman Drain Area 3 | 738.4 | * | 738.9 | 739.9 |
| At Hesterman Drain Area 4 | 737.6 | * | 739.5 | 740.5 |
| At Hesterman Drain Area 5A | 738.4 | 739.5 | 739.5 | 740.5 |
| At Hesterman Drain Area 5B - North | 735.4 | 736.6 | 737.4 | 738.4 |
| At Hesterman Drain Area 5B - South | 735.4 | 736.6 | 737.4 | 738.4 |
| At Hesterman Drain Area 7 | 744.4 | 744.5 | 745.7 | 746.7 |
| **St. Joseph Creek (EBSJ)** | **REVISED DATA** | | | |
| At Williams Port Pond | 736.5 | 738.3 | 738.9 | 739.9 |
| **St Joseph Creek Reach No. 11 (EBSJ)** | | | | |
| At Prince Pond | * | * | 709.9 | * |
| At Rogers Street Ponding Area | * | * | 710.0 | * |
| **Swift Meadows (EBSM)** | | | | |
| At Meadows Business Park | 727.0 | 728.0 | 728.4 | 729.2 |
| **Swift Meadows Reach No. 2 (EBSM)** | | | | |
| At Chateau Medinah | 734.8 | 735.0 | 735.1 | 735.3 |
| At Medinah Meadows | 736.4 | 737.4 | 737.9 | 739.2 |
| At Vittoria Brooks | 733.8 | 733.9 | 734.0 | 734.0 |
| At Willow Bridge | 737.7 | 737.9 | 738.0 | 738.1 |
| **Fox River Watershed (FR)** | | | | |
| **Waubansee Creek (FRWA)** | | | | |
| At Lake #4: Along Waubansee Creek from just north of Liberty Road to just south of Meridian Parkway | * | * | 693.8 | * |
| At Lake #5: Along Waubansee Creek from just north of Meridian Parkway to approximately 1,900 feet upstream of Meridian Parkway | * | * | 695.7 | * |
| **Salt Creek Watershed (SC)** | | | | |
| **North Branch (SCBW)** | | | | |
| At Lake Charles | 722.0 | 723.8 | 724.2 | 724.9 |
| **Devon Avenue Tributary (SCDA)** | | | | |
| At Midas Pond (North) | 678.7 | 679.4 | 685.1 | 685.6 |
| At Midas Pond (South) | 678.7 | 679.4 | 685.1 | 685.6 |

*Data not available

REVISED TO REFLECT LOMR EFFECTIVE APRIL 26, 2021


MENOMINI DR
BRIGHTON DR
SUNNYRIDGE CT
BURNING TR
CREE CT
EMBDEN LN
City of Wheaton 170221
ORCHARD RD
4632000M N
REVISED AREA
JOINS PANEL 0153
DuPage County Unincorporated Areas 170197
WHITE BIRCH LN
RED MAPLE LN
COLONIAL SQ
DORSET DR
30
29
SUMMERFIELD CT
SIOUX CT
WHITE BIRCH CT
CREE LN
WENDEIN CT
Arrowhead East Wetland
ZONE AE (EL 739)
Hesterman Drain Area 7
ZONE AE (EL 745.7)
56
Rott Creek
Culvert
ZONE AE (EL 737)
Rott Creek Reach No. 9
Hesterman Drain Area 5B - North
ZONE AE (EL 737)
Hesterman Drain Area 5B - South
Hesterman Drain Area 5A
ZONE AE (EL 740)
31
32
4631000M N
Without Base Flood Elevation (BFE) Zone A, V, A99
With BFE or Depth Zone AE, AO, AH, VE, AR
SPECIAL FLOOD HAZARD AREAS
Regulatory Floodway
0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
Future Conditions 1% Annual Chance Flood Hazard Zone X
OTHER AREAS OF FLOOD HAZARD
Area with Reduced Flood Risk due to Levee See Notes. Zone X
SCALE
Map Projection: NAD 1983 UTM Zone 16N Western Hemisphere Vertical Datum: NAVD 88
1 inch = 500 feet 1:6,000
0 250 500 1,000 Feet
0 75 150 300 Meters
FEMA
National Flood Insurance Program
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP
DU PAGE COUNTY, ILLINOIS
AND INCORPORATED AREAS
PANEL 134 OF 287
Panel Contains:
COMMUNITY NUMBER PANEL SUFFIX
DU PAGE COUNTY 170197 0134 J
NAPERVILLE, CITY OF 170213 0134 J
WARRENVILLE, CITY OF 170218 0134 J
WHEATON, CITY OF 170221 0134 J
REVISED TO REFLECT LOMR EFFECTIVE APRIL 26, 2021
VERSION NUMBER 2.6.4.0
MAP NUMBER 17043C0134J
EFFECTIVE DATE August 1, 2019


BRIGHTON DR
MIDDLETON CT
GREENSBORO DR
SOMERSET LN
BUCKINGHAM DR
CROMWELL DR
GLADSTONE DR
COLONIAL SQ
SHERWOOD PL
RICHTON DR
City of Wheaton 170221
BERKSHIRE PL
BUCKINGHAM DR
BUCKINGHAM CT
BURNHAM PL
CANTERBURY PL
MIDDLETON DR
29
ZONE AE (EL 745.7)
Hesterman Drain Area 7
Rott Creek Reach No. 9
DORSET DR
Culvert
1880000 FT
JOINS PANEL 0134
ZONE AE (EL 740)
City of Wheaton 170221
Hesterman Drain Area 5A
ZONE AE (EL 740)
REVISED AREA
DuPage County Unincorporated Areas 170197
32
Rott Creek Reach No. 7
ZONE AE (EL 740)
City of Naperville 170213
Hesterman Drain Area 3
ZONE AE (EL 738.9
33
Rott Creek Reach No. 6
Culvert
ZONE AE (EL 738.9
ZONE AE (EL 735)
Rott Creek
Bell Pond North
ZONE AE (EL 738.9
FAIRMEADOW LN
DELLES RD
NAPERVILLE RD
DuPage County Unincorporated Areas 170197
LUCENT LN
Culvert
Rott Creek Reach No. 5
City of Naperville 170213
39TH ST
Village of Lisle 170211
T 39 N
T 38 N
1875000 FT
BARKE LN
DuPage County Unincorporated Areas 170197
DANADA CT
Culvert
INDIAN HILL DR
5
Rott Creek
GROVE CT
SPECIAL FLOOD HAZARD AREAS
Without Base Flood Elevation (BFE) Zone A, V, A99
With BFE or Depth Zone AE, AO, AH, VE, AR
Regulatory Floodway
0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
OTHER AREAS OF FLOOD HAZARD
Future Conditions 1% Annual Chance Flood Hazard Zone X
Area with Reduced Flood Risk due to Levee See Notes. Zone X
SCALE
N
1 inch = 500 feet 1:6,000
0 250 500 1,000 Feet
0 75 150 300 Meters
FEMA
National Flood Insurance Program
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP
DU PAGE COUNTY, ILLINOIS
AND INCORPORATED AREAS
PANEL 153 OF 287
Panel Contains
COMMUNITY NUMBER PANEL SUFFIX
DU PAGE COUNTY 170197 0153 J
LISLE, VILLAGE OF 170211 0153 J
NAPERVILLE, CITY OF 170213 0153 J
WHEATON, CITY OF 170221 0153 J
REVISED TO REFLECT LOMR EFFECTIVE APRIL 26, 2021
VERSION NUMBER 2.6.4.0
MAP NUMBER 17043C0153J
EFFECTIVE DATE August 1, 2019

# EXHIBIT 1D

# DUPAGE COUNTY SOILS MAP

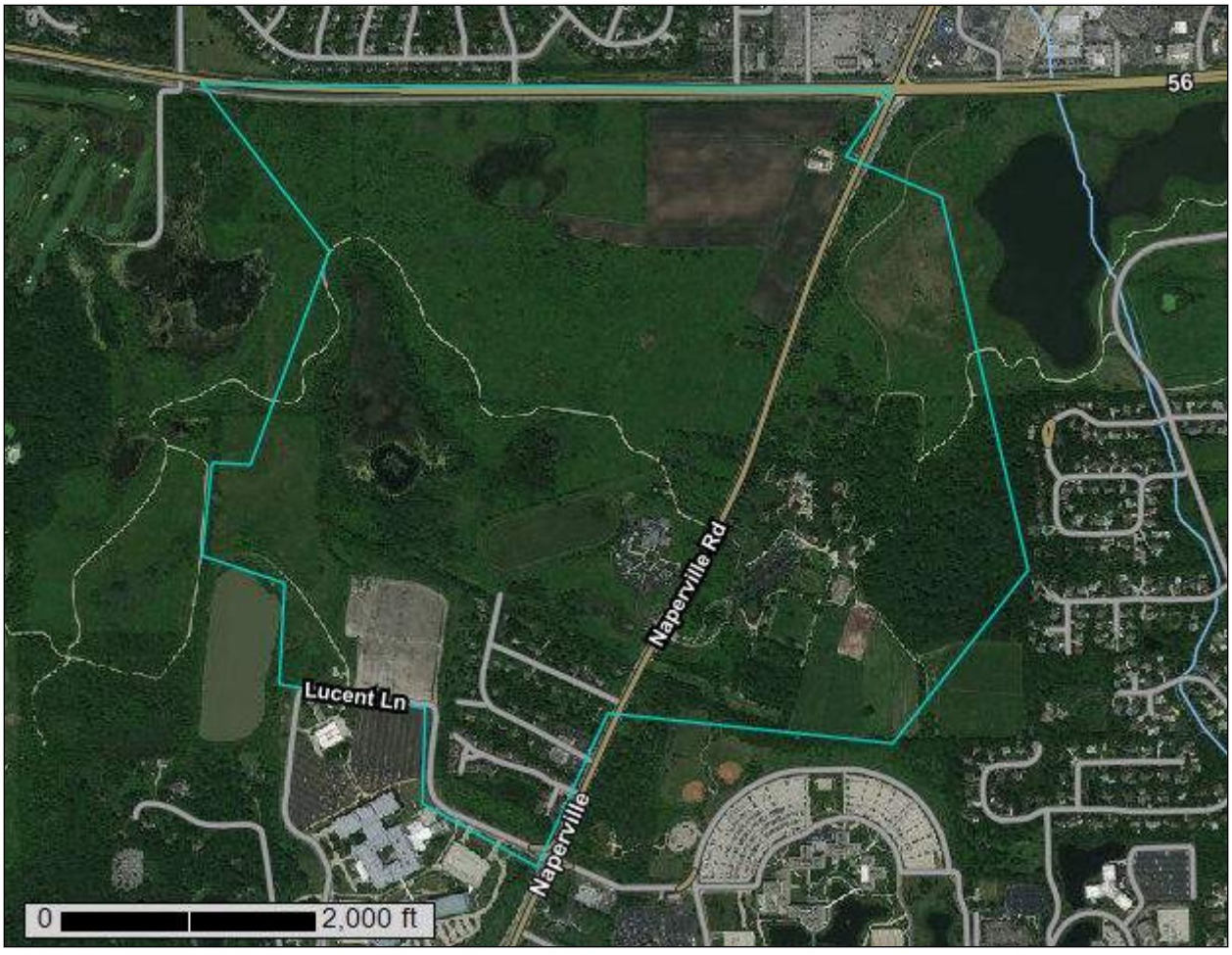
United States Department of Agriculture

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

# 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

402138 A 2

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

# Illinois Department of **Natural Resources**

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov
Mailing Address: 1 Old State Capitol Plaza, Springfield, IL 62701

JB Pritzker, Governor
Colleen Callahan, Director

FAX (217) 524-7525

DuPage County
Naperville
Demolition and New Construction of a Single Family & Townhomes, Nokia Site
West side of Naperville Road at Lucent Ln. then NW to West of Delles Rd.
CEMCON-402.138
SHPO Log #017080520

RECEIVED
SEP 16 2020

September 10, 2020

Jonathon Helck
CEMCON, Ltd.
2280 White Oak Circle, Suite 100
Aurora, IL 60502-9675

Dear Mr. Helck:

This letter is to inform you that we have reviewed the information provided concerning the referenced project.

Our review of the records indicates that no known historic, or historically significant architectural properties exist within the project area. This project area is exempt from archaeological review in accordance with Section 6 of the Illinois State Agency Historic Resources Preservation Act (20 ILCS 3420/1 et. seq.).

Please note that the state law is less restrictive than the federal cultural resource laws concerning archaeology. If your project will use federal loans or grants, need federal agency permits, use federal property, or involve assistance from a federal agency, then your project must be reviewed under the National Historic Preservation Act of 1966, as amended. Please notify us immediately if such is the case.

Please retain this letter in your files as evidence of compliance with Section 4 of the Illinois State Agency Historic Resources Preservation Act.

If you have any questions, please call 217/782-4836.

Sincerely,

Robert F. Appleman
Deputy State Historic
Preservation Officer

# 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 011
11.20 Ac.
CN = 80.9
Tc = 0.25

SUBAREA 010
28.17 Ac.
CN = 83.8
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., 20-10000086**

SHEET 1 OF 1

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PLOT FILE CREATED: 2/3/2021 BY: LESLIE LUNDBERG DRAWING PATH: P:\402138\ENV\LAND\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 |
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| 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 |
| | | | | | | |
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| | | | | | | |
| 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 |
| | | | | | | |
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| 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 |
| | | | | | | |
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| 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 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 | | | 1.29 | 83.85 |
| C | Residential District: 1/8 Ac. Lots (townhomes) | 90 | | | 8.32 | 748.8 |
| C | Residential District: 1/2 Ac. Lots (single-family) | 80 | | | 12.02 | 961.6 |
| C | Impervious Area (paving, standing water) | 98 | | | 3.65 | 357.7 |
| | | | | | | |
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| | | | | | | |
| 1/ Use only one CN source per line. | | | Totals = | | 28.17 | 2360.030 |

CN (weighted) = Total Product / Total Area = 2360.030 / 28.170 = 83.778

Use CN = 83.8

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 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 | Residential District: 1/2 Ac. Lots (single-family) | 80 | | | 11.20 | 896 |
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| 1/ Use only one CN source per line. | | | Totals = | | 11.20 | 896.000 |

CN (weighted) = Total Product / Total Area = 896.000 / 11.200 = 80.000

Use CN = 80.0

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 | 9/4/2020 |
| 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 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) | | 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 | 0.025 | | | |
| 6. | $Tc = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ | hr | 0.213 | + | = | 0.213 |

**Shallow Concentrated Flow**

| | | Segment ID | | | | |
|---|---|---|---|---|---|---|
| 7. | Surface description (paved or unpaved) | | unpaved | | | |
| 8. | Flow length, L | | 260 | | | |
| 9. | Watercourse slope, s | | 0.018 | | | |
| 10. | Average velocity, V (figure 3-1) | | 2.18 | | | |
| 11. | $T_t = \frac{L}{3600\, V}$ | hr | 0.033 | + | = | 0.033 |

**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 | 0.246 | |
| | | min | 15 | |

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 | | |
| ~~OUTDOOR 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

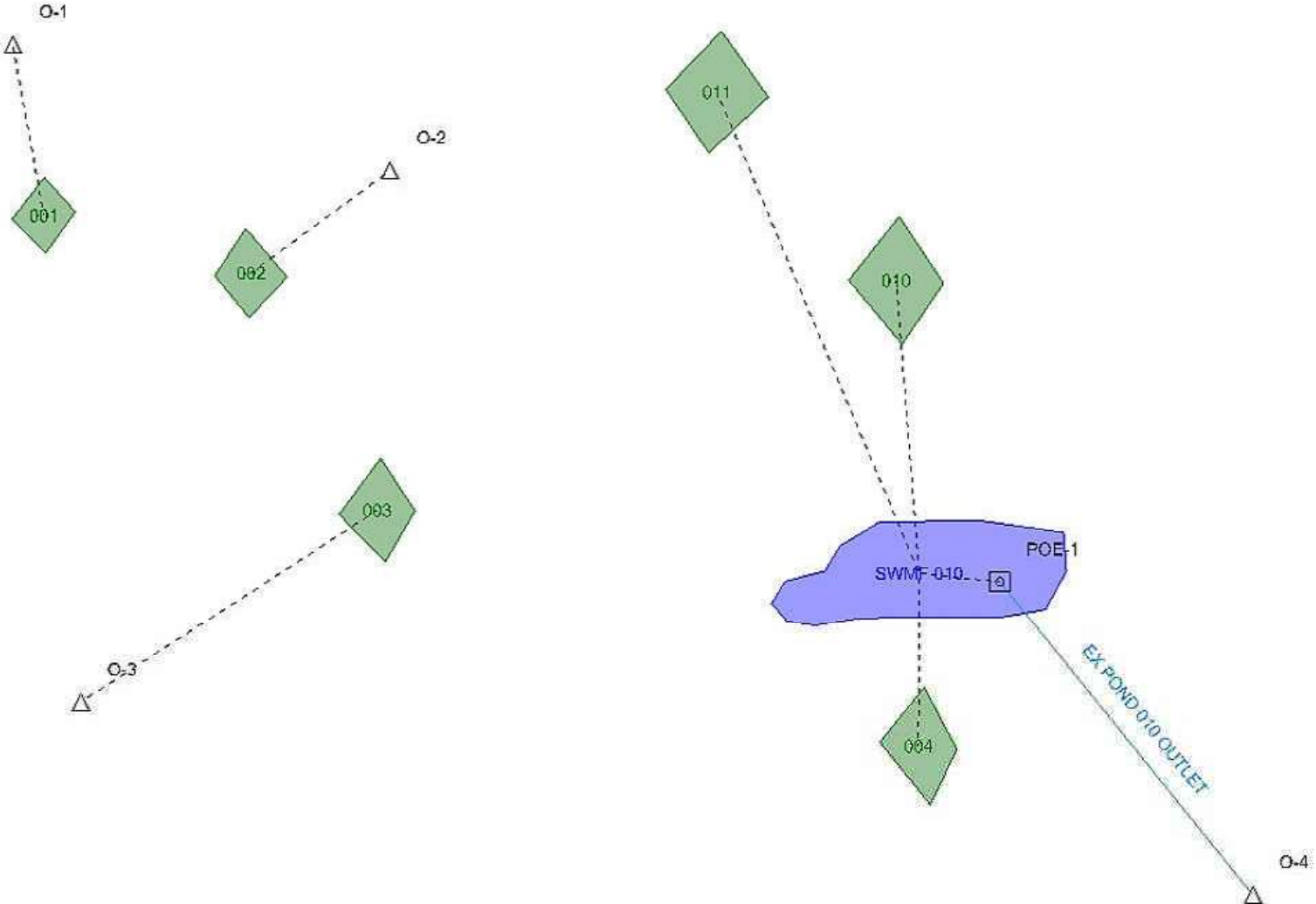
| | | | |
|---|---|---|---|
| DRN/CKD BY: SPM/SAR | DISC NO.: AB4821GR | FLD. BK./PG. 87/1 | SHEET NO. 4 OF 16 |
| SCALE: 1"=30' | DATE: 11-29-99 | JOB NO.: 482.001 | |

G:\AB2\001\AB4821GR Mon Aug 28 14:54:33 2000 SM

# EXHIBIT 2C

# “EXIST” EXISTING CONDITIONS

# PONDPACK MODEL


O-1
001
O-2
002
003
O-3
011
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 | 15.540 | 16.000 | 20.07 | (N/A) | (N/A) |
| 011 | 100Yr 24Hr | 100 | None | 5.751 | 16.000 | 7.72 | (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 | 9.944 | 24.150 | 4.45 | (N/A) | (N/A) |
| SWMF 010 (IN) | 100Yr 24Hr | 100 | None | 24.272 | 16.000 | 32.19 | (N/A) | (N/A) |
| SWMF 010 (OUT) | 100Yr 24Hr | 100 | None | 9.944 | 24.150 | 4.45 | 736.56 | 21.891 |

## Executive Summary (Links)

| Label | Type | Location | Hydrograph Volume (ac-ft) | Peak Time (hours) | Peak Flow ($ft^3/s$) | 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 |
|---|---|---|---|---|---|---|---|
| EX POND 010 OUTLET | Pond Outlet | Upstream | 24.272 | 16.000 | 32.19 | SWMF 010 | Pond Inflow |
| EX POND 010 OUTLET | Pond Outlet | Outflow | 9.944 | 24.150 | 4.45 | SWMF 010 | Pond Outflow |
| EX POND 010 OUTLET | Pond Outlet | Link | 9.944 | 24.150 | 4.45 | | |
| EX POND 010 OUTLET | Pond Outlet | Downstream | 9.944 | 24.150 | 4.45 | 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 | 5.587 | 0.550 | 90.13 | (N/A) | (N/A) |
| 011 | 100Yr 1Hr | 100 | None | 1.929 | 0.400 | 41.03 | (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 | 2.375 | 1.850 | 1.37 | (N/A) | (N/A) |
| SWMF 010 (IN) | 100Yr 1Hr | 100 | None | 8.280 | 0.550 | 132.03 | (N/A) | (N/A) |
| SWMF 010 (OUT) | 100Yr 1Hr | 100 | None | 2.375 | 1.850 | 1.37 | 732.94 | 8.137 |

## Executive Summary (Links)

| Label | Type | Location | Hydrograph Volume (ac-ft) | Peak Time (hours) | Peak Flow ($ft^3/s$) | 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 |
|---|---|---|---|---|---|---|---|
| EX POND 010 OUTLET | Pond Outlet | Upstream | 8.280 | 0.550 | 132.03 | SWMF 010 | Pond Inflow |
| EX POND 010 OUTLET | Pond Outlet | Outflow | 2.375 | 1.850 | 1.37 | SWMF 010 | Pond Outflow |
| EX POND 010 OUTLET | Pond Outlet | Link | 2.375 | 1.850 | 1.37 | | |
| EX POND 010 OUTLET | Pond Outlet | Downstream | 2.375 | 1.850 | 1.37 | O-4 | |

# Scenario Calculation Summary

| Scenario Summary | |
|---|---|
| ID | 45 |
| 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 | 72Hr |

| Output Summary | | | |
|---|---|---|---|
| Output Increment | 0.050 hours | Duration | 72.000 hours |

| Rainfall Summary | | | |
|---|---|---|---|
| Return Event Tag | 2 | Rainfall Type | Time-Depth Curve |
| Total Depth | 3.3 in | Storm Event | 2YR-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 | 2Yr 24Hr | 2 | None | 0.237 | 17.100 | 0.42 | (N/A) | (N/A) |
| 002 | 2Yr 24Hr | 2 | None | 1.142 | 17.100 | 1.98 | (N/A) | (N/A) |
| 003 | 2Yr 24Hr | 2 | None | 5.392 | 16.200 | 8.14 | (N/A) | (N/A) |
| 004 | 2Yr 24Hr | 2 | None | 0.503 | 17.100 | 0.92 | (N/A) | (N/A) |
| 010 | 2Yr 24Hr | 2 | None | 4.190 | 16.100 | 6.21 | (N/A) | (N/A) |
| 011 | 2Yr 24Hr | 2 | None | 1.410 | 16.050 | 2.20 | (N/A) | (N/A) |
| O-1 | 2Yr 24Hr | 2 | None | 0.237 | 17.100 | 0.42 | (N/A) | (N/A) |
| O-2 | 2Yr 24Hr | 2 | None | 1.142 | 17.100 | 1.98 | (N/A) | (N/A) |
| O-3 | 2Yr 24Hr | 2 | None | 5.392 | 16.200 | 8.14 | (N/A) | (N/A) |
| O-4 | 2Yr 24Hr | 2 | None | 3.141 | 24.250 | 1.01 | (N/A) | (N/A) |
| SWMF 010 (IN) | 2Yr 24Hr | 2 | None | 6.103 | 16.100 | 9.27 | (N/A) | (N/A) |
| SWMF 010 (OUT) | 2Yr 24Hr | 2 | None | 3.141 | 24.250 | 1.01 | 731.34 | 5.499 |

## Executive Summary (Links)

| Label | Type | Location | Hydrograph Volume (ac-ft) | Peak Time (hours) | Peak Flow ($ft^3/s$) | 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 |
|---|---|---|---|---|---|---|---|
| EX POND 010 OUTLET | Pond Outlet | Upstream | 6.103 | 16.100 | 9.27 | SWMF 010 | Pond Inflow |
| EX POND 010 OUTLET | Pond Outlet | Outflow | 3.141 | 24.250 | 1.01 | SWMF 010 | Pond Outflow |
| EX POND 010 OUTLET | Pond Outlet | Link | 3.141 | 24.250 | 1.01 | | |
| EX POND 010 OUTLET | Pond Outlet | Downstream | 3.141 | 24.250 | 1.01 | 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 | 1.625 | 0.850 | 16.43 | (N/A) | (N/A) |
| 011 | 2Yr 2Hr | 2 | None | 0.491 | 0.700 | 5.74 | (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) |
| SWMF 010 (IN) | 2Yr 2Hr | 2 | None | 2.221 | 0.800 | 21.98 | (N/A) | (N/A) |
| SWMF 010 (OUT) | 2Yr 2Hr | 2 | None | 0.000 | 0.000 | 0.00 | 728.90 | 2.221 |

## Executive Summary (Links)

| Label | Type | Location | Hydrograph Volume (ac-ft) | Peak Time (hours) | Peak Flow ($ft^3/s$) | 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 |
|---|---|---|---|---|---|---|---|
| EX POND 010 OUTLET | Pond Outlet | Upstream | 2.221 | 0.800 | 21.98 | 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 | Pond Outlet | Link | 0.000 | 0.000 | 0.00 | | |
| EX POND 010 OUTLET | Pond Outlet | Downstream | 0.000 | 0.000 | 0.00 | 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 |

Subsection: Unit Hydrograph Summary
Label: 001

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

| 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 |

Subsection: Unit Hydrograph Summary
Label: 003

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

| 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) | 28.170 acres |

| | |
|---|---|
| Computational Time Increment | 0.063 hours |
| Time to Peak (Computed) | 16.014 hours |
| Flow (Peak, Computed) | 20.08 ft³/s |
| Output Increment | 0.050 hours |
| Time to Flow (Peak Interpolated Output) | 16.000 hours |
| Flow (Peak Interpolated Output) | 20.07 ft³/s |

| Drainage Area | |
|---|---|
| SCS CN (Composite) | 83.800 |
| Area (User Defined) | 28.170 acres |
| Maximum Retention (Pervious) | 1.9 in |
| Maximum Retention (Pervious, 20 percent) | 0.4 in |

| Cumulative Runoff | |
|---|---|
| Cumulative Runoff Depth (Pervious) | 6.6 in |
| Runoff Volume (Pervious) | 15.540 ac-ft |

| Hydrograph Volume (Area under Hydrograph curve) | |
|---|---|
| Volume | 15.540 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 | 67.77 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 |

| | |
|---|---|
| Storm Event | 100YR-24HR |
| Return Event | 100 years |
| Duration | 72.000 hours |
| Depth | 8.6 in |
| Time of Concentration (Composite) | 0.250 hours |
| Area (User Defined) | 11.200 acres |

| | |
|---|---|
| Computational Time Increment | 0.033 hours |
| Time to Peak (Computed) | 16.000 hours |
| Flow (Peak, Computed) | 7.72 ft³/s |
| Output Increment | 0.050 hours |
| Time to Flow (Peak Interpolated Output) | 16.000 hours |
| Flow (Peak Interpolated Output) | 7.72 ft³/s |

| Drainage Area | |
|---|---|
| SCS CN (Composite) | 80.000 |
| Area (User Defined) | 11.200 acres |
| Maximum Retention (Pervious) | 2.5 in |
| Maximum Retention (Pervious, 20 percent) | 0.5 in |

| Cumulative Runoff | |
|---|---|
| Cumulative Runoff Depth (Pervious) | 6.2 in |
| Runoff Volume (Pervious) | 5.751 ac-ft |

| Hydrograph Volume (Area under Hydrograph curve) | |
|---|---|
| Volume | 5.751 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 | 50.76 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 |

## 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 | TW | 726.88 | 737.00 |
| Irregular Weir | Weir - 1 | Forward | TW | 736.39 | 737.00 |
| Tailwater Settings | Tailwater | | | (N/A) | (N/A) |

| Structure ID: Orifice - 1<br>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 |

# Index

# 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
4.20 Ac.
CN = 88.5
Tc = 0.25 Hr

SUBAREA 002
20.38 Ac.
CN = 87.1
Tc = 0.34 Hr

SUBAREA 003
23.57 Ac.
CN = 88.7
Tc = 0.33 Hr

SUBAREA 004
2.28 Ac.
CN = 86.5
Tc = 0.08 Hr

SUBAREA 005
5.14 Ac.
CN = 86.5
Tc = 0.38 Hr

SUBAREA 006
3.18 Ac.
CN = 91.1
Tc = 0.27 Hr

SUBAREA 007
2.28 Ac.
CN = 88.9
Tc = 0.25 Hr

SUBAREA 008
0.68 Ac.
CN = 90.0
Tc = 0.08 Hr

ROAD A
ROAD B
ROAD C
ROAD D
ROAD E
ROAD F
ROAD G
ROAD H
ROAD I
ROAD J
LUCENT LANE
DANADA 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
10-16-20/LAL: REVISED PER 2020-10-05 CITY COMMENTS
01-20-21/LAL: REVISED PER PLAN COMMISSION MEETING 12/16
02-19-21/LAL: REVISED PER PLAN COMMISSION MEETING 2/6

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

SHEET 1 OF 1

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# 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 | ARF | Date | 2/22/2021 |

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 | | | 1.85 | 158.9104683 |
| C | Open Space | 74 | | | 0.74 | 54.88842975 |
| C | SWMF | 98 | | | 0.68 | 66.87892562 |
| C | Impervious Area (NWL) | 98 | | | 0.93 | 91.12245179 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 1/ Use only one CN source per line. | | | Totals = | | 4.20 | 371.800 |

$$\text{CN (weighted)} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{371.800}{4.202} = 88.486$$

Use CN = 88.5

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 | ARF | Date | 2/22/2021 |

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 | | | 9.52 | 818.4412305 |
| C | Open Space | 74 | | | 1.95 | 144.1386134 |
| C | SWMF | 98 | | | 0.76 | 74.46740129 |
| C | Impervious Area (NWL, paving) | 98 | | | 0.46 | 44.65794307 |
| C | Single Family, 1/8 Ac. Lots (assumed 65% impervious) | 90 | | | 7.70 | 692.7479339 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 1/ Use only one CN source per line. | | | Totals = | | 20.38 | 1774.453 |

$$\text{CN (weighted)} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{1774.453}{20.377} = 87.080$$

Use CN = 87.1

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 | 9/9/2020 |
| Location | DuPage County, IL | Checked | ARF | Date | 2/22/2021 |

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 | | | 1.41 | 126.4859504 |
| C | Open Space | 74 | | | 3.44 | 254.6846924 |
| C | SWMF | 98 | | | 1.89 | 185.2280992 |
| C | Impervious Area (NWL, paving) | 98 | | | 1.03 | 100.4702479 |
| C | Single Family, 1/8 Ac. Lots (assumed 65% impervious) | 90 | | | 15.81 | 1422.995868 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 1/ Use only one CN source per line. | | | Totals = | | 23.57 | 2089.865 |

CN (weighted) = Total Product / Total Area = 2089.865 / 23.573 = 88.653

Use CN = 88.7

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 | 9/8/2020 |
| Location | DuPage County, IL | Checked | ARF | Date | 2/22/2021 |

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 | Single Family, 1/8 Ac. Lots (assumed 65% impervious) | 90 | | | 1.60 | 143.6363636 |
| C | Open Space | 74 | | | 0.56 | 41.79063361 |
| C | Impervious Area (Bike Path) | 98 | | | 0.12 | 12.0137741 |
| | | | | | | |
| | | | | | | |
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| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 1/ Use only one CN source per line. | | | Totals = | | 2.28 | 197.441 |

CN (weighted) = Total Product / Total Area = 197.441 / 2.283 = 86.472

Use CN = 86.5

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 | 9/8/2020 |
| Location | DuPage County, IL | Checked | ARF | Date | 2/22/2021 |

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 | | | 1.67 | 149.8512397 |
| C | Open Space | 74 | | | 1.67 | 123.2365014 |
| C | SWMF | 98 | | | 0.91 | 89.39012856 |
| C | Impervious Area (NWL, paving) | 98 | | | 0.18 | 17.54820937 |
| C | Single Family, 1/8 Ac. Lots (assumed 65% impervious) | 90 | | | 0.72 | 64.75206612 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 1/ Use only one CN source per line. | | | Totals = | | 5.14 | 444.778 |

$$\text{CN (weighted)} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{444.778}{5.141} = 86.515$$

Use CN = 86.5

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 9/8/2020
Location DuPage County, IL | Checked ARF | Date 2/22/2021

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 | | | 2.01 | 180.91 |
| C | Open Space | 74 | | | 0.25 | 18.41 |
| C | SWMF | 98 | | | 0.57 | 56.13 |
| C | Impervious Area (NWL, paving) | 98 | | | 0.35 | 34.15 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 1/ Use only one CN source per line. | | | Totals = | | 3.18 | 289.590 |

CN (weighted) = Total Product / Total Area = 289.590 / 3.180 = 91.066

Use CN = 91.1

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 | ARF | Date | 2/22/2021 |

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 | | | 1.44 | 129.9628099 |
| C | Open Space | 74 | | | 0.39 | 28.70642792 |
| C | SWMF | 98 | | | 0.13 | 13.20615243 |
| C | Impervious Area (NWL, paving) | 98 | | | 0.32 | 31.02433425 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 1/ Use only one CN source per line. | | | Totals = | | 2.28 | 202.900 |

$$\text{CN (weighted)} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{202.900}{2.283} = 88.863$$

Use CN = 88.9

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 | ARF | Date | 2/22/2021 |

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 |
| | | | | | | |
| | | | | | | |
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| | | | | | | |
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| | | | | | | |
| | | | | | | |

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 | 9/9/2020 |
| 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 | | | | | |
| 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 | | + | | = | |

| 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 | |
| | min | |

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

| | | | | | |
|---|---|---|---|---|---|
| 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 | | | | |
| 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 | | + | = | |

**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 | |
| | | min | |

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

Job #: 402138
Project: Naper Commons

Date: September 7, 2020
Revised: February 22, 2021
By: ARF

| PROP SWMF-001 | | | | |
|---|---|---|---|---|
| **STAGE/ STORAGE RELATIONSHIP** | | | | |
| | | | | |
| ELEV. | AREA (S.F.) | AREA (AC.) | INCREM. VOLUME (AC.-Ft.) | **CUMULATIVE VOLUME (Ac-Ft)** |
| 737.5 | 40500 | 0.930 | 0.000 | **0.000** |
| 738.0 | 47180 | 1.083 | 0.503 | **0.503** |
| 739.0 | 66110 | 1.518 | 1.300 | **1.804** |
| 739.5 | 74510 | 1.711 | 0.807 | **2.611** |
| 740.0 | 82910 | 1.903 | 0.903 | **3.514** |
| 741.0 | 98190 | 2.254 | 2.079 | **5.593** |
| | | | | |
| | | | | |

Job #: 402138
Project: Naper Commons

Date: September 7, 2020
Revised: February 22, 2021
By: ARF

| PROP SWMF-002 | | | | |
|---|---|---|---|---|
| **STAGE/ STORAGE RELATIONSHIP** | | | | |
| | | | | |
| ELEV. | AREA (S.F.) | AREA (AC.) | INCREM. VOLUME (AC.-Ft.) | **CUMULATIVE VOLUME (Ac-Ft)** |
| 732.0 | 19850 | 0.456 | 0.000 | **0.000** |
| 733.0 | 24480 | 0.562 | 0.509 | **0.509** |
| 734.0 | 29460 | 0.676 | 0.619 | **1.128** |
| 735.0 | 34770 | 0.798 | 0.737 | **1.865** |
| 736.0 | 40460 | 0.929 | 0.864 | **2.729** |
| 737.0 | 46550 | 1.069 | 0.999 | **3.728** |
| 738.0 | 52950 | 1.216 | 1.142 | **4.870** |
| 739.0 | 57340 | 1.316 | 1.266 | **6.136** |
| | | | | |

Job #: 402138
Project: Naper Commons

Date: September 7, 2020
Revised: February 22, 2021
By: ARF

| PROP SWMF-003 | | | | |
|---|---|---|---|---|
| **STAGE/ STORAGE RELATIONSHIP** | | | | |
| | | | | |
| ELEV. | AREA (S.F.) | AREA (AC.) | INCREM. VOLUME (AC.-Ft.) | **CUMULATIVE VOLUME (Ac-Ft)** |
| 732.0 | 44660 | 1.025 | 0.000 | **0.000** |
| 733.0 | 57050 | 1.310 | 1.167 | **1.167** |
| 734.0 | 69960 | 1.606 | 1.458 | **2.625** |
| 735.0 | 83450 | 1.916 | 1.761 | **4.386** |
| 736.0 | 97480 | 2.238 | 2.077 | **6.463** |
| 737.0 | 112020 | 2.572 | 2.405 | **8.868** |
| 738.0 | 126990 | 2.915 | 2.743 | **11.611** |
| 739.0 | 142440 | 3.270 | 3.093 | **14.704** |

Job #: 402138
Project: Naper Commons

Date: September 7, 2020
Revised: February 22, 2021
By: ARF

| PROP SWMF-005 | | | | |
|---|---|---|---|---|
| **STAGE/ STORAGE RELATIONSHIP** | | | | |
| | | | | |
| ELEV. | AREA (S.F.) | AREA (AC.) | INCREM. VOLUME (AC.-Ft.) | **CUMULATIVE VOLUME (Ac-Ft)** |
| 729.0 | 7800 | 0.179 | 0.000 | **0.000** |
| 730.0 | 10260 | 0.236 | 0.207 | **0.207** |
| 731.0 | 13120 | 0.301 | 0.268 | **0.476** |
| 732.0 | 16350 | 0.375 | 0.338 | **0.814** |
| 733.0 | 21610 | 0.496 | 0.436 | **1.250** |
| 734.0 | 30300 | 0.696 | 0.596 | **1.846** |
| 735.0 | 38650 | 0.887 | 0.791 | **2.637** |
| 736.0 | 47530 | 1.091 | 0.989 | **3.626** |
| 737.0 | 56900 | 1.306 | 1.199 | **4.825** |
| | | | | |

Job #: 402138
Project: Naper Commons

Date: September 7, 2020
Revised: February 22, 2021
By: ARF

| PROP SWMF-006 | | | | |
|---|---|---|---|---|
| **STAGE/ STORAGE RELATIONSHIP** | | | | |
| | | | | |
| ELEV. | AREA (S.F.) | AREA (AC.) | INCREM. VOLUME (AC.-Ft.) | **CUMULATIVE VOLUME (Ac-Ft)** |
| 729.0 | 15180 | 0.348 | 0.000 | **0.000** |
| 730.0 | 18290 | 0.420 | 0.384 | **0.384** |
| 731.0 | 21690 | 0.498 | 0.459 | **0.843** |
| 732.0 | 25350 | 0.582 | 0.540 | **1.383** |
| 733.0 | 29280 | 0.672 | 0.627 | **2.010** |
| 734.0 | 32980 | 0.757 | 0.715 | **2.725** |
| 735.0 | 37120 | 0.852 | 0.805 | **3.529** |
| 736.0 | 40130 | 0.921 | 0.887 | **4.416** |
| 737.0 | 44410 | 1.020 | 0.970 | **5.386** |
| | | | | |

Job #: 402138
Project: Naper Commons

Date: September 7, 2020
Revised: February 22, 2021
By: ARF

| PROP SWMF-007 | | | | |
|---|---|---|---|---|
| **STAGE/ STORAGE RELATIONSHIP** | | | | |
| | | | | |
| ELEV. | AREA (S.F.) | AREA (AC.) | INCREM. VOLUME (AC.-Ft.) | **CUMULATIVE VOLUME (Ac-Ft)** |
| 739.0 | 13790 | 0.317 | 0.000 | **0.000** |
| 739.5 | 16730 | 0.384 | 0.175 | **0.175** |
| 740.0 | 19660 | 0.451 | 0.209 | **0.384** |
| 741.0 | 25850 | 0.593 | 0.522 | **0.906** |
| | | | | |
| | | | | |

Job #: 402138
Project: Naper Commons

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: Naper Commons

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

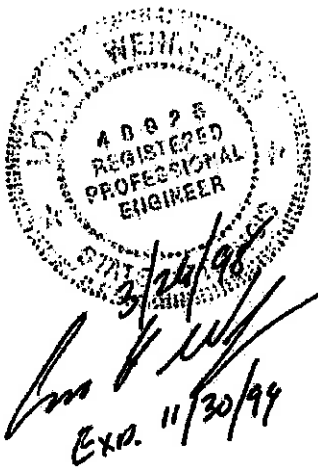
March, 1998

**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-

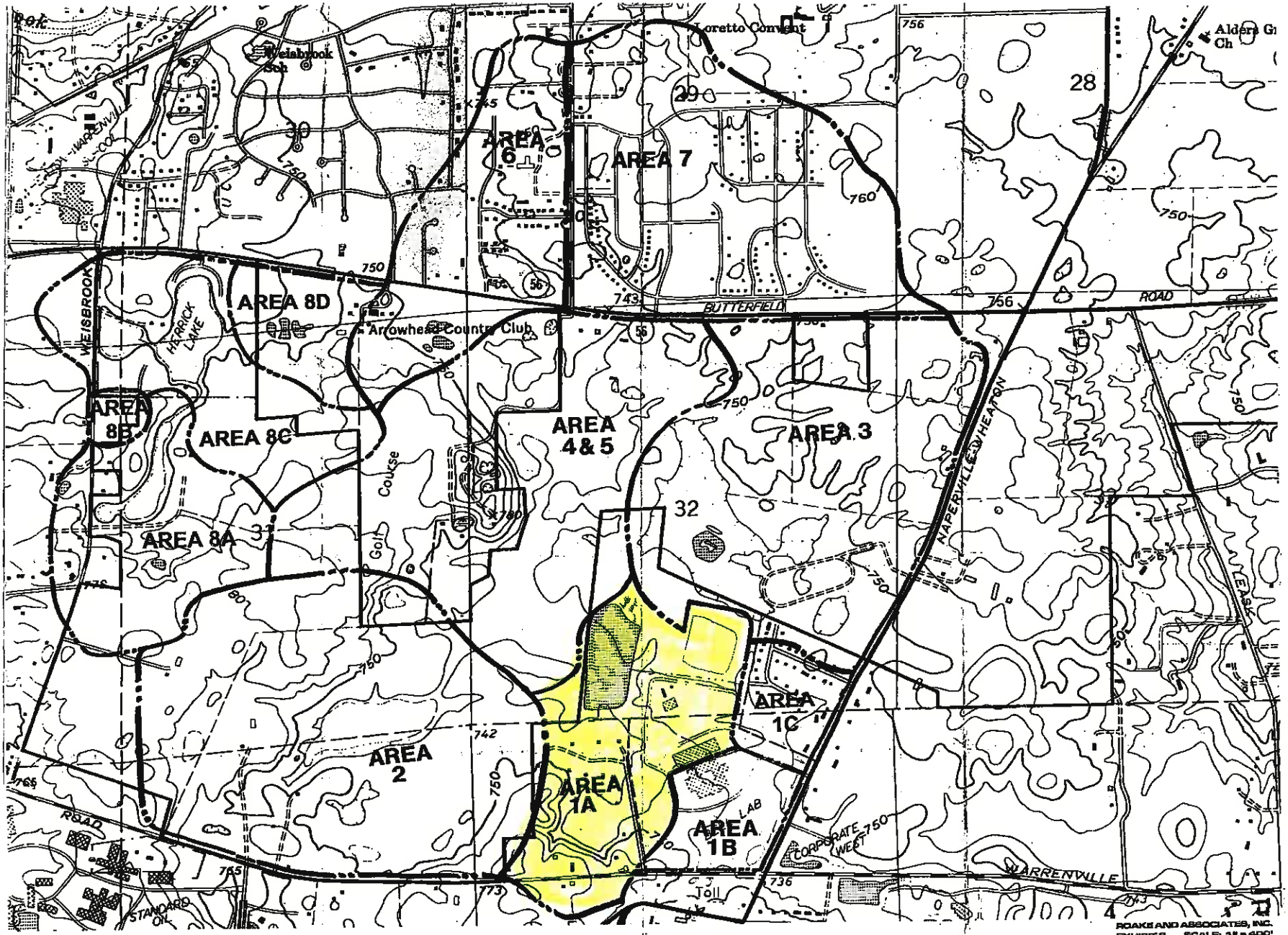
```
**********80-80 LIST OF INPUT DATA (CONTINUED)**********
 8                          736.3        4.0          7.8          4
 8                          736.5        9.0          8.5
 8                          737.0       16.8         12.0
 8                          737.9       21.0         22.8
 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

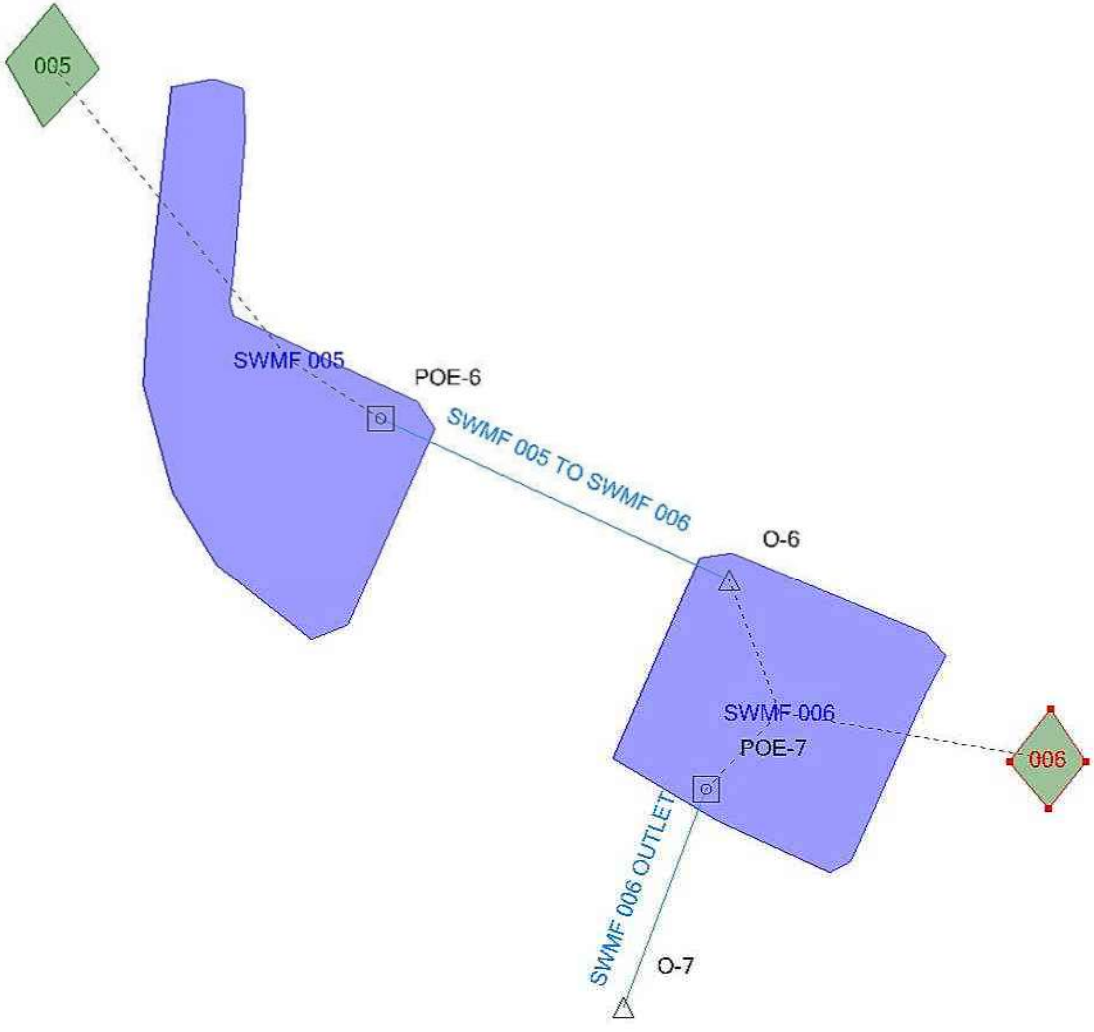
PROVIDED/REQUIRED FOR PARKING Lot


AREA 6
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 | 2.959 | 16.000 | 3.75 | (N/A) | (N/A) |
| 006 | 100Yr 24Hr | 100 | None | 1.981 | 16.000 | 2.39 | (N/A) | (N/A) |
| O-7 | 100Yr 24Hr | 100 | None | 1.008 | 24.000 | 0.83 | (N/A) | (N/A) |
| SWMF 005 (IN) | 100Yr 24Hr | 100 | None | 2.959 | 16.000 | 3.75 | (N/A) | (N/A) |
| SWMF 005 (OUT) | 100Yr 24Hr | 100 | None | 1.399 | 14.950 | 1.66 | 733.52 | 1.559 |
| SWMF 005 (Reverse) | 100Yr 24Hr | 100 | None | 0.000 | 2.300 | 0.00 | (N/A) | (N/A) |
| SWMF 006 (IN) | 100Yr 24Hr | 100 | None | 3.380 | 14.950 | 4.03 | (N/A) | (N/A) |
| SWMF 006 (OUT) | 100Yr 24Hr | 100 | None | 1.008 | 24.000 | 0.83 | 733.50 | 2.370 |

## 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 |
|---|---|---|---|---|---|---|---|
| SWMF 005 TO SWMF 006 | Pond Outlet | Upstream | 2.959 | 16.000 | 3.75 | SWMF 005 | Pond Inflow |
| SWMF 005 TO SWMF 006 | Pond Outlet | Outflow | 1.399 | 14.950 | 1.66 | SWMF 005 | Pond Outflow |
| SWMF 005 TO SWMF 006 | Negative Flow | Outflow | 0.000 | 2.300 | 0.00 | SWMF 005 | Pond Outflow |
| SWMF 005 TO SWMF 006 | Pond Outlet | Link | 1.397 | 14.950 | 1.66 | | |
| SWMF 005 TO SWMF 006 | Pond Outlet | Downstream | 3.380 | 14.950 | 4.03 | SWMF 006 | |
| SWMF 006 OUTLET | Pond Outlet | Upstream | 3.380 | 14.950 | 4.03 | SWMF 006 | Pond Inflow |
| SWMF 006 OUTLET | Pond Outlet | Outflow | 1.008 | 24.000 | 0.83 | SWMF 006 | Pond Outflow |
| SWMF 006 OUTLET | Pond Outlet | Link | 1.008 | 24.000 | 0.83 | | |
| SWMF 006 OUTLET | Pond Outlet | Downstream | 1.008 | 24.000 | 0.83 | O-7 | |

## Messages

| | |
|---|---|
| Message Id | 15 |
| Scenario | 100Yr 24Hr |
| Element Type | Composite Outlet Structure |
| Element Id | 66 |
| Label | SWMF 005 TO SWMF 006 |
| Time | (N/A) |
| Message | Kr (reverse flow entrance loss coefficient) was not specified. Kr was set to same value as Ke= 0.200 . |
| Source | Warning |
| Message Id | 39 |
| Scenario | 100Yr 24Hr |
| Element Type | Composite Outlet Structure |
| Element Id | 66 |
| Label | SWMF 005 TO SWMF 006 |
| Time | (N/A) |
| Message | Reverse flow conditions encountered for one or more headwater elevations. Calculated reverse flows may be approximate. |
| Source | Warning |

# 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) | 5.140 acres |

| | |
|---|---|
| Computational Time Increment | 0.051 hours |
| Time to Peak (Computed) | 16.011 hours |
| Flow (Peak, Computed) | 3.75 ft³/s |
| Output Increment | 0.050 hours |
| Time to Flow (Peak Interpolated Output) | 16.000 hours |
| Flow (Peak Interpolated Output) | 3.75 ft³/s |

| Drainage Area | |
|---|---|
| SCS CN (Composite) | 86.500 |
| Area (User Defined) | 5.140 acres |
| Maximum Retention (Pervious) | 1.6 in |
| Maximum Retention (Pervious, 20 percent) | 0.3 in |

| Cumulative Runoff | |
|---|---|
| Cumulative Runoff Depth (Pervious) | 6.9 in |
| Runoff Volume (Pervious) | 2.975 ac-ft |

| Hydrograph Volume (Area under Hydrograph curve) | |
|---|---|
| Volume | 2.959 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 | 15.33 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) | 2.39 ft³/s |
| Output Increment | 0.050 hours |
| Time to Flow (Peak Interpolated Output) | 16.000 hours |
| Flow (Peak Interpolated Output) | 2.39 ft³/s |

| Drainage Area | |
|---|---|
| SCS CN (Composite) | 91.100 |
| Area (User Defined) | 3.180 acres |
| Maximum Retention (Pervious) | 1.0 in |
| Maximum Retention (Pervious, 20 percent) | 0.2 in |

| Cumulative Runoff | |
|---|---|
| Cumulative Runoff Depth (Pervious) | 7.5 in |
| Runoff Volume (Pervious) | 1.987 ac-ft |

| Hydrograph Volume (Area under Hydrograph curve) | |
|---|---|
| Volume | 1.981 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 | 0.207 |
| 731.00 | 0.476 |
| 732.00 | 0.814 |
| 733.00 | 1.250 |
| 734.00 | 1.846 |
| 735.00 | 2.637 |
| 736.00 | 3.626 |
| 737.00 | 4.825 |

## Elevation-Volume

| Pond Elevation (ft) | Pond Volume (ac-ft) |
|---|---|
| 729.00 | 0.000 |
| 730.00 | 0.384 |
| 731.00 | 0.843 |
| 732.00 | 1.383 |
| 733.00 | 2.010 |
| 734.00 | 2.725 |
| 735.00 | 3.529 |
| 736.00 | 4.416 |
| 737.00 | 5.386 |

| 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<br>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<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 24.0 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 | 0.012 |
| 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 | 731.19 ft | T1 Flow | 15.55 ft³/s |
| T2 Elevation | 731.39 ft | T2 Flow | 17.77 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<br>Structure Type: Orifice-Circular | |
|---|---|
| Number of Openings | 1 |
| Elevation | 728.50 ft |
| Orifice Diameter | 3.8 in |
| Orifice Coefficient | 0.600 |

| Structure ID: Weir - 1<br>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<br>Structure Type: TW Setup, DS Channel | |
|---|---|
| Tailwater Type | Free Outfall |

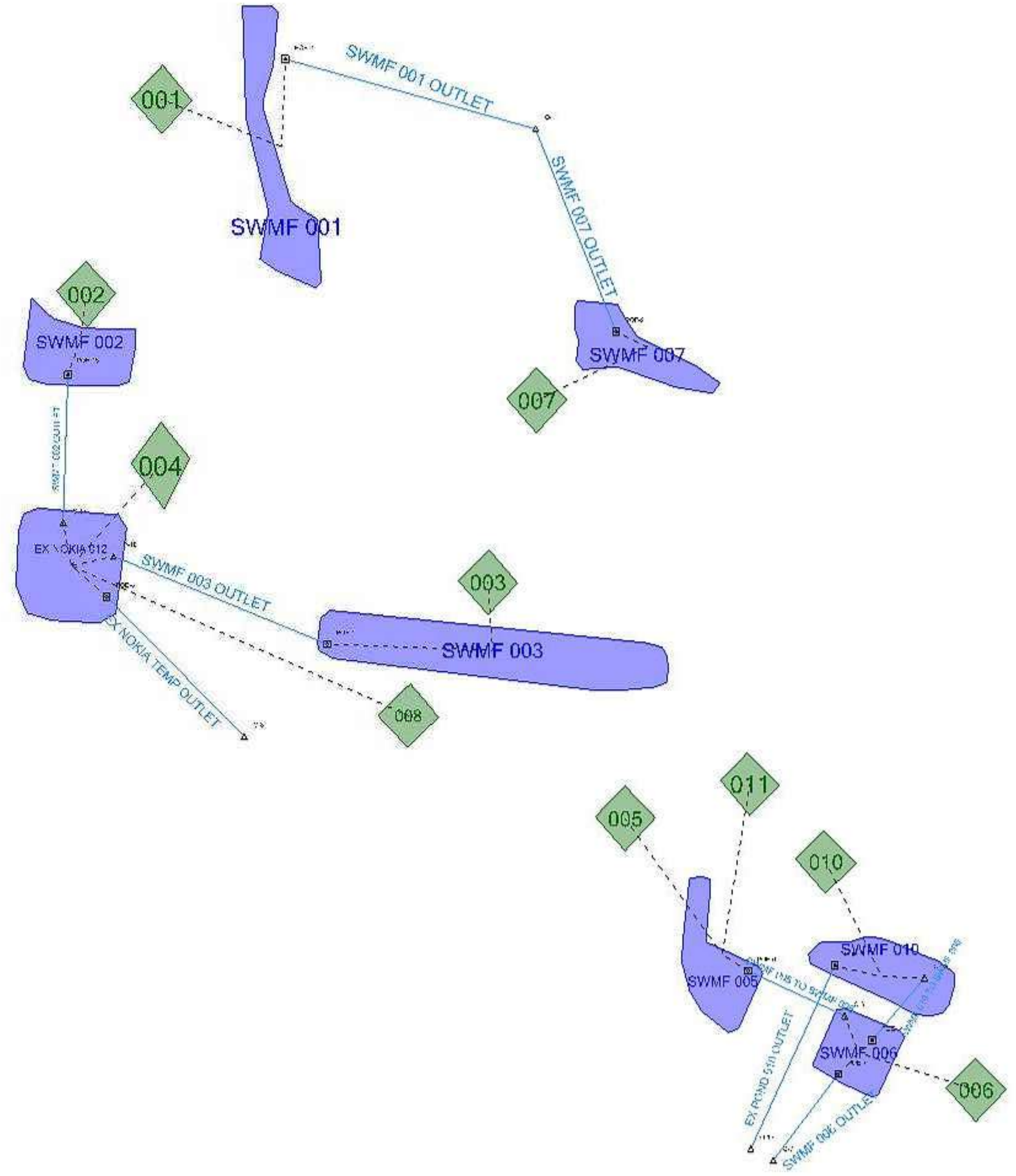
| Convergence Tolerances | |
|---|---|
| Maximum Iterations | 30 |
| Tailwater Tolerance (Minimum) | 0.01 ft |
| Tailwater Tolerance (Maximum) | 0.50 ft |
| Headwater Tolerance (Minimum) | 0.01 ft |
| Headwater Tolerance (Maximum) | 0.50 ft |
| Flow Tolerance (Minimum) | 0.001 ft³/s |
| Flow Tolerance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

# Index

# EXHIBIT 2G

# “PROP” PROPOSED CONDITIONS

# PONDPACK MODEL & OUTPUT


001
SWMF 001
SWMF 001 OUTLET
SWMF 007 OUTLET
002
SWMF 002
SWMF 007
007
004
EX NOKIA 012
SWMF 003 OUTLET
003
SWMF 003
008
EX NOKIA TEMP OUTLET
011
005
010
SWMF 005
SWMF 010
SWMF 006
006
EX POND 010 OUTLET
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 | 2.507 | 16.000 | 3.11 | (N/A) | (N/A) |
| 002 | 100Yr 24Hr | 100 | None | 11.863 | 16.000 | 14.93 | (N/A) | (N/A) |
| 003 | 100Yr 24Hr | 100 | None | 14.100 | 16.000 | 17.45 | (N/A) | (N/A) |
| 004 | 100Yr 24Hr | 100 | None | 1.318 | 16.000 | 1.67 | (N/A) | (N/A) |
| 005 | 100Yr 24Hr | 100 | None | 2.959 | 16.000 | 3.75 | (N/A) | (N/A) |
| 006 | 100Yr 24Hr | 100 | None | 1.981 | 16.000 | 2.39 | (N/A) | (N/A) |
| 007 | 100Yr 24Hr | 100 | None | 1.370 | 16.000 | 1.69 | (N/A) | (N/A) |
| 008 | 100Yr 24Hr | 100 | None | 0.417 | 16.000 | 0.51 | (N/A) | (N/A) |
| 010 | 100Yr 24Hr | 100 | None | 15.436 | 16.050 | 20.08 | (N/A) | (N/A) |
| 011 | 100Yr 24Hr | 100 | None | 5.729 | 16.000 | 7.72 | (N/A) | (N/A) |
| EX NOKIA 012 (IN) | 100Yr 24Hr | 100 | None | 13.613 | 17.000 | 12.42 | (N/A) | (N/A) |
| EX NOKIA 012 (OUT) | 100Yr 24Hr | 100 | None | 2.921 | 24.000 | 3.83 | 734.99 | 10.689 |
| O-1 | 100Yr 24Hr | 100 | None | 1.191 | 18.150 | 1.22 | (N/A) | (N/A) |
| O-13 | 100Yr 24Hr | 100 | None | 1.585 | 24.000 | 1.91 | (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) |
|---|---|---|---|---|---|---|---|---|
| O-7 | 100Yr 24Hr | 100 | None | 0.864 | 24.000 | 0.80 | (N/A) | (N/A) |
| O-8 | 100Yr 24Hr | 100 | None | 2.921 | 24.000 | 3.83 | (N/A) | (N/A) |
| SWMF 001 (IN) | 100Yr 24Hr | 100 | None | 2.507 | 16.000 | 3.11 | (N/A) | (N/A) |
| SWMF 001 (OUT) | 100Yr 24Hr | 100 | None | 0.039 | 24.000 | 0.04 | 739.41 | 2.468 |
| SWMF 002 (IN) | 100Yr 24Hr | 100 | None | 11.863 | 16.000 | 14.93 | (N/A) | (N/A) |
| SWMF 002 (OUT) | 100Yr 24Hr | 100 | None | 8.894 | 17.300 | 8.10 | 737.31 | 4.083 |
| SWMF 003 (IN) | 100Yr 24Hr | 100 | None | 14.100 | 16.000 | 17.45 | (N/A) | (N/A) |
| SWMF 003 (OUT) | 100Yr 24Hr | 100 | None | 2.984 | 18.350 | 2.35 | 737.82 | 11.115 |
| SWMF 005 (IN) | 100Yr 24Hr | 100 | None | 8.688 | 16.000 | 11.47 | (N/A) | (N/A) |
| SWMF 005 (OUT) | 100Yr 24Hr | 100 | None | 4.665 | 14.800 | 9.21 | 736.33 | 4.023 |
| SWMF 005 (Reverse) | 100Yr 24Hr | 100 | None | 0.000 | 2.500 | 0.00 | (N/A) | (N/A) |
| SWMF 006 (IN) | 100Yr 24Hr | 100 | None | 6.646 | 14.800 | 11.59 | (N/A) | (N/A) |
| SWMF 006 (OUT) | 100Yr 24Hr | 100 | None | 2.023 | 14.700 | 11.21 | 736.33 | 4.733 |
| SWMF 006 (Reverse) | 100Yr 24Hr | 100 | None | -0.027 | 16.700 | -1.86 | (N/A) | (N/A) |
| SWMF 007 (IN) | 100Yr 24Hr | 100 | None | 1.370 | 16.000 | 1.69 | (N/A) | (N/A) |
| SWMF 007 (OUT) | 100Yr 24Hr | 100 | None | 1.152 | 18.150 | 1.19 | 740.14 | 0.459 |
| SWMF 010 (IN) | 100Yr 24Hr | 100 | None | 16.559 | 14.700 | 30.13 | (N/A) | (N/A) |
| SWMF 010 (OUT) | 100Yr 24Hr | 100 | None | 1.585 | 24.000 | 1.91 | 736.33 | 14.943 |

## 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 | 13.613 | 17.000 | 12.42 | EX NOKIA 012 | Pond Inflow |
| EX NOKIA TEMP OUTLET | Pond Outlet | Outflow | 2.921 | 24.000 | 3.83 | EX NOKIA 012 | 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 |
|---|---|---|---|---|---|---|---|
| EX NOKIA TEMP OUTLET | Pond Outlet | Link | 2.921 | 24.000 | 3.83 | | |
| EX NOKIA TEMP OUTLET | Pond Outlet | Downstream | 2.921 | 24.000 | 3.83 | O-8 | |
| EX POND 010 OUTLET | Pond Outlet | Upstream | 16.559 | 14.700 | 30.13 | SWMF 010 | Pond Inflow |
| EX POND 010 OUTLET | Pond Outlet | Outflow | 1.585 | 24.000 | 1.91 | SWMF 010 | Pond Outflow |
| EX POND 010 OUTLET | Pond Outlet | Link | 1.585 | 24.000 | 1.91 | | |
| EX POND 010 OUTLET | Pond Outlet | Downstream | 1.585 | 24.000 | 1.91 | O-13 | |
| SWMF 001 OUTLET | Pond Outlet | Upstream | 2.507 | 16.000 | 3.11 | SWMF 001 | Pond Inflow |
| SWMF 001 OUTLET | Pond Outlet | Outflow | 0.039 | 24.000 | 0.04 | SWMF 001 | Pond Outflow |
| SWMF 001 OUTLET | Pond Outlet | Link | 0.039 | 24.000 | 0.04 | | |
| SWMF 001 OUTLET | Pond Outlet | Downstream | 1.191 | 18.150 | 1.22 | O-1 | |
| SWMF 002 OUTLET | Pond Outlet | Upstream | 11.863 | 16.000 | 14.93 | SWMF 002 | Pond Inflow |
| SWMF 002 OUTLET | Pond Outlet | Outflow | 8.894 | 17.300 | 8.10 | SWMF 002 | Pond Outflow |
| SWMF 002 OUTLET | Pond Outlet | Link | 8.873 | 17.300 | 8.10 | | |
| SWMF 002 OUTLET | Pond Outlet | Downstream | 13.613 | 17.000 | 12.42 | EX NOKIA 012 | |
| SWMF 003 OUTLET | Pond Outlet | Upstream | 14.100 | 16.000 | 17.45 | SWMF 003 | Pond Inflow |
| SWMF 003 OUTLET | Pond Outlet | Outflow | 2.984 | 18.350 | 2.35 | SWMF 003 | Pond Outflow |
| SWMF 003 OUTLET | Pond Outlet | Link | 2.984 | 18.350 | 2.35 | | |
| SWMF 003 OUTLET | Pond Outlet | Downstream | 13.613 | 17.000 | 12.42 | EX NOKIA 012 | |
| SWMF 005 TO SWMF 006 | Pond Outlet | Upstream | 8.688 | 16.000 | 11.47 | SWMF 005 | Pond Inflow |
| SWMF 005 TO SWMF 006 | Pond Outlet | Outflow | 4.665 | 14.800 | 9.21 | SWMF 005 | Pond Outflow |
| SWMF 005 TO SWMF 006 | Negative Flow | Outflow | 0.000 | 2.500 | 0.00 | 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 | Pond Outlet | Link | 4.660 | 14.800 | 9.21 | | |
| SWMF 005 TO SWMF 006 | Negative Flow | Link | 0.000 | 2.500 | 0.00 | | |
| SWMF 005 TO SWMF 006 | Pond Outlet | Downstream | 6.646 | 14.800 | 11.59 | SWMF 006 | |
| SWMF 006 OUTLET | Pond Outlet | Upstream | 6.646 | 14.800 | 11.59 | SWMF 006 | Pond Inflow |
| SWMF 006 OUTLET | Pond Outlet | Outflow | 2.023 | 14.700 | 11.21 | SWMF 006 | Pond Outflow |
| SWMF 006 OUTLET | Negative Flow | Outflow | -0.027 | 16.700 | -1.86 | SWMF 006 | Pond Outflow |
| SWMF 006 OUTLET | Pond Outlet | Link | 0.864 | 24.000 | 0.80 | | |
| SWMF 006 OUTLET | Pond Outlet | Downstream | 0.864 | 24.000 | 0.80 | O-7 | |
| SWMF 007 OUTLET | Pond Outlet | Upstream | 1.370 | 16.000 | 1.69 | SWMF 007 | Pond Inflow |
| SWMF 007 OUTLET | Pond Outlet | Outflow | 1.152 | 18.150 | 1.19 | SWMF 007 | Pond Outflow |
| SWMF 007 OUTLET | Pond Outlet | Link | 1.152 | 18.150 | 1.19 | | |
| SWMF 007 OUTLET | Pond Outlet | Downstream | 1.191 | 18.150 | 1.22 | O-1 | |
| SWMF 010 TO SWMF 006 | Pond Outlet | Upstream | 6.646 | 14.800 | 11.59 | SWMF 006 | Pond Inflow |
| SWMF 010 TO SWMF 006 | Pond Outlet | Outflow | 2.023 | 14.700 | 11.21 | SWMF 006 | Pond Outflow |
| SWMF 010 TO SWMF 006 | Negative Flow | Outflow | -0.027 | 16.700 | -1.86 | SWMF 006 | Pond Outflow |
| SWMF 010 TO SWMF 006 | Pond Outlet | Link | 1,414.299 | 24.000 | 2,942.54 | | |
| SWMF 010 TO SWMF 006 | Pond Outlet | Downstream | 16.559 | 14.700 | 30.13 | SWMF 010 | |

## Messages

# Scenario Calculation Summary

| Scenario Summary | |
|---|---|
| ID | 111 |
| Label | 100YR-12HR |
| Notes | |
| Active Topology | <I> Base Active Topology |
| Hydrology | <I> Base Hydrology |
| Rainfall Runoff | 100YR-12HR |
| 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 | <I> 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 | 7.5 in | Storm Event | 100YR-12HR |

| 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-12HR | 100 | None | 2.135 | 5.000 | 5.31 | (N/A) | (N/A) |
| 002 | 100YR-12HR | 100 | None | 10.082 | 5.050 | 25.17 | (N/A) | (N/A) |
| 003 | 100YR-12HR | 100 | None | 12.026 | 5.050 | 29.72 | (N/A) | (N/A) |
| 004 | 100YR-12HR | 100 | None | 1.115 | 5.000 | 2.83 | (N/A) | (N/A) |
| 005 | 100YR-12HR | 100 | None | 2.513 | 5.050 | 6.28 | (N/A) | (N/A) |
| 006 | 100YR-12HR | 100 | None | 1.697 | 5.000 | 4.13 | (N/A) | (N/A) |
| 007 | 100YR-12HR | 100 | None | 1.168 | 5.000 | 2.89 | (N/A) | (N/A) |
| 008 | 100YR-12HR | 100 | None | 0.356 | 5.000 | 0.88 | (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) |
|---|---|---|---|---|---|---|---|---|
| 010 | 100YR-12HR | 100 | None | 13.041 | 5.100 | 32.82 | (N/A) | (N/A) |
| 011 | 100YR-12HR | 100 | None | 4.779 | 5.050 | 12.42 | (N/A) | (N/A) |
| EX NOKIA 012 (IN) | 100YR-12HR | 100 | None | 13.925 | 6.000 | 15.41 | (N/A) | (N/A) |
| EX NOKIA 012 (OUT) | 100YR-12HR | 100 | None | 4.854 | 17.100 | 3.62 | 734.65 | 9.711 |
| O-1 | 100YR-12HR | 100 | None | 1.175 | 7.650 | 1.34 | (N/A) | (N/A) |
| O-13 | 100YR-12HR | 100 | None | 2.701 | 12.400 | 1.80 | (N/A) | (N/A) |
| O-7 | 100YR-12HR | 100 | None | 1.199 | 12.400 | 0.75 | (N/A) | (N/A) |
| O-8 | 100YR-12HR | 100 | None | 4.854 | 17.100 | 3.62 | (N/A) | (N/A) |
| SWMF 001 (IN) | 100YR-12HR | 100 | None | 2.135 | 5.000 | 5.31 | (N/A) | (N/A) |
| SWMF 001 (OUT) | 100YR-12HR | 100 | None | 0.055 | 12.400 | 0.03 | 739.19 | 2.112 |
| SWMF 002 (IN) | 100YR-12HR | 100 | None | 10.082 | 5.050 | 25.16 | (N/A) | (N/A) |
| SWMF 002 (OUT) | 100YR-12HR | 100 | None | 8.619 | 6.600 | 10.05 | 737.87 | 4.726 |
| SWMF 003 (IN) | 100YR-12HR | 100 | None | 12.026 | 5.000 | 29.72 | (N/A) | (N/A) |
| SWMF 003 (OUT) | 100YR-12HR | 100 | None | 3.836 | 6.950 | 2.59 | 737.47 | 10.166 |
| SWMF 005 (IN) | 100YR-12HR | 100 | None | 7.292 | 5.050 | 18.69 | (N/A) | (N/A) |
| SWMF 005 (OUT) | 100YR-12HR | 100 | None | 4.735 | 6.050 | 12.14 | 735.58 | 3.211 |
| SWMF 005 (Reverse) | 100YR-12HR | 100 | None | 0.000 | 1.400 | 0.00 | (N/A) | (N/A) |
| SWMF 006 (IN) | 100YR-12HR | 100 | None | 6.432 | 6.050 | 15.54 | (N/A) | (N/A) |
| SWMF 006 (OUT) | 100YR-12HR | 100 | None | 2.566 | 5.950 | 15.26 | 735.56 | 4.022 |
| SWMF 006 (Reverse) | 100YR-12HR | 100 | None | -0.002 | 9.100 | -0.53 | (N/A) | (N/A) |
| SWMF 007 (IN) | 100YR-12HR | 100 | None | 1.168 | 5.000 | 2.89 | (N/A) | (N/A) |
| SWMF 007 (OUT) | 100YR-12HR | 100 | None | 1.121 | 7.650 | 1.31 | 740.33 | 0.558 |
| SWMF 010 (IN) | 100YR-12HR | 100 | None | 14.408 | 5.650 | 44.57 | (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 010 (OUT) | 100YR-12HR | 100 | None | 2.701 | 12.400 | 1.80 | 735.56 | 13.188 |

## 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 | 13.925 | 6.000 | 15.41 | EX NOKIA 012 | Pond Inflow |
| EX NOKIA TEMP OUTLET | Pond Outlet | Outflow | 4.854 | 17.100 | 3.62 | EX NOKIA 012 | Pond Outflow |
| EX NOKIA TEMP OUTLET | Pond Outlet | Link | 4.854 | 17.100 | 3.62 | | |
| EX NOKIA TEMP OUTLET | Pond Outlet | Downstream | 4.854 | 17.100 | 3.62 | O-8 | |
| EX POND 010 OUTLET | Pond Outlet | Upstream | 14.408 | 5.650 | 44.57 | SWMF 010 | Pond Inflow |
| EX POND 010 OUTLET | Pond Outlet | Outflow | 2.701 | 12.400 | 1.80 | SWMF 010 | Pond Outflow |
| EX POND 010 OUTLET | Pond Outlet | Link | 2.701 | 12.400 | 1.80 | | |
| EX POND 010 OUTLET | Pond Outlet | Downstream | 2.701 | 12.400 | 1.80 | O-13 | |
| SWMF 001 OUTLET | Pond Outlet | Upstream | 2.135 | 5.000 | 5.31 | SWMF 001 | Pond Inflow |
| SWMF 001 OUTLET | Pond Outlet | Outflow | 0.055 | 12.400 | 0.03 | SWMF 001 | Pond Outflow |
| SWMF 001 OUTLET | Pond Outlet | Link | 0.055 | 12.400 | 0.03 | | |
| SWMF 001 OUTLET | Pond Outlet | Downstream | 1.175 | 7.650 | 1.34 | O-1 | |
| SWMF 002 OUTLET | Pond Outlet | Upstream | 10.082 | 5.050 | 25.16 | SWMF 002 | Pond Inflow |
| SWMF 002 OUTLET | Pond Outlet | Outflow | 8.619 | 6.600 | 10.05 | SWMF 002 | Pond Outflow |
| SWMF 002 OUTLET | Pond Outlet | Link | 8.619 | 6.600 | 10.05 | | |
| SWMF 002 OUTLET | Pond Outlet | Downstream | 13.925 | 6.000 | 15.41 | EX NOKIA 012 | |
| SWMF 003 OUTLET | Pond Outlet | Upstream | 12.026 | 5.000 | 29.72 | SWMF 003 | 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 |
|---|---|---|---|---|---|---|---|
| SWMF 003 OUTLET | Pond Outlet | Outflow | 3.836 | 6.950 | 2.59 | SWMF 003 | Pond Outflow |
| SWMF 003 OUTLET | Pond Outlet | Link | 3.836 | 6.950 | 2.59 | | |
| SWMF 003 OUTLET | Pond Outlet | Downstream | 13.925 | 6.000 | 15.41 | EX NOKIA 012 | |
| SWMF 005 TO SWMF 006 | Pond Outlet | Upstream | 7.292 | 5.050 | 18.69 | SWMF 005 | Pond Inflow |
| SWMF 005 TO SWMF 006 | Pond Outlet | Outflow | 4.735 | 6.050 | 12.14 | SWMF 005 | Pond Outflow |
| SWMF 005 TO SWMF 006 | Negative Flow | Outflow | 0.000 | 1.400 | 0.00 | SWMF 005 | Pond Outflow |
| SWMF 005 TO SWMF 006 | Pond Outlet | Link | 4.735 | 6.050 | 12.14 | | |
| SWMF 005 TO SWMF 006 | Negative Flow | Link | 0.000 | 1.400 | 0.00 | | |
| SWMF 005 TO SWMF 006 | Pond Outlet | Downstream | 6.432 | 6.050 | 15.54 | SWMF 006 | |
| SWMF 006 OUTLET | Pond Outlet | Upstream | 6.432 | 6.050 | 15.54 | SWMF 006 | Pond Inflow |
| SWMF 006 OUTLET | Pond Outlet | Outflow | 2.566 | 5.950 | 15.26 | SWMF 006 | Pond Outflow |
| SWMF 006 OUTLET | Negative Flow | Outflow | -0.002 | 9.100 | -0.53 | SWMF 006 | Pond Outflow |
| SWMF 006 OUTLET | Pond Outlet | Link | 1.199 | 12.400 | 0.75 | | |
| SWMF 006 OUTLET | Pond Outlet | Downstream | 1.199 | 12.400 | 0.75 | O-7 | |
| SWMF 007 OUTLET | Pond Outlet | Upstream | 1.168 | 5.000 | 2.89 | SWMF 007 | Pond Inflow |
| SWMF 007 OUTLET | Pond Outlet | Outflow | 1.121 | 7.650 | 1.31 | SWMF 007 | Pond Outflow |
| SWMF 007 OUTLET | Pond Outlet | Link | 1.121 | 7.650 | 1.31 | | |
| SWMF 007 OUTLET | Pond Outlet | Downstream | 1.175 | 7.650 | 1.34 | O-1 | |
| SWMF 010 TO SWMF 006 | Pond Outlet | Upstream | 6.432 | 6.050 | 15.54 | SWMF 006 | Pond Inflow |
| SWMF 010 TO SWMF 006 | Pond Outlet | Outflow | 2.566 | 5.950 | 15.26 | 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 010 TO SWMF 006 | Negative Flow | Outflow | -0.002 | 9.100 | -0.53 | SWMF 006 | Pond Outflow |
| SWMF 010 TO SWMF 006 | Pond Outlet | Link | 2,020.757 | 12.400 | 1,852.79 | | |
| SWMF 010 TO SWMF 006 | Pond Outlet | Downstream | 14.408 | 5.650 | 44.57 | SWMF 010 | |

## Messages

| | |
|---|---|
| Message Id | 69 |
| Scenario | 2YR-1HR |
| Element Type | Pond |
| Element Id | 44 |
| Label | SWMF 006 |
| Time | (N/A) |
| Message | The pond has a diversion with both interconnected and level pool outlet structures. It is recommended that you use either all interconnected or all level pool outlet structures with a diversion from a pond. |
| Source | Warning |
| Message Id | 71 |
| Scenario | 2YR-1HR |
| Element Type | Pond |
| Element Id | 44 |
| Label | SWMF 006 |
| Time | (N/A) |
| Message | The pond SWMF 006 has a mixed diversion using both a level pool and interconnected pond route. This configuration may lead to a loop in the system. PondPack does not support loops. Please review your network topology for any possible loops. |
| Source | Warning |
| Message Id | 39 |
| Scenario | 2YR-1HR |
| Element Type | Composite Outlet Structure |
| Element Id | 87 |
| Label | EX NOKIA TEMP OUTLET |
| Time | (N/A) |
| Message | Reverse flow conditions encountered for one or more headwater elevations. Calculated reverse flows may be approximate. |
| Source | Warning |

# 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 | 0.755 | 16.000 | 1.06 | (N/A) | (N/A) |
| 002 | 2YR-24HR | 2 | None | 3.458 | 16.050 | 4.96 | (N/A) | (N/A) |
| 003 | 2YR-24HR | 2 | None | 4.266 | 16.050 | 5.97 | (N/A) | (N/A) |
| 004 | 2YR-24HR | 2 | None | 0.379 | 16.000 | 0.55 | (N/A) | (N/A) |
| 005 | 2YR-24HR | 2 | None | 0.850 | 16.050 | 1.23 | (N/A) | (N/A) |
| 006 | 2YR-24HR | 2 | None | 0.633 | 16.000 | 0.85 | (N/A) | (N/A) |
| 007 | 2YR-24HR | 2 | None | 0.417 | 16.000 | 0.58 | (N/A) | (N/A) |
| 008 | 2YR-24HR | 2 | None | 0.130 | 16.000 | 0.18 | (N/A) | (N/A) |
| 010 | 2YR-24HR | 2 | None | 4.155 | 16.100 | 6.21 | (N/A) | (N/A) |
| 011 | 2YR-24HR | 2 | None | 1.403 | 16.050 | 2.20 | (N/A) | (N/A) |
| EX NOKIA 012 (IN) | 2YR-24HR | 2 | None | 5.280 | 17.000 | 6.57 | (N/A) | (N/A) |
| EX NOKIA 012 (OUT) | 2YR-24HR | 2 | None | 0.874 | 24.000 | 1.92 | 732.57 | 4.404 |
| O-1 | 2YR-24HR | 2 | None | 0.337 | 18.050 | 0.48 | (N/A) | (N/A) |
| O-13 | 2YR-24HR | 2 | None | 0.292 | 24.000 | 0.65 | (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) |
|---|---|---|---|---|---|---|---|---|
| O-7 | 2YR-24HR | 2 | None | 0.424 | 24.000 | 0.51 | (N/A) | (N/A) |
| O-8 | 2YR-24HR | 2 | None | 0.874 | 24.000 | 1.92 | (N/A) | (N/A) |
| SWMF 001 (IN) | 2YR-24HR | 2 | None | 0.755 | 16.000 | 1.06 | (N/A) | (N/A) |
| SWMF 001 (OUT) | 2YR-24HR | 2 | None | 0.019 | 24.000 | 0.02 | 738.18 | 0.737 |
| SWMF 002 (IN) | 2YR-24HR | 2 | None | 3.458 | 16.050 | 4.96 | (N/A) | (N/A) |
| SWMF 002 (OUT) | 2YR-24HR | 2 | None | 3.116 | 17.300 | 4.27 | 733.27 | 0.676 |
| SWMF 003 (IN) | 2YR-24HR | 2 | None | 4.266 | 16.000 | 5.97 | (N/A) | (N/A) |
| SWMF 003 (OUT) | 2YR-24HR | 2 | None | 1.655 | 18.600 | 1.75 | 734.05 | 2.711 |
| SWMF 005 (IN) | 2YR-24HR | 2 | None | 2.253 | 16.050 | 3.43 | (N/A) | (N/A) |
| SWMF 005 (OUT) | 2YR-24HR | 2 | None | 1.327 | 16.900 | 2.02 | 732.26 | 0.926 |
| SWMF 005 (Reverse) | 2YR-24HR | 2 | None | 0.000 | 5.400 | 0.00 | (N/A) | (N/A) |
| SWMF 006 (IN) | 2YR-24HR | 2 | None | 1.960 | 16.050 | 2.85 | (N/A) | (N/A) |
| SWMF 006 (OUT) | 2YR-24HR | 2 | None | 0.424 | 24.000 | 0.51 | 732.24 | 1.535 |
| SWMF 007 (IN) | 2YR-24HR | 2 | None | 0.417 | 16.000 | 0.58 | (N/A) | (N/A) |
| SWMF 007 (OUT) | 2YR-24HR | 2 | None | 0.318 | 17.500 | 0.46 | 739.46 | 0.162 |
| SWMF 010 (IN) | 2YR-24HR | 2 | None | 4.155 | 16.100 | 6.21 | (N/A) | (N/A) |
| SWMF 010 (OUT) | 2YR-24HR | 2 | None | 0.292 | 24.000 | 0.65 | 730.19 | 3.862 |

## 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 | 5.280 | 17.000 | 6.57 | EX NOKIA 012 | Pond Inflow |
| EX NOKIA TEMP OUTLET | Pond Outlet | Outflow | 0.874 | 24.000 | 1.92 | EX NOKIA 012 | Pond Outflow |
| EX NOKIA TEMP OUTLET | Pond Outlet | Link | 0.874 | 24.000 | 1.92 | | |

# 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 | Downstream | 0.874 | 24.000 | 1.92 | O-8 | |
| EX POND 010 OUTLET | Pond Outlet | Upstream | 4.155 | 16.100 | 6.21 | SWMF 010 | Pond Inflow |
| EX POND 010 OUTLET | Pond Outlet | Outflow | 0.292 | 24.000 | 0.65 | SWMF 010 | Pond Outflow |
| EX POND 010 OUTLET | Pond Outlet | Link | 0.292 | 24.000 | 0.65 | | |
| EX POND 010 OUTLET | Pond Outlet | Downstream | 0.292 | 24.000 | 0.65 | O-13 | |
| SWMF 001 OUTLET | Pond Outlet | Upstream | 0.755 | 16.000 | 1.06 | 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 | 0.337 | 18.050 | 0.48 | O-1 | |
| SWMF 002 OUTLET | Pond Outlet | Upstream | 3.458 | 16.050 | 4.96 | SWMF 002 | Pond Inflow |
| SWMF 002 OUTLET | Pond Outlet | Outflow | 3.116 | 17.300 | 4.27 | SWMF 002 | Pond Outflow |
| SWMF 002 OUTLET | Pond Outlet | Link | 3.116 | 17.300 | 4.27 | | |
| SWMF 002 OUTLET | Pond Outlet | Downstream | 5.280 | 17.000 | 6.57 | EX NOKIA 012 | |
| SWMF 003 OUTLET | Pond Outlet | Upstream | 4.266 | 16.000 | 5.97 | SWMF 003 | Pond Inflow |
| SWMF 003 OUTLET | Pond Outlet | Outflow | 1.655 | 18.600 | 1.75 | SWMF 003 | Pond Outflow |
| SWMF 003 OUTLET | Pond Outlet | Link | 1.648 | 18.600 | 1.75 | | |
| SWMF 003 OUTLET | Pond Outlet | Downstream | 5.280 | 17.000 | 6.57 | EX NOKIA 012 | |
| SWMF 005 TO SWMF 006 | Pond Outlet | Upstream | 2.253 | 16.050 | 3.43 | SWMF 005 | Pond Inflow |
| SWMF 005 TO SWMF 006 | Pond Outlet | Outflow | 1.327 | 16.900 | 2.02 | SWMF 005 | Pond Outflow |
| SWMF 005 TO SWMF 006 | Negative Flow | Outflow | 0.000 | 5.400 | 0.00 | SWMF 005 | Pond Outflow |
| SWMF 005 TO SWMF 006 | Pond Outlet | Link | 1.327 | 16.900 | 2.02 | | |

# 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 | Link | 0.000 | 5.400 | 0.00 | | |
| SWMF 005 TO SWMF 006 | Pond Outlet | Downstream | 1.960 | 16.050 | 2.85 | SWMF 006 | |
| SWMF 006 OUTLET | Pond Outlet | Upstream | 1.960 | 16.050 | 2.85 | SWMF 006 | Pond Inflow |
| SWMF 006 OUTLET | Pond Outlet | Outflow | 0.424 | 24.000 | 0.51 | SWMF 006 | Pond Outflow |
| SWMF 006 OUTLET | Pond Outlet | Link | 0.424 | 24.000 | 0.51 | | |
| SWMF 006 OUTLET | Pond Outlet | Downstream | 0.424 | 24.000 | 0.51 | O-7 | |
| SWMF 007 OUTLET | Pond Outlet | Upstream | 0.417 | 16.000 | 0.58 | SWMF 007 | Pond Inflow |
| SWMF 007 OUTLET | Pond Outlet | Outflow | 0.318 | 17.500 | 0.46 | SWMF 007 | Pond Outflow |
| SWMF 007 OUTLET | Pond Outlet | Link | 0.318 | 17.500 | 0.46 | | |
| SWMF 007 OUTLET | Pond Outlet | Downstream | 0.337 | 18.050 | 0.48 | O-1 | |
| SWMF 010 TO SWMF 006 | Pond Outlet | Upstream | 1.960 | 16.050 | 2.85 | SWMF 006 | Pond Inflow |
| SWMF 010 TO SWMF 006 | Pond Outlet | Outflow | 0.424 | 24.000 | 0.51 | 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 | 4.155 | 16.100 | 6.21 | SWMF 010 | |

## Messages

| | |
|---|---|
| Message Id | 69 |
| Scenario | 100Yr 24Hr |
| Element Type | Pond |
| Element Id | 44 |
| Label | SWMF 006 |
| Time | (N/A) |
| Message | The pond has a diversion with both interconnected and level pool outlet structures. It is recommended that you use either all interconnected or all level pool outlet structures with a diversion from a pond. |
| Source | Warning |

# Table of Contents

# 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) | 0.250 hours |
| Area (User Defined) | 4.200 acres |

| | |
|---|---|
| Computational Time Increment | 0.033 hours |
| Time to Peak (Computed) | 16.000 hours |
| Flow (Peak, Computed) | 3.11 ft³/s |
| Output Increment | 0.050 hours |
| Time to Flow (Peak Interpolated Output) | 16.000 hours |
| Flow (Peak Interpolated Output) | 3.11 ft³/s |

| Drainage Area | |
|---|---|
| SCS CN (Composite) | 88.500 |
| Area (User Defined) | 4.200 acres |
| Maximum Retention (Pervious) | 1.3 in |
| Maximum Retention (Pervious, 20 percent) | 0.3 in |

| Cumulative Runoff | |
|---|---|
| Cumulative Runoff Depth (Pervious) | 7.2 in |
| Runoff Volume (Pervious) | 2.515 ac-ft |

| Hydrograph Volume (Area under Hydrograph curve) | |
|---|---|
| Volume | 2.507 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 | 19.04 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) | 20.380 acres |

| | |
|---|---|
| Computational Time Increment | 0.045 hours |
| Time to Peak (Computed) | 16.003 hours |
| Flow (Peak, Computed) | 14.93 ft³/s |
| Output Increment | 0.050 hours |
| Time to Flow (Peak Interpolated Output) | 16.000 hours |
| Flow (Peak Interpolated Output) | 14.93 ft³/s |

| Drainage Area | |
|---|---|
| SCS CN (Composite) | 87.100 |
| Area (User Defined) | 20.380 acres |
| Maximum Retention (Pervious) | 1.5 in |
| Maximum Retention (Pervious, 20 percent) | 0.3 in |

| Cumulative Runoff | |
|---|---|
| Cumulative Runoff Depth (Pervious) | 7.0 in |
| Runoff Volume (Pervious) | 11.918 ac-ft |

| Hydrograph Volume (Area under Hydrograph curve) | |
|---|---|
| Volume | 11.863 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 | 67.92 ft³/s |
| Unit peak time, Tp | 0.227 hours |

Subsection: Unit Hydrograph Summary
Label: 002

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

| 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) | 23.570 acres |

| | |
|---|---|
| Computational Time Increment | 0.044 hours |
| Time to Peak (Computed) | 15.972 hours |
| Flow (Peak, Computed) | 17.45 ft³/s |
| Output Increment | 0.050 hours |
| Time to Flow (Peak Interpolated Output) | 16.000 hours |
| Flow (Peak Interpolated Output) | 17.45 ft³/s |

| Drainage Area | |
|---|---|
| SCS CN (Composite) | 88.700 |
| Area (User Defined) | 23.570 acres |
| Maximum Retention (Pervious) | 1.3 in |
| Maximum Retention (Pervious, 20 percent) | 0.3 in |

| Cumulative Runoff | |
|---|---|
| Cumulative Runoff Depth (Pervious) | 7.2 in |
| Runoff Volume (Pervious) | 14.163 ac-ft |

| Hydrograph Volume (Area under Hydrograph curve) | |
|---|---|
| Volume | 14.100 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 | 80.93 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) | 0.083 hours |
| Area (User Defined) | 2.280 acres |

| | |
|---|---|
| Computational Time Increment | 0.011 hours |
| Time to Peak (Computed) | 16.000 hours |
| Flow (Peak, Computed) | 1.67 ft³/s |
| Output Increment | 0.050 hours |
| Time to Flow (Peak Interpolated Output) | 16.000 hours |
| Flow (Peak Interpolated Output) | 1.67 ft³/s |

| Drainage Area | |
|---|---|
| SCS CN (Composite) | 86.500 |
| Area (User Defined) | 2.280 acres |
| Maximum Retention (Pervious) | 1.6 in |
| Maximum Retention (Pervious, 20 percent) | 0.3 in |

| Cumulative Runoff | |
|---|---|
| Cumulative Runoff Depth (Pervious) | 6.9 in |
| Runoff Volume (Pervious) | 1.320 ac-ft |

| Hydrograph Volume (Area under Hydrograph curve) | |
|---|---|
| Volume | 1.318 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 | 31.00 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) | 0.380 hours |
| Area (User Defined) | 5.140 acres |

| | |
|---|---|
| Computational Time Increment | 0.051 hours |
| Time to Peak (Computed) | 16.011 hours |
| Flow (Peak, Computed) | 3.75 ft³/s |
| Output Increment | 0.050 hours |
| Time to Flow (Peak Interpolated Output) | 16.000 hours |
| Flow (Peak Interpolated Output) | 3.75 ft³/s |

| Drainage Area | |
|---|---|
| SCS CN (Composite) | 86.500 |
| Area (User Defined) | 5.140 acres |
| Maximum Retention (Pervious) | 1.6 in |
| Maximum Retention (Pervious, 20 percent) | 0.3 in |

| Cumulative Runoff | |
|---|---|
| Cumulative Runoff Depth (Pervious) | 6.9 in |
| Runoff Volume (Pervious) | 2.975 ac-ft |

| Hydrograph Volume (Area under Hydrograph curve) | |
|---|---|
| Volume | 2.959 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 | 15.33 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) | 2.39 ft³/s |
| Output Increment | 0.050 hours |
| Time to Flow (Peak Interpolated Output) | 16.000 hours |
| Flow (Peak Interpolated Output) | 2.39 ft³/s |

| Drainage Area | |
|---|---|
| SCS CN (Composite) | 91.100 |
| Area (User Defined) | 3.180 acres |
| Maximum Retention (Pervious) | 1.0 in |
| Maximum Retention (Pervious, 20 percent) | 0.2 in |

| Cumulative Runoff | |
|---|---|
| Cumulative Runoff Depth (Pervious) | 7.5 in |
| Runoff Volume (Pervious) | 1.987 ac-ft |

| Hydrograph Volume (Area under Hydrograph curve) | |
|---|---|
| Volume | 1.981 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) | 2.280 acres |

| | |
|---|---|
| Computational Time Increment | 0.033 hours |
| Time to Peak (Computed) | 16.000 hours |
| Flow (Peak, Computed) | 1.69 ft³/s |
| Output Increment | 0.050 hours |
| Time to Flow (Peak Interpolated Output) | 16.000 hours |
| Flow (Peak Interpolated Output) | 1.69 ft³/s |

| Drainage Area | |
|---|---|
| SCS CN (Composite) | 88.900 |
| Area (User Defined) | 2.280 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) | 1.375 ac-ft |

| Hydrograph Volume (Area under Hydrograph curve) | |
|---|---|
| Volume | 1.370 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 | 10.33 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) | 28.170 acres |

| | |
|---|---|
| Computational Time Increment | 0.063 hours |
| Time to Peak (Computed) | 16.043 hours |
| Flow (Peak, Computed) | 20.08 ft³/s |
| Output Increment | 0.050 hours |
| Time to Flow (Peak Interpolated Output) | 16.050 hours |
| Flow (Peak Interpolated Output) | 20.08 ft³/s |

| Drainage Area | |
|---|---|
| SCS CN (Composite) | 83.800 |
| Area (User Defined) | 28.170 acres |
| Maximum Retention (Pervious) | 1.9 in |
| Maximum Retention (Pervious, 20 percent) | 0.4 in |

| Cumulative Runoff | |
|---|---|
| Cumulative Runoff Depth (Pervious) | 6.6 in |
| Runoff Volume (Pervious) | 15.540 ac-ft |

| Hydrograph Volume (Area under Hydrograph curve) | |
|---|---|
| Volume | 15.436 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 | 67.91 ft³/s |
| Unit peak time, Tp | 0.313 hours |

Subsection: Unit Hydrograph Summary
Label: 010

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

| SCS Unit Hydrograph Parameters | |
|---|---|
| Unit receding limb, Tr | 1.253 hours |
| Total unit time, Tb | 1.567 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) | 11.200 acres |

| | |
|---|---|
| Computational Time Increment | 0.033 hours |
| Time to Peak (Computed) | 16.000 hours |
| Flow (Peak, Computed) | 7.72 ft³/s |
| Output Increment | 0.050 hours |
| Time to Flow (Peak Interpolated Output) | 16.000 hours |
| Flow (Peak Interpolated Output) | 7.72 ft³/s |

| Drainage Area | |
|---|---|
| SCS CN (Composite) | 80.000 |
| Area (User Defined) | 11.200 acres |
| Maximum Retention (Pervious) | 2.5 in |
| Maximum Retention (Pervious, 20 percent) | 0.5 in |

| Cumulative Runoff | |
|---|---|
| Cumulative Runoff Depth (Pervious) | 6.2 in |
| Runoff Volume (Pervious) | 5.751 ac-ft |

| Hydrograph Volume (Area under Hydrograph curve) | |
|---|---|
| Volume | 5.729 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 | 50.76 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 |

## 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 | 0.503 |
| 739.00 | 1.804 |
| 739.50 | 2.611 |
| 740.00 | 3.514 |
| 741.00 | 5.593 |

## Elevation-Volume

| Pond Elevation (ft) | Pond Volume (ac-ft) |
|---|---|
| 732.00 | 0.000 |
| 733.00 | 0.509 |
| 734.00 | 1.128 |
| 735.00 | 1.865 |
| 736.00 | 2.729 |
| 737.00 | 3.728 |
| 738.00 | 4.870 |
| 739.00 | 6.136 |

## Elevation-Volume

| Pond Elevation (ft) | Pond Volume (ac-ft) |
|---|---|
| 732.00 | 0.000 |
| 733.00 | 1.167 |
| 734.00 | 2.625 |
| 735.00 | 4.386 |
| 736.00 | 6.463 |
| 737.00 | 8.868 |
| 738.00 | 11.611 |
| 739.00 | 14.704 |

## Elevation-Volume

| Pond Elevation (ft) | Pond Volume (ac-ft) |
|---|---|
| 729.00 | 0.000 |
| 730.00 | 0.207 |
| 731.00 | 0.476 |
| 732.00 | 0.814 |
| 733.00 | 1.250 |
| 734.00 | 1.846 |
| 735.00 | 2.637 |
| 736.00 | 3.626 |
| 737.00 | 4.825 |

## Elevation-Volume

| Pond Elevation (ft) | Pond Volume (ac-ft) |
|---|---|
| 729.00 | 0.000 |
| 730.00 | 0.384 |
| 731.00 | 0.843 |
| 732.00 | 1.383 |
| 733.00 | 2.010 |
| 734.00 | 2.725 |
| 735.00 | 3.529 |
| 736.00 | 4.416 |
| 737.00 | 5.386 |

## Elevation-Volume

| Pond Elevation (ft) | Pond Volume (ac-ft) |
|---|---|
| 739.00 | 0.000 |
| 739.50 | 0.175 |
| 740.00 | 0.384 |
| 741.00 | 0.906 |

## 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 + Reverse | TW | 730.00 | 736.50 |
| Rectangular Weir | Weir - 1 | Forward + Reverse | TW | 735.90 | 736.50 |
| Tailwater Settings | Tailwater | | | (N/A) | (N/A) |

| Structure ID: Orifice - 1<br>Structure Type: Orifice-Circular | |
|---|---|
| Number of Openings | 1 |
| Elevation | 730.00 ft |
| Orifice Diameter | 9.0 in |
| Orifice Coefficient | 0.600 |

| Structure ID: Weir - 1<br>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 |

| 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<br>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<br>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<br>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<br>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<br>Structure Type: Orifice-Circular | |
|---|---|
| Number of Openings | 1 |
| Elevation | 731.80 ft |
| Orifice Diameter | 13.0 in |
| Orifice Coefficient | 0.600 |

| Structure ID: Weir - 1<br>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<br>Structure Type: Orifice-Circular | |
|---|---|
| Number of Openings | 1 |
| Elevation | 731.80 ft |
| Orifice Diameter | 7.0 in |
| Orifice Coefficient | 0.600 |

| Structure ID: Weir - 1<br>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<br>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<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 24.0 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 | 0.012 |
| 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 | 731.19 ft | T1 Flow | 15.55 ft³/s |
| T2 Elevation | 731.39 ft | T2 Flow | 17.77 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<br>Structure Type: Orifice-Circular | |
|---|---|
| Number of Openings | 1 |
| Elevation | 728.50 ft |
| Orifice Diameter | 3.4 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 |

| 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 | 740.50 | 741.00 |
| Tailwater Settings | Tailwater | | | (N/A) | (N/A) |

| Structure ID: Orifice - 1<br>Structure Type: Orifice-Circular | |
|---|---|
| Number of Openings | 1 |
| Elevation | 739.00 ft |
| Orifice Diameter | 7.0 in |
| Orifice Coefficient | 0.600 |

| Structure ID: Weir - 1<br>Structure Type: Rectangular Weir | |
|---|---|
| Number of Openings | 1 |
| Elevation | 740.50 ft |
| Weir Length | 20.00 ft |
| Weir Coefficient | 3.00 (ft^0.5)/s |

| Structure ID: TW<br>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 |

# Index

UPDATED 100YR 12HR-48HR (Time-Depth Curve, 100 years)...1

# TAB 4

# WETLAND ASSESSMENT

# EXHIBIT 4A

# WETLAND DELINEATION &

# ASSESSMENT REPORT

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