# STORM WATER REPORT

# FOR KANE COUNTY PUD

# PROPOSED SOLAR FACILITY ON 0 DIETRICH ROAD, HAMPSHIRE, KANE COUNTY, IL

Prepared for

**New Leaf Energy**
55 Technology Drive, Suite 102
Lowell, MA 01851

Prepared by

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9575 West Higgins Road, Suite 600
Rosemont, IL 60018
847-823-0500
CBBEL Project No. 230040.00070

*June 2024*

Edmund Burke
Illinois Registered Professional Engineer
No. 062-072858

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# LIST OF EXHIBITS



# LIST OF CALCULATIONS

# CHAPTER 1 PROJECT OVERVIEW

## 1.1 INTRODUCTION

New Leaf Energy, Inc. ("NLE"), along with Christopher B Burke Engineering, LTD ("CBBEL"), is requesting a Special Use Permit to allow for the development of a 4.99-megawatt AC community solar generating facility on approximately 30 acres of a 60-acre parent parcel, which consists of wooded and agricultural land, located at the northwest corner of Dietrich Road and Brier Hill Road in Hampshire.

NLE, through its affiliated CBBEL, proposes the development of a 4.99-megawatt AC solar photovoltaic system on a single parcel of land in Hampshire, Illinois, with the Assessor Parcel Number (APN) of 01-01-0100-002, (the "Project"). The project will consist of a single-axis tracking ground-mounted solar array, associated electrical equipment, an access driveway, and fencing.

## 1.2 PURPOSE

This memorandum summarizes the preliminary stormwater implications for a proposed solar array proposed to be constructed on 0 Dietrich Road. The site's general location is shown on Exhibit 1. The proposed solar array includes constructing a 29.5-acre solar field, including 0.42 acres of gravel access road and 0.05 acres of equipment pad for a total added impervious area of 0.47 acres (20,473 $ft^2$).

# CHAPTER 2 STORMWATER MANAGEMENT

## 2.1 EXISTING STORMWATER SYSTEM

Under current conditions, the site has two outfalls where surface runoff leaves the site. There are no closed systems within the site. The site is a mix of forest strips of land enclosing a mix of agricultural areas. The first outfall is a swale that leaves the agriculture field on the north side of the property at the location of an existing wetland without depressional storage. The second outfall is sheet flow reaching an existing wetland with depressional storage on the western side of the property. The FEMA FIRM maps indicated no regulatory floodplain onsite and are provided as Exhibit 4. There are two wetlands located at the outfalls of the project. The wetland locations are shown on Exhibit 3. The existing drainage plan is provided as Exhibit 2.

## 2.2 PROPOSED STORMWATER SYSTEM

As part of the proposed solar array, gravel roads, and equipment panels are proposed to be constructed. There will be minor tree/shrub clearing locations to construct the proposed fence line, and this total area is under 1 Acre. The ground cover in locations where solar panels are installed will be restored to a meadow seed type. Runoff rates will not be increased as part of the proposed improvements. Table 2-1 summarizes the proposed impacts. The added impervious area is under 25,000 $ft^2$ (0.47 Acres), and the overall hydrologically disturbed area is under 3 acres. Based on the ordinance table 9-81, no detention is required. The proposed drainage plans are provided as Exhibit 6.

| | | |
|---|---|---|
| Gravel Road Area | 0.42 | Acres |
| Equipment Pad | 0.05 | Acres |
| Total Impervious | 0.47 | Acres |
| | | |
| Tree Clearing | 0.5 | Acres |
| Total Hydrologically Disturbed Area | 0.97 | Acres |

Table 2-1 Impact Area Summary

An XP-SWMM model was created to verify that no runoff rate increase was observed. Supporting calculations/critical output are provided in the Appendix.

| | Existing Release Rate (CFS) | Proposed Release Rate (CFS) |
|---|---|---|
| Outlet 1 | 117.1 | 99.9 |
| Outlet 2 | 73.3 | 84.4 |

Table 2-2 Flow Summary

Additional Calculations include the PV-SMaRT calculator, indicating that the solar panels' construction does not drastically modify the runoff CN from the site, indicating that the complete site is not hydrologically disturbed.

## 2.3 PHOTOVOLTAIC STORMWATER MANAGEMENT RESEARCH AND TESTING (PV-SMART)

The Photovoltaic Stormwater Management Research and Testing project (PV-SMaRT) calculates the runoff differences between pre-development and post-development (Solar Array Construction). This calculator for stormwater management and water quality at ground-mounted solar sites was developed by the National Renewable Energy Laboratory ("NREL") in partnership with the University of Minnesota, Great Plains Institute, and Fresh Energy. PV-SMaRT factors in the impacts of precipitation hitting the panel and the infiltration of the adjacent land use. The program utilizes the worst-case scenario of panels at full tilt, causing the highest runoff velocity. PV-SMaRT's findings show 58% less runoff than the SCS Curve Number Method for sites with solar panels present with pollinator plantings.

This report includes PV-SMaRT findings as supplemental calculations (Calculations 3). The soil map included in Exhibit 5 shows where the inputs originated. This included utilizing the soil type, depth to restrictive layer, and bulk density from the USDA Natural Resources Conservation Service Web Soil Survey. Weighted values were calculated for the site as no boring data was available at the time of this submittal. For pre-construction calculations, existing vegetation was classified as poorly managed row crops. For post-construction calculations, panel spacing of 20 ft and panel width of 7 ft were inputted along with newly established pollinator vegetation.

Because the runoff CN is impacted so minimally, it was concluded that the overall site is not hydrologically disturbed.

## 2.4 BMPS

Table 9-107 indicates that Category 1 BMPs are required since the disturbed area is over 5,000 $ft^2$. The total BMP volume for the site is 1,706 $ft^3$. This is based on the added impervious area of 0.47 Acres. BMP Volumes were also calculated using PV-SMaRT for one inch of runoff. PV-SMaRT factors in the presence of solar panels and the change in land use to determine runoff that will be runoff from the solar field. This calculation shows a required value of 2105 $ft^3$. A proposed infiltration area is proposed to meet the required BMP volumes. The site is shown on the PDP.

# CHAPTER 3 FLOODPLAIN IMPACTS

The Flood Insurance Rate Map (FIRM) of Kane County, Illinois, and Incorporated Areas, map number 17089C0040H, effective date August 3, 2009, was reviewed to determine the location of regulatory floodplain within the study areas. The FIRM indicates that a 100-year regulatory floodplain is not mapped within the study area.

# CHAPTER 4 WETLAND IMPACTS

On December 13, 2023, Christopher B. Burke Engineering, Ltd. (CBBEL) completed a field investigation of the Dietrich Road Solar PV Array Project study area to determine the onsite wetland boundaries. Two (2) wetlands were identified within the study area using the U.S. Army Corps of Engineers Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (August 2010). The wetland boundaries were flagged and located with a handheld submeter GPS unit. The wetland locations are shown on Exhibit 3.

Wetland 1 consisted of a large pond of an unknown depth with a small, emergent wetland fringe and a rocky/muddy shoreline. Wetland 2 consisted of a depressional area with emergent vegetation located in the north/northwest portion of the project area.

The project limits are outside of all wetland buffers; therefore there will be no impact to either wetland onsite.

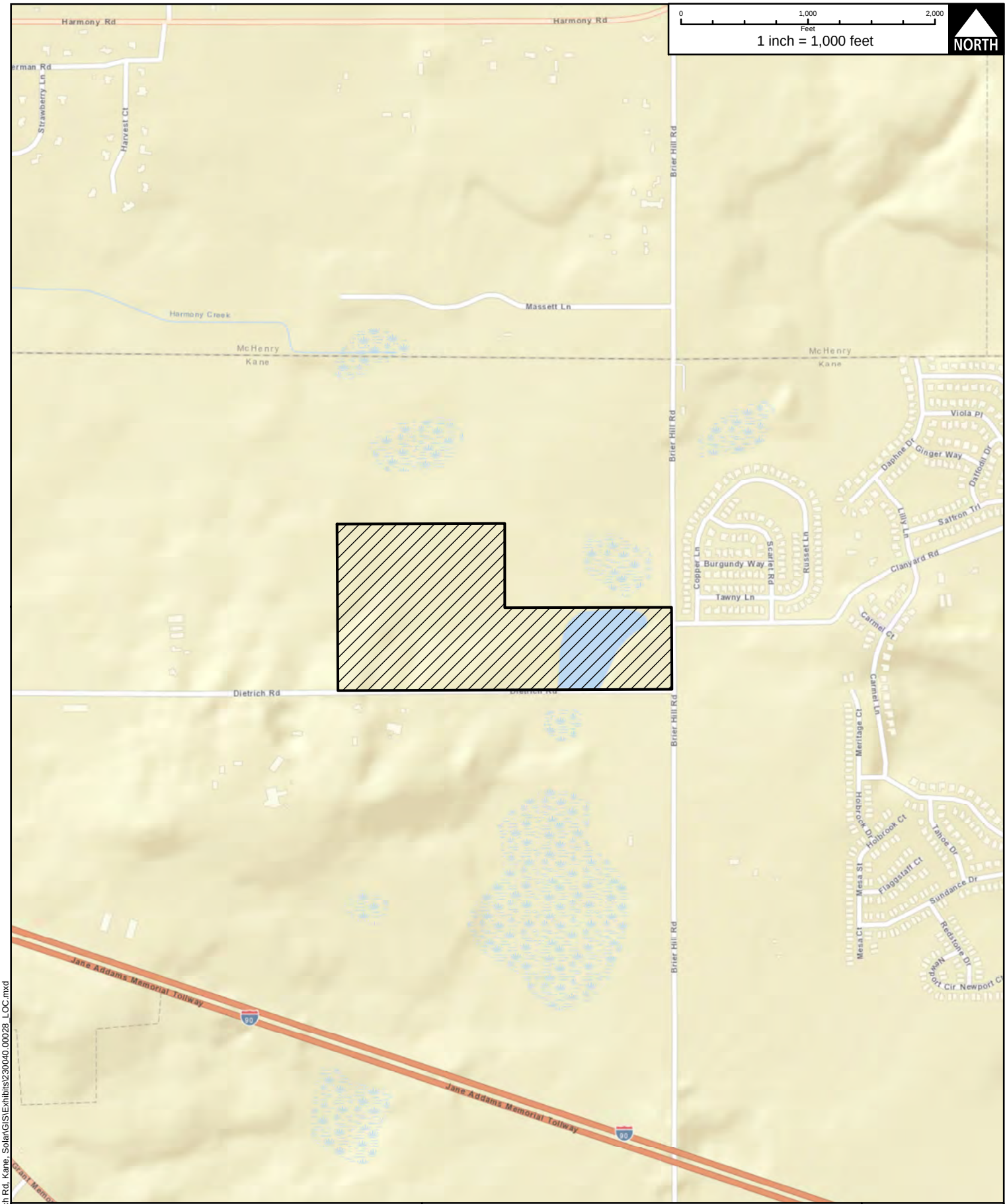
# CHAPTER 5 SUMMARY

The proposed solar system meets the requirements laid out in the Kane Stormwater Ordinance. BMP volume will be provided onsite via an infiltration basin. The permit will be submitted at a future date during the construction plan phase of the project.

# *Exhibits*

# *Exhibit 1*

# *General Location Map*




CLIENT:

NEW LEAF ENERGY

TITLE:

0 DIETRICH RD, HAMPSHIRE
LOCATION MAP

CBBEL# 23-0040.00028

DATE: 5/20/2023

EXH 1


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


| | | | | |
|---|---|---|---|---|
| DSGN. | | | SCALE: | 1 "= 1,000 ' |
| DWN. | KEK | | USER: | kkopija |
| CHKD. | JMA | | PLOT DATE: | 5/20/2023 |
| FILE NAME: | 230040.00028_LOC | | | |

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# *Exhibit 2*

# *Existing Drainage Map*

**LEGEND**

DRAINAGE BOUNDARY

SHEET FLOW

OUTLET

OUTLET 1
35.64 ACRES

PROPOSED PROJECT AREA

OUTLET 2
23.33 ACRES

BRIER HILLD ROAD

DIETRICH ROAD

N

100 0 100 200 300
SCALE IN FEET


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


CLIENT:

new leaf energy

30 CENTURY HILL, SUITE 301
LATHAM, NY 12110
PHONE: (888)898-6273
FAX: (888)843-6778
NEWLEAFENERGY.COM

| | | |
|---|---|---|
| DSGN. | | |
| DWN. | | |
| CHKD. | | |
| SCALE: | 200.00 ' / in. | |
| PLOT DATE: | 5/20/2024 | |
| CAD USER: | edburke | |
| FILE: | *FILE* | |
| MODEL: | Default | |

TITLE:

# EXISTING DRAINAGE PLAN
## 0 DIETRICH ROAD
## HAMPSHIRE, KANE COUNTY, ILLINOIS

| | |
|---|---|
| PROJ. NO. | 230040.00026 |
| DATE: | 05/15/24 |
| SHEET 1 | OF 1 |
| DRAWING NO. | EXH 2 |

FILE NAME *FILE*

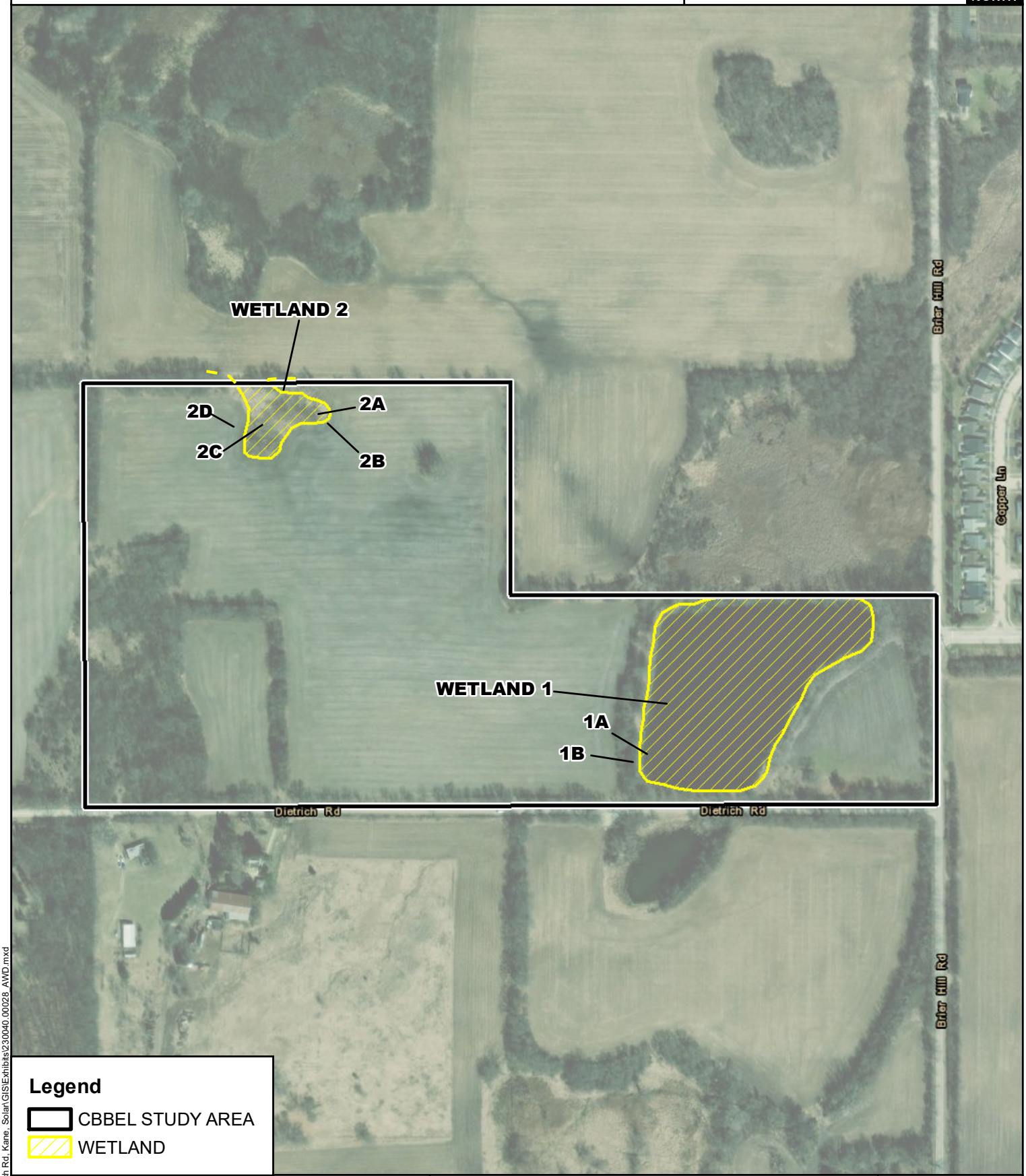
# *Exhibit 3*

# *Wetland Map*

NOTE: AERIAL PHOTOGRAPH TAKEN FROM ESRI WORLD IMAGERY, DATED: FEBRUARY 23, 2023
*JURISDICTIONAL STATUS & BUFFER WIDTHS ARE SUBJECT TO REGULATORY APPROVAL
SECTION 1, T42N, R6E / HAMPSHIRE, KANE COUNTY, ILLINOIS

0 400 800
Feet
1 inch = 400 feet

NORTH




**Legend**

- CBBEL STUDY AREA
- WETLAND

CLIENT:

**NEW LEAF ENERGY**

TITLE:

**0 DIETRICH RD, HAMPSHIRE**
**APPROXIMATE WETLAND DELINEATION**

CBBEL# 23-0040.00028
DATE: 12/14/2023

**EXH 3**


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


| | | | | |
|---|---|---|---|---|
| DSGN. | | | SCALE: | 1 "= 400 ' |
| DWN. | KEK | | USER: | rheller |
| CHKD. | JMA | | PLOT DATE: | 12/14/2023 |
| FILE NAME: | 230040.00028_AWD | | | |

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# *Exhibit 4*

# *Floodplain Map*

NOTE: TAKEN FROM THE FLOOD INSURANCE RATE MAP(FIRM), KANE COUNTY AND INCORPORATED AREAS, ILLINOIS, MAP NUMBER 17089C0040H, EFFECTIVE DATE: AUGUST 3, 2009

0 400 800
Feet
1 inch = 400 feet

NORTH

NO FLOODPLAIN MAPPED ON-SITE


CLIENT:

NEW LEAF ENERGY

TITLE:

0 DIETRICH RD, HAMPSHIRE
FLOOD INSURANCE RATE MAP

CBBEL# 23-0040.00028

DATE: 5/20/2023

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

| | | | | |
|---|---|---|---|---|
| DSGN. | | | SCALE: | 1 "= 400 ' |
| DWN. | KEK | | USER: | kkopija |
| CHKD. | JMA | | PLOT DATE: | 5/20/2023 |
| FILE NAME: | 230040.00028_FIRM | | | |

EXH **4**

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# *Exhibit 5*

# *Soils Map*

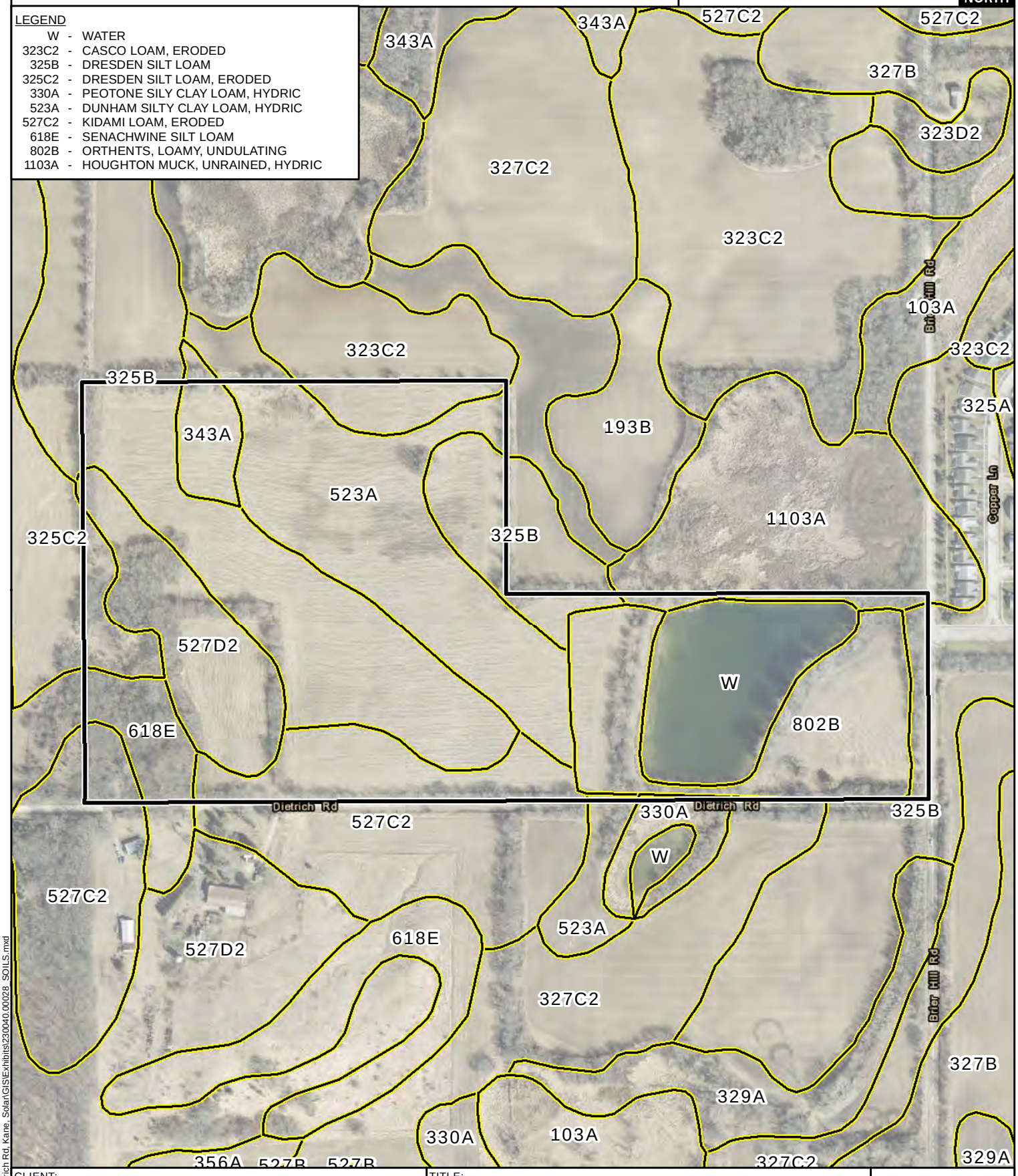
NOTE: TAKEN FROM THE SOIL SURVEY OF KANE COUNTY, ILLINOIS(2013)

0 400 800
Feet
1 inch = 400 feet

NORTH

LEGEND

| | | |
|---|---|---|
| W | - | WATER |
| 323C2 | - | CASCO LOAM, ERODED |
| 325B | - | DRESDEN SILT LOAM |
| 325C2 | - | DRESDEN SILT LOAM, ERODED |
| 330A | - | PEOTONE SILY CLAY LOAM, HYDRIC |
| 523A | - | DUNHAM SILTY CLAY LOAM, HYDRIC |
| 527C2 | - | KIDAMI LOAM, ERODED |
| 618E | - | SENACHWINE SILT LOAM |
| 802B | - | ORTHENTS, LOAMY, UNDULATING |
| 1103A | - | HOUGHTON MUCK, UNRAINED, HYDRIC |




CLIENT:

NEW LEAF ENERGY

TITLE:

0 DIETRICH RD, HAMPSHIRE
SOIL SURVEY

CBBEL# 23-0040.00028

DATE: 5/20/2023

EXH **5**


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


| | | | | |
|---|---|---|---|---|
| DSGN. | | | SCALE: | 1 "= 400 ' |
| DWN. | KEK | | USER: | kkopija |
| CHKD. | JMA | | PLOT DATE: | 5/20/2023 |
| FILE NAME: | 230040.00028_SOILS | | | |

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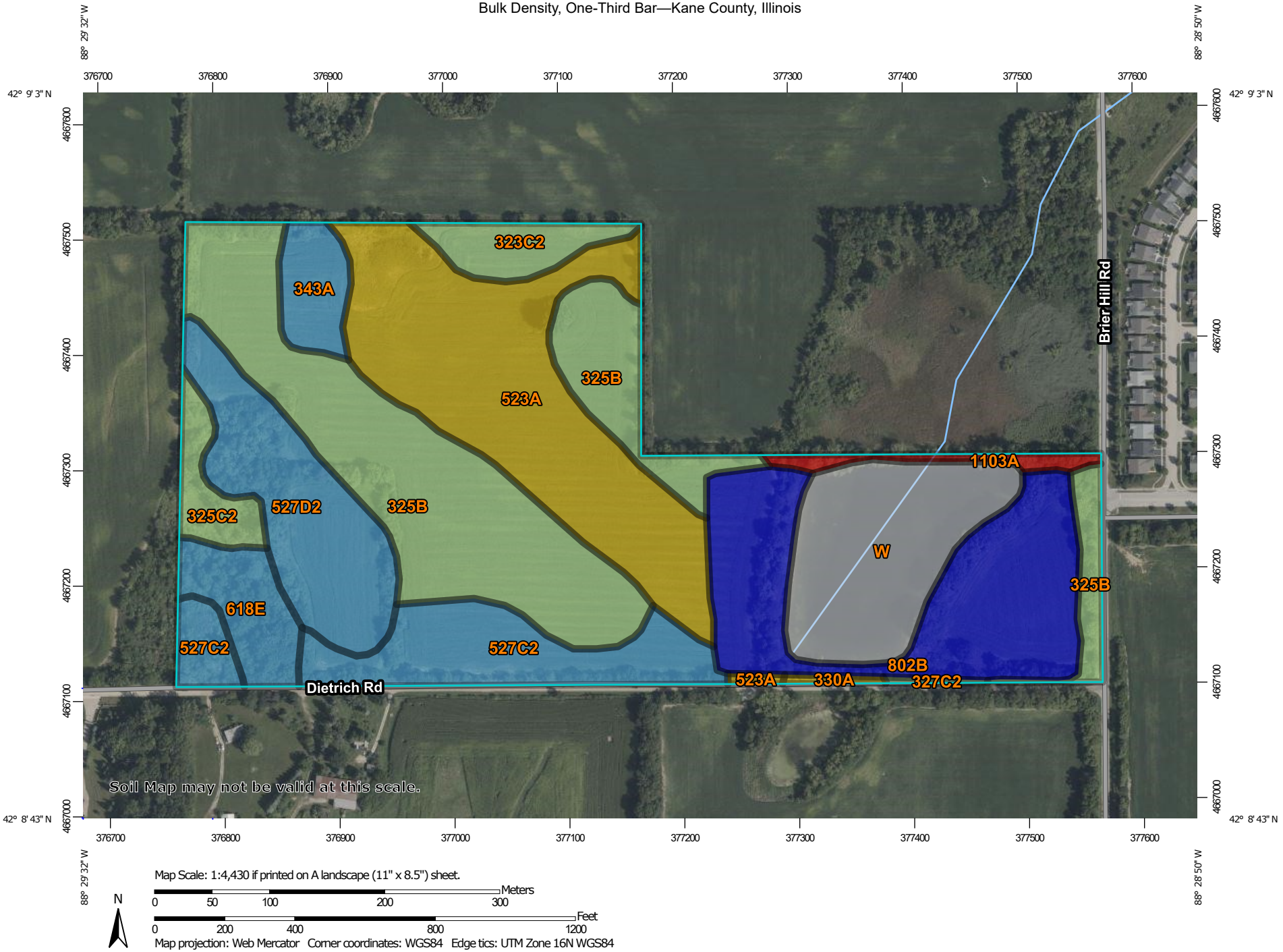

88° 29' 32" W
88° 28' 50" W
42° 9' 3" N
42° 8' 43" N
376700
376800
376900
377000
377100
377200
377300
377400
377500
377600
4667600
4667500
4667400
4667300
4667200
4667100
4667000
323C2
343A
325B
523A
325B
1103A
325C2
527D2
325B
W
325B
618E
527C2
527C2
802B
523A
330A
327C2
Brier Hill Rd
Dietrich Rd
Soil Map may not be valid at this scale.
Map Scale: 1:4,430 if printed on A landscape (11" x 8.5") sheet.
N
0 50 100 200 300 Meters
0 200 400 800 1200 Feet
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 Rating Polygons**

- <= 0.21
- > 0.21 and <= 1.45
- > 1.45 and <= 1.56
- > 1.56 and <= 1.61
- > 1.61 and <= 1.75
- Not rated or not available

**Soil Rating Lines**

- <= 0.21
- > 0.21 and <= 1.45
- > 1.45 and <= 1.56
- > 1.56 and <= 1.61
- > 1.61 and <= 1.75
- Not rated or not available

**Soil Rating Points**

- <= 0.21
- > 0.21 and <= 1.45
- > 1.45 and <= 1.56
- > 1.56 and <= 1.61
- > 1.61 and <= 1.75
- Not rated or not available

**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: Kane County, Illinois
Survey Area Data: Version 17, Aug 28, 2023

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

Date(s) aerial images were photographed: Aug 19, 2022—Sep 1, 2023

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.

# Bulk Density, One-Third Bar

| Map unit symbol | Map unit name | Rating (grams per cubic centimeter) | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| 323C2 | Casco loam, 4 to 6 percent slopes, eroded | 1.56 | 1.6 | 2.6% |
| 325B | Dresden silt loam, 2 to 4 percent slopes | 1.54 | 14.9 | 24.9% |
| 325C2 | Dresden silt loam, 4 to 6 percent slopes, eroded | 1.54 | 1.3 | 2.3% |
| 327C2 | Fox silt loam, 4 to 6 percent slopes, eroded | 1.56 | 0.1 | 0.1% |
| 330A | Peotone silty clay loam, 0 to 2 percent slopes | 1.43 | 0.1 | 0.2% |
| 343A | Kane silt loam, 0 to 2 percent slopes | 1.58 | 1.5 | 2.6% |
| 523A | Dunham silty clay loam, 0 to 2 percent slopes | 1.45 | 11.7 | 19.7% |
| 527C2 | Kidami loam, 4 to 6 percent slopes, eroded | 1.59 | 5.4 | 9.1% |
| 527D2 | Kidami loam, 6 to 12 percent slopes, eroded | 1.61 | 5.6 | 9.5% |
| 618E | Senachwine silt loam, 12 to 20 percent slopes | 1.61 | 2.1 | 3.5% |
| 802B | Orthents, loamy, 1 to 6 percent slopes | 1.75 | 8.3 | 14.0% |
| 1103A | Houghton muck, undrained, 0 to 2 percent slopes | 0.21 | 0.7 | 1.2% |
| W | Water | | 6.2 | 10.3% |
| **Totals for Area of Interest** | | | **59.6** | **100.0%** |

## Description

Bulk density, one-third bar, is the ovendry weight of the soil material less than 2 millimeters in size per unit volume of soil at water tension of 1/3 bar, expressed in grams per cubic centimeter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

## Rating Options

*Units of Measure:* grams per cubic centimeter

*Aggregation Method:* Dominant Component

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Higher

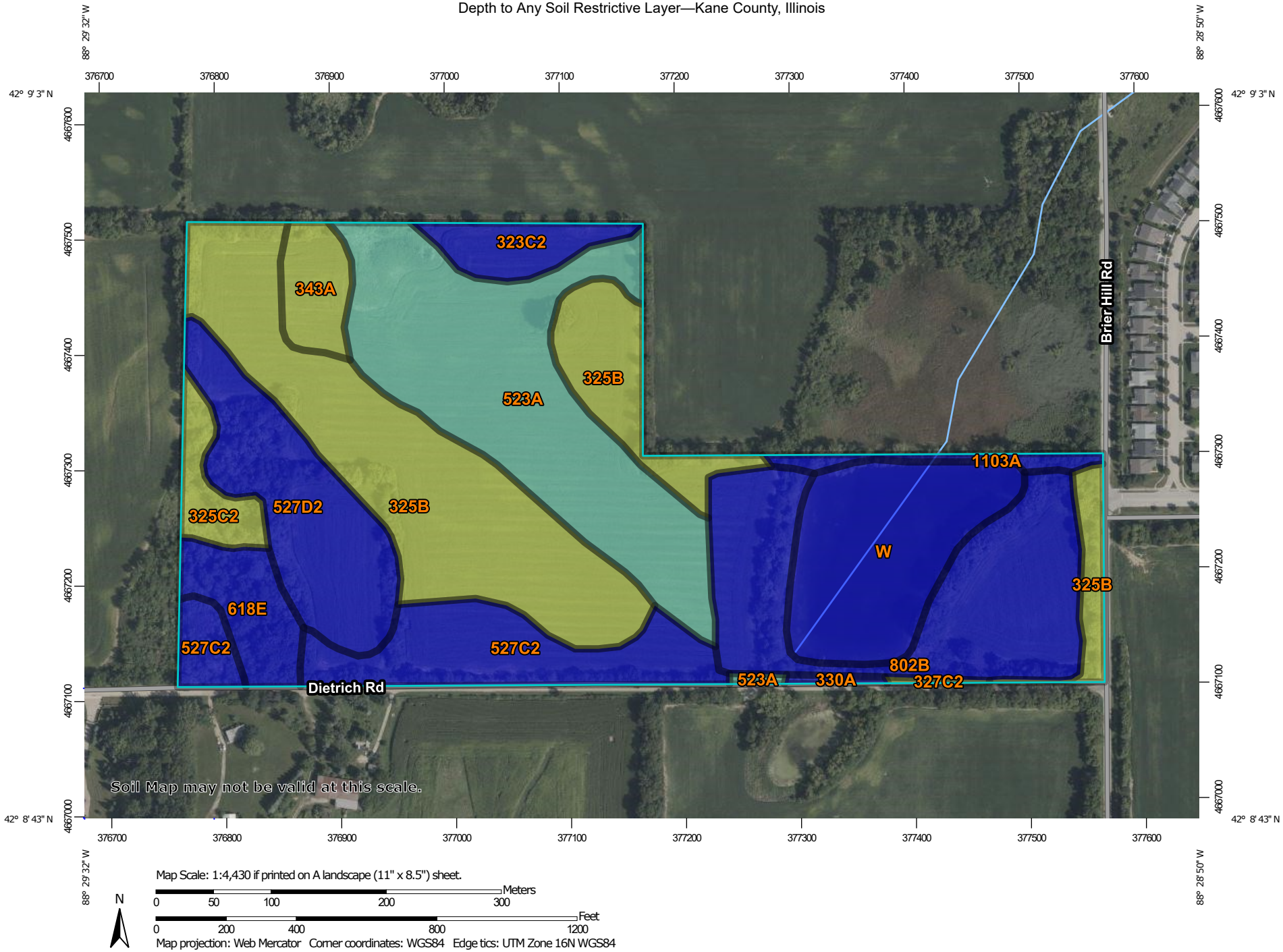
*Interpret Nulls as Zero:* No

*Layer Options (Horizon Aggregation Method):* Depth Range (Weighted Average)

*Top Depth:* 0

*Bottom Depth:* 60

*Units of Measure:* Inches




Map Scale: 1:4,430 if printed on A landscape (11" x 8.5") sheet.

N

0 50 100 200 300 Meters

0 200 400 800 1200 Feet

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 Rating Polygons**

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

**Soil Rating Lines**

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

**Soil Rating Points**

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

**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: Kane County, Illinois
Survey Area Data: Version 17, Aug 28, 2023

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

Date(s) aerial images were photographed: Aug 19, 2022—Sep 1, 2023

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.

# Depth to Any Soil Restrictive Layer

| Map unit symbol | Map unit name | Rating (centimeters) | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| 323C2 | Casco loam, 4 to 6 percent slopes, eroded | >200 | 1.6 | 2.6% |
| 325B | Dresden silt loam, 2 to 4 percent slopes | 81 | 14.9 | 24.9% |
| 325C2 | Dresden silt loam, 4 to 6 percent slopes, eroded | 79 | 1.3 | 2.3% |
| 327C2 | Fox silt loam, 4 to 6 percent slopes, eroded | 81 | 0.1 | 0.1% |
| 330A | Peotone silty clay loam, 0 to 2 percent slopes | >200 | 0.1 | 0.2% |
| 343A | Kane silt loam, 0 to 2 percent slopes | 74 | 1.5 | 2.6% |
| 523A | Dunham silty clay loam, 0 to 2 percent slopes | 112 | 11.7 | 19.7% |
| 527C2 | Kidami loam, 4 to 6 percent slopes, eroded | >200 | 5.4 | 9.1% |
| 527D2 | Kidami loam, 6 to 12 percent slopes, eroded | >200 | 5.6 | 9.5% |
| 618E | Senachwine silt loam, 12 to 20 percent slopes | >200 | 2.1 | 3.5% |
| 802B | Orthents, loamy, 1 to 6 percent slopes | >200 | 8.3 | 14.0% |
| 1103A | Houghton muck, undrained, 0 to 2 percent slopes | >200 | 0.7 | 1.2% |
| W | Water | >200 | 6.2 | 10.3% |
| **Totals for Area of Interest** | | | **59.6** | **100.0%** |

## Description

A "restrictive layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

This theme presents the depth to any type of restrictive layer that is described for each map unit. If more than one type of restrictive layer is described for an individual soil type, the depth to the shallowest one is presented. If no restrictive layer is described in a map unit, it is represented by the "greater than 200" depth class.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

## Rating Options

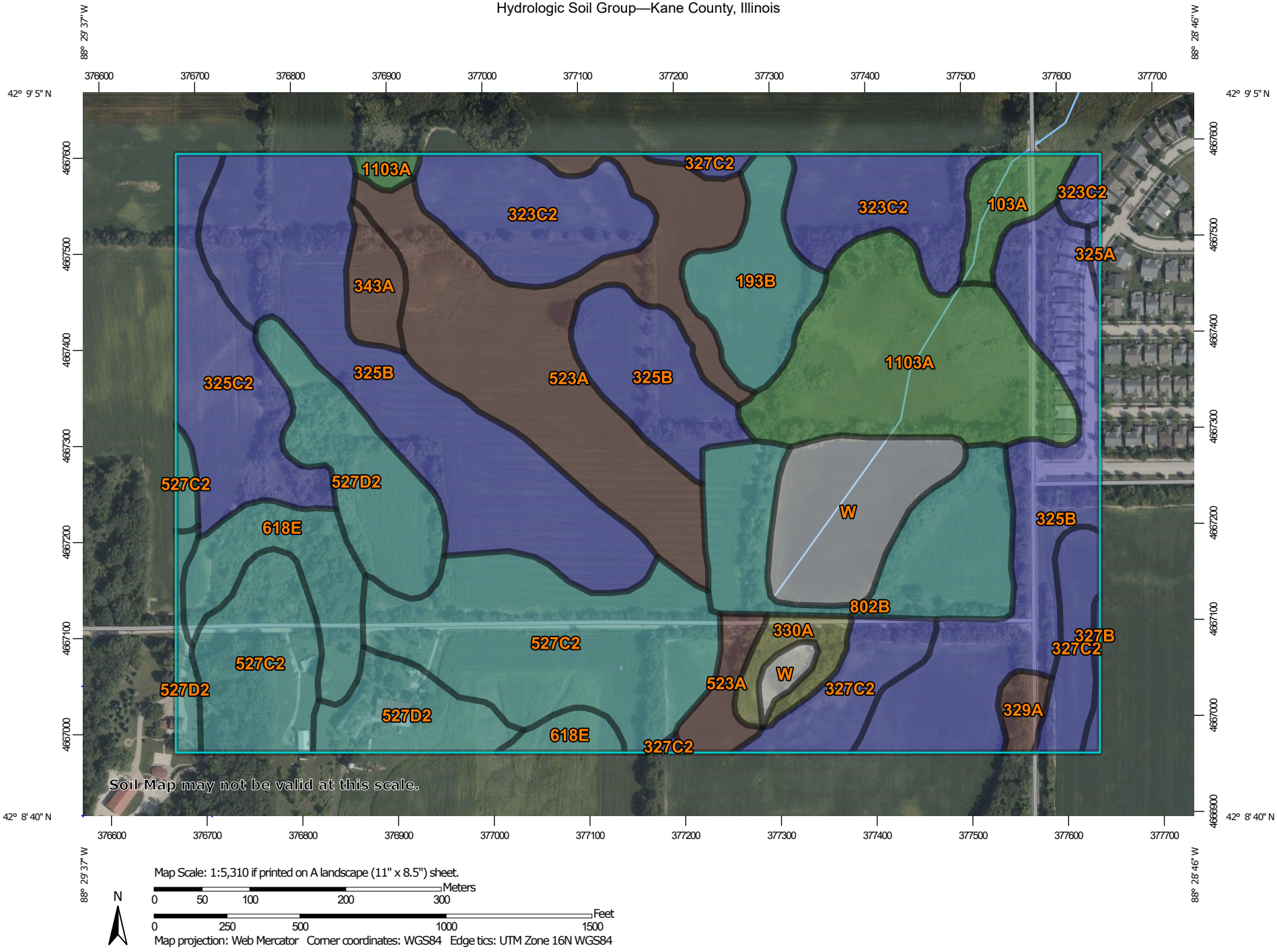
*Units of Measure:* centimeters

*Aggregation Method:* Dominant Component

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Lower

*Interpret Nulls as Zero:* No




Map Scale: 1:5,310 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

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 Rating Polygons**

A

A/D

B

B/D

C

C/D

D

Not rated or not available

**Soil Rating Lines**

A

A/D

B

B/D

C

C/D

D

Not rated or not available

**Soil Rating Points**

A

A/D

B

B/D

C

C/D

D

Not rated or not available

**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: Kane County, Illinois
Survey Area Data: Version 17, Aug 28, 2023

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

Date(s) aerial images were photographed: Aug 19, 2022—Sep 1, 2023

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.

# Hydrologic Soil Group

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| 103A | Houghton muck, 0 to 2 percent slopes | A/D | 2.2 | 1.5% |
| 193B | Mayville silt loam, 2 to 5 percent slopes | C | 4.8 | 3.2% |
| 323C2 | Casco loam, 4 to 6 percent slopes, eroded | B | 11.8 | 7.9% |
| 325A | Dresden silt loam, 0 to 2 percent slopes | B | 0.2 | 0.1% |
| 325B | Dresden silt loam, 2 to 4 percent slopes | B | 32.1 | 21.5% |
| 325C2 | Dresden silt loam, 4 to 6 percent slopes, eroded | B | 7.1 | 4.8% |
| 327B | Fox silt loam, 2 to 4 percent slopes | B | 0.3 | 0.2% |
| 327C2 | Fox silt loam, 4 to 6 percent slopes, eroded | B | 6.1 | 4.1% |
| 329A | Will loam, 0 to 2 percent slopes | B/D | 0.9 | 0.6% |
| 330A | Peotone silty clay loam, 0 to 2 percent slopes | C/D | 1.7 | 1.2% |
| 343A | Kane silt loam, 0 to 2 percent slopes | B/D | 1.7 | 1.2% |
| 523A | Dunham silty clay loam, 0 to 2 percent slopes | B/D | 18.1 | 12.1% |
| 527C2 | Kidami loam, 4 to 6 percent slopes, eroded | C | 18.5 | 12.4% |
| 527D2 | Kidami loam, 6 to 12 percent slopes, eroded | C | 10.3 | 6.9% |
| 618E | Senachwine silt loam, 12 to 20 percent slopes | C | 5.6 | 3.7% |
| 802B | Orthents, loamy, 1 to 6 percent slopes | C | 8.3 | 5.6% |
| 1103A | Houghton muck, undrained, 0 to 2 percent slopes | A/D | 12.7 | 8.5% |
| W | Water | | 6.8 | 4.5% |
| **Totals for Area of Interest** | | | **149.3** | **100.0%** |

## Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Higher

# *Exhibit 6*

# *Proposed Drainage Plan*

**LEGEND**

DRAINAGE BOUNDARY

SHEET FLOW

OUTLET

OUTLET 1
35.64 ACRES

PROPOSED BMP AREA

PROPOSED PROJECT AREA

OUTLET 2
23.33 ACRES

BRIER HILLD ROAD

DIETRICH ROAD

PROPOSED CHAIN LINK FENCE

N

100 0 100 200 300
SCALE IN FEET


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


CLIENT:

new leaf energy

30 CENTURY HILL, SUITE 301
LATHAM, NY 12110
PHONE: (888)898-6273
FAX: (888)843-6778
NEWLEAFENERGY.COM

| | | |
|---|---|---|
| DSGN. | | |
| DWN. | | |
| CHKD. | | |
| SCALE: | 200.00 ' / In. | |
| PLOT DATE: | 6/12/2024 | |
| CAD USER: | cdburke | |
| FILE: | %FILEN% | |
| MODEL: | Default | |

TITLE:

# PROPOSED DRAINAGE PLAN
## 0 DIETRICH ROAD
## HAMPSHIRE, KANE COUNTY, ILLINOIS

| | |
|---|---|
| PROJ. NO. | 230040.00028 |
| DATE: | 05/15/24 |
| SHEET 1 | OF 1 |
| DRAWING NO. | EXH 5 |

FILE NAME %FILE%

# *Calculations 1*

# *BMPs*

Solar Runoff Requirements

Dietrich BMP Volumes

NLE

| | | |
|---|---|---|
| By: | EMB | 6/12/2024 |
| Checked: | TAF | 6/13/2024 |

| **County Requirements** | | |
|---|---|---|
| County: | Kane | |
| Runoff: | 1 | Inch |
| Added Impervious | 0.47 | Acres |
| Required Volume | 1706.1 | cu. Feet |

| **PV-SMaRT** | | |
|---|---|---|
| Post Conditions runoff depth for 1" of rainfall | 0.02 | inches |
| Total Site | 29 | Acres |
| Required Volume | 2105.4 | cu. Feet |

| **BMP Summary** | | |
|---|---|---|
| County | 1706.1 | cu. Feet |
| PV-SMaRT | 2105.4 | cu. Feet |
| Provided | 2868 | cu. Feet |

# BMP Runoff Depth

| | |
|---|---|
| Soil Texture | Silt Loam |
| Soil Depth (inches) | 46 |
| Bulk Density (g/cm$^3$) | 1.53 |
| Vegetation Present | Newly Established Pollinator |
| Are Solar Panels Present? | YES |
| Panel Width (feet) | 7 |
| Panel Spacing (feet) | 20 |
| Array Orientation | Combination |
| Percent Slope | 4 |

***BLUE CELLS REQUIRE USER INPUT***

***MAROON CELLS REPRESENT TOOL OUTPUTS***

| | |
|---|---|
| Runoff Curve Number | 72.8 |
| 24-Hr Precip Event (inches) | 1.00 |
| Expected Runoff (inches) | 0.02 |

## *Proposed Conditions*
## *ELEVATION-STORAGE RELATIONSHIP*

***POND:*** Outlet 1
***JOB NO.*** NLE 00028
***PROJECT:*** Kne County
***FILE:*** N:\NewLeaf\230040.00028 - 0 Dietrich Rd, Kane, Solar\Drain\Spreadsheets\[NLE 00028 - Stage -Storage.xlsx]STO
***DATE:*** 12-Jun-24

***SIDE SLOPES:*** 4:1 (H:V)

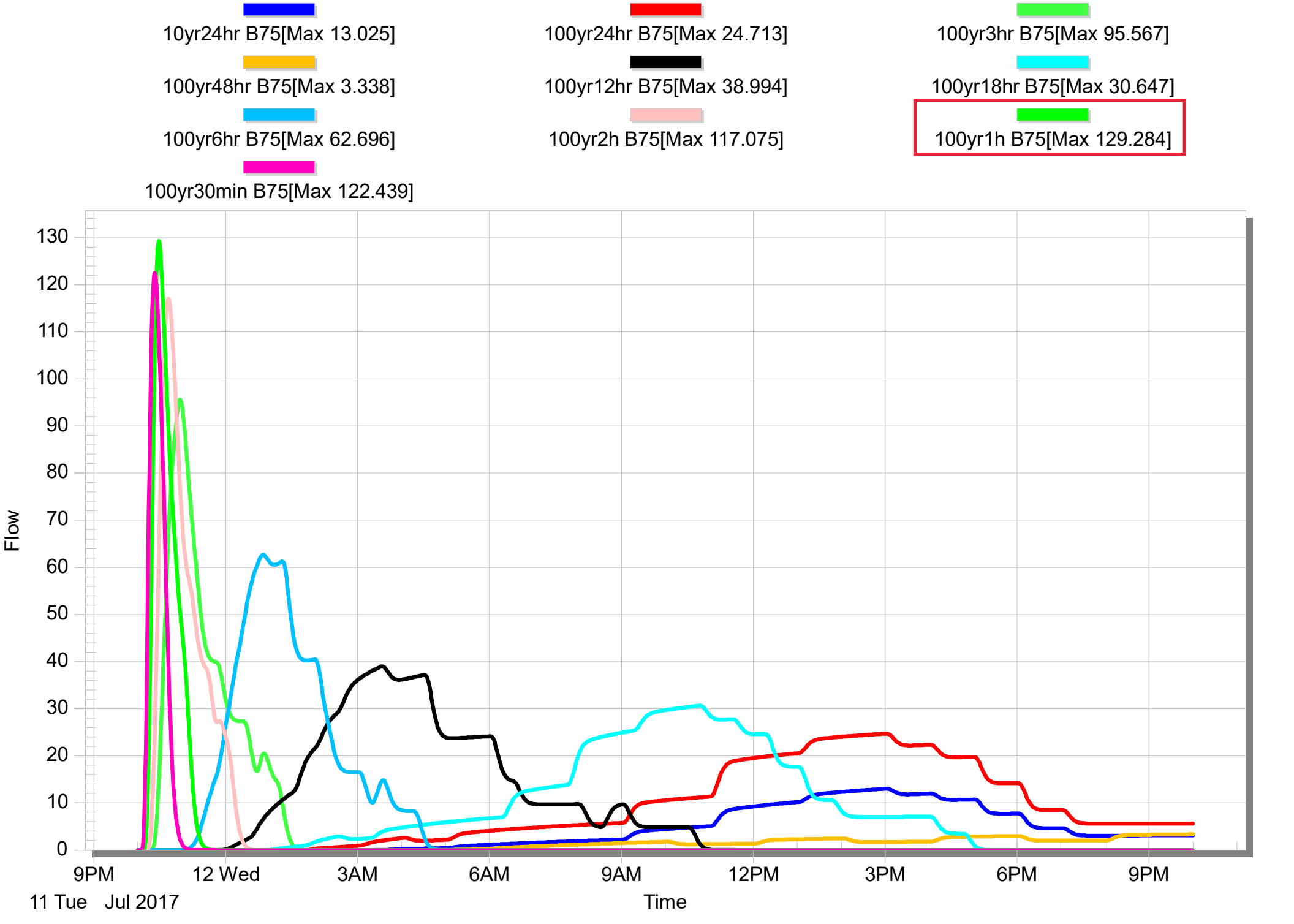
| ELEVATION (ft) | | AREA (s.f.) | AREA (ac) | AVERAGE AREA (ac) | Δ ELEVATION (ft) | INCREMENTAL STORAGE (ac-ft) | CUMULATIVE STORAGE (ac-ft) |
|---|---|---|---|---|---|---|---|
| 892.00 | NWL | - | 0.055 | | | | 0.00 |
| | | | | 0.066 | 1.00 | 0.066 | |
| 893.00 | | - | 0.077 | | | | 0.07 |

Total Volume in Cubic Feet 2868.43

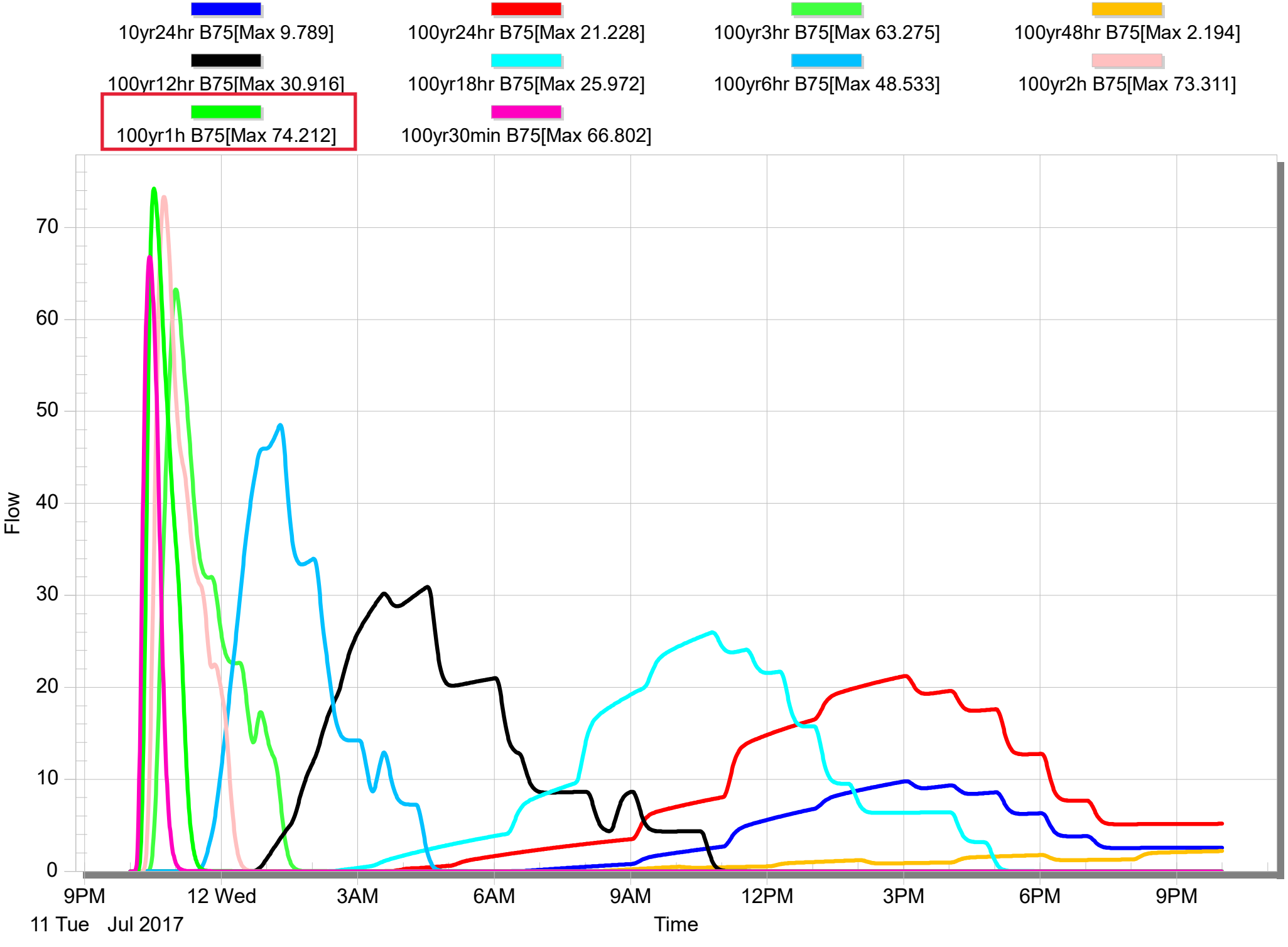
# *Calculations 2*

# *XP-SWMM*

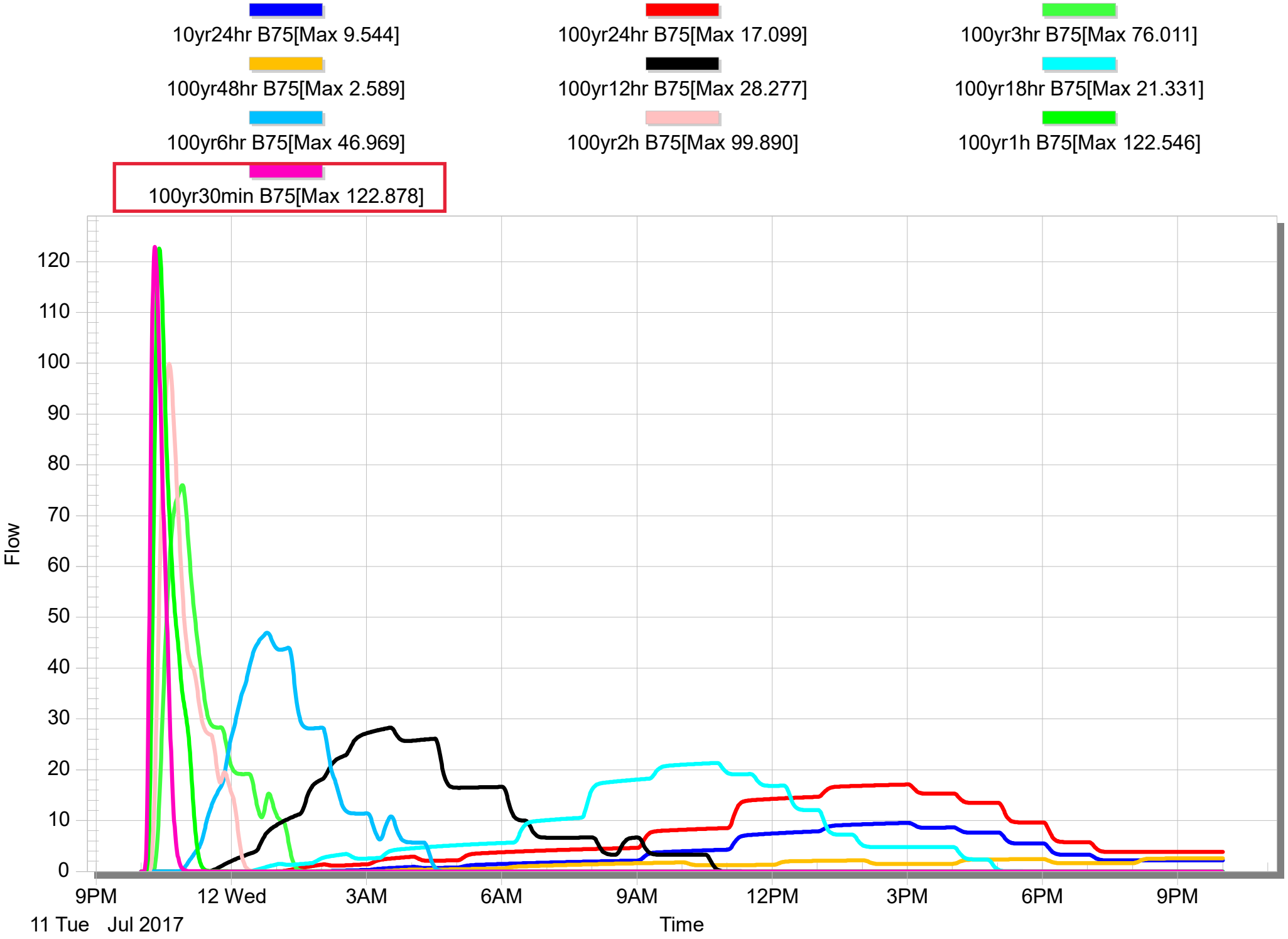
# Node - Outlet 1



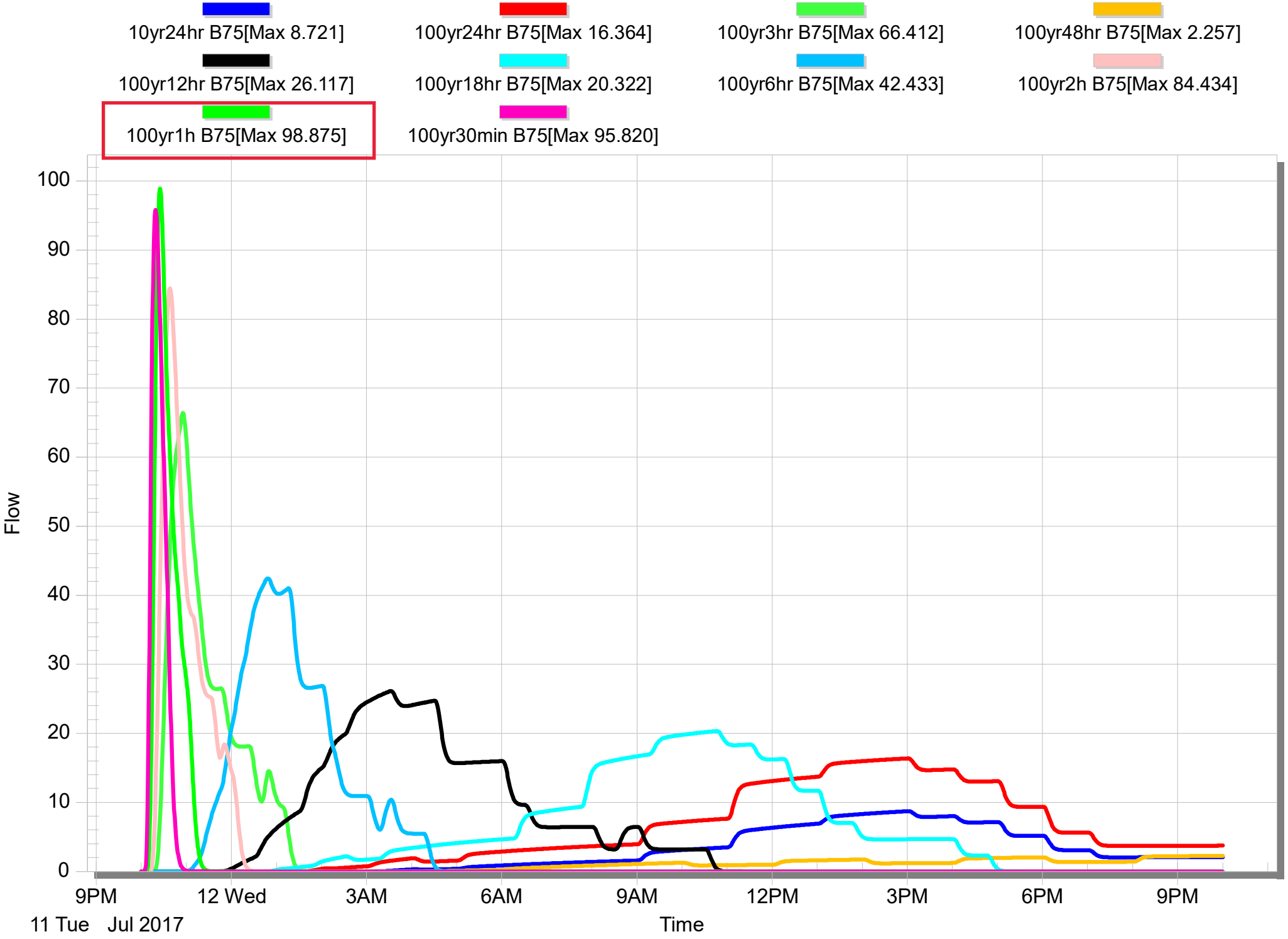
# Node - Outlet 1 Proposed



# Node - Outlet 2



# Node - Outlet 2 Proposed



Prepared by MA

# Time of Concentration (Tc) or Travel Time (Tt)

Project: NLE Dietrich Road | By: EMB | Date: 5/15/2024
Location: Kane County | Checked: | Date:
File: N:\NewLeaf\230040.00028 - 0 Dietrich Rd,

(Present) / Developed

Tc through subarea: To Outlet 2

## SHEET FLOW

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Segment ID | A | | | | | | |
| Surface Description (table 3-1) | | Grass | | | | | | |
| Manning's roughness coeff., n | | 0.24 | | | | | | |
| Flow Length, L (total L ≤ 100') | (ft) | 100 | | | | | | |
| Two-yr 24-hr rainfall, P2 (Bulletin 75) | (in) | 3.34 | | | | | | |
| Land slope, s | (ft/ft) | 0.04 | | | | | | |
| Tt = (0.007(nL)0.8)/(P20.5 s0.4) | (hr) | 0.18 | + | | | | = | 0.18 hr |

## SHALLOW CONCENTRATED FLOW

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Segment ID | B | | | | | | | | |
| Surface Description (paved or unpaved) | | unpaved | | | | | | | | |
| Flow Length, L | (ft) | 942 | | | | | | | | |
| Watercourse slope, s | (ft/ft) | 0.0276 | | | | | | | | |
| Average velocity, V | (ft/s) | 2.68 | | | | | | | | |
| Tt = L / 3600 V | (hr) | 0.10 | + | | + | | + | | = | 0.10 hr |

## CHANNEL FLOW

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Segment ID | C | | | | | | | | |
| Cross-sectional flow area, a | (ft2) | | | | | | | | | |
| Wetted perimeter, Pw | (ft) | | | | | | | | | |
| Hydraulic radius, r = a/Pw | (ft) | | | | | | | | | |
| Channel slope, s | (ft/ft) | | | | | | | | | |
| Manning's roughness coeff., n | | 0.05 | | | | | | | | |
| V = (1.49 r0.667 s0.5) / n | (ft/s) | 3.00 | | | | | | | | |
| Flow length, L | (ft) | 0 | | | | | | | | |
| Tt = L / 3600 V | (hr) | 0.0000 | + | | | | | | = | 0.00 hr |

**Watershed or subarea Tc or Tt** = 0.28 hr

17 min

Prepared by MA

# Time of Concentration (Tc) or Travel Time (Tt)

Project: NLE Dietrich Road  By: EMB  Date: 5/15/2024
Location: Kane County  Checked:  Date:
File: N:\NewLeaf\230040.00028 - 0 Dietrich Rd,

(Present / Developed)
Tc through subarea To Outlet 1

## SHEET FLOW

| | | Segment ID | A | | |
|---|---|---|---|---|---|
| Surface Description (table 3-1) | | | Grass | | |
| Manning's roughness coeff., n | | | 0.24 | | |
| Flow Length, L (total L ≤ 100') | (ft) | | 100 | | |
| Two-yr 24-hr rainfall, P2 (Bulletin 75) | (in) | | 3.34 | | |
| Land slope, s | (ft/ft) | | 0.07 | | |
| Tt = (0.007(nL)0.8)/(P20.5 s0.4) | (hr) | | 0.14 | + | = 0.14 hr |

## SHALLOW CONCENTRATED FLOW

| | | Segment ID | B | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Surface Description (paved or unpaved) | | | unpaved | | | | | | |
| Flow Length, L | (ft) | | 1024 | | | | | | |
| Watercourse slope, s | (ft/ft) | | 0.06836 | | | | | | |
| Average velocity, V | (ft/s) | | 4.22 | | | | | | |
| Tt = L / 3600 V | (hr) | | 0.07 | + | | + | | + | = 0.07 hr |

## CHANNEL FLOW

| | | Segment ID | C | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Cross-sectional flow area, a | (ft2) | | | | | | | | |
| Wetted perimeter, Pw | (ft) | | | | | | | | |
| Hydraulic radius, r = a/Pw | (ft) | | | | | | | | |
| Channel slope, s | (ft/ft) | | | | | | | | |
| Manning's roughness coeff., n | | | 0.05 | | | | | | |
| V = (1.49 r0.667 s0.5) / n | (ft/s) | | 3.00 | | | | | | |
| Flow length, L | (ft) | | 0 | | | | | | |
| Tt = L / 3600 V | (hr) | | 0.0000 | + | | | | | = 0.00 hr |

**Watershed or subarea Tc or Tt** = 0.21 hr
13 min

**Runoff Curve Number**

Project: NLE 00028 By: EMB Date: 5/15/2024
Location: Kane County Checked: Date:
File: N:\NewLeaf\230040.00028 - 0 Dietrich Rd, Ka

Circle One: (EXISTING) PROPOSED Description: To Oulet 1

| Soil Name and Hydrologic Group (Appendix A) | Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio) | Curve Number Table 2-2 | Fig. 2-3 | Fig. 2-4 | Area X acres / sq. mi. / % | Product of Curve Number and Area |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| B | Row Crop SR | 78 | | | 11.83 | 922.74 |
| C | Row Crop SR | 85 | | | 4.18 | 355.3 |
| D | Row Crop SR | 89 | | | 10.59 | 942.51 |
| - | Roadway | 98 | | | 0.15 | 14.7 |
| - | Water | 98 | | | | 0 |
| B | Woods | 60 | | | 2.55 | 153 |
| C | Woods | 73 | | | 5.97 | 435.81 |
| D | Woods | 79 | | | 0.37 | 29.23 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | **Totals =** | 35.640 | 2853.29 |

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{2853.3}{35.64} = \underline{80.06}$

Use CN = **80**

**Runoff Curve Number**

Project: NLE 00028 By: EMB Date: 5/15/2024
Location: Kane County Checked: Date:
File: N:\NewLeaf\230040.00028 - 0 Dietrich Rd, Ka

Circle One: (EXISTING) PROPOSED Description: To Oulet 1

| Soil Name and Hydrologic Group (Appendix A) | Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio) | Curve Number Table 2-2 | Fig. 2-3 | Fig. 2-4 | Area X acres / sq. mi. / % | Product of Curve Number and Area |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| B | Row Crop SR | 78 | | | 1.87 | 145.86 |
| C | Row Crop SR | 85 | | | 4.74 | 402.9 |
| D | Row Crop SR | 89 | | | 2.23 | 198.47 |
| - | Roadway | 98 | | | 0.58 | 56.84 |
| - | Water | 98 | | | 6.64 | 650.72 |
| B | Woods | 60 | | | | 0 |
| C | Woods | 73 | | | 3.32 | 242.36 |
| D | Woods | 79 | | | 0.3 | 23.7 |
| C | Open Space | 79 | | | 3.65 | 288.35 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | **Totals =** | 23.330 | 2009.2 |

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{2009.2}{23.33} = 86.12$

Use CN = **86**

**Runoff Curve Number**

Project: NLE 00028 By: EMB Date: 5/15/2024
Location: Kane County Checked: Date:
File: N:\NewLeaf\230040.00028 - 0 Dietrich Rd, Ka

Circle One: EXISTING (PROPOSED) Description: To Oulet 1

| Soil Name and Hydrologic Group (Appendix A) | Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio) | Curve Number Table 2-2 | Fig. 2-3 | Fig. 2-4 | Area X acres / sq. mi. / % | Product of Curve Number and Area |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| B | Meadow | 58 | | | 11.58 | 671.64 |
| C | Meadow | 71 | | | 4.18 | 296.78 |
| D | Meadow | 78 | | | 10.59 | 826.02 |
| - | Roadway | 98 | | | 0.4 | 39.2 |
| - | Water | 98 | | | | 0 |
| B | Woods | 60 | | | 2.55 | 153 |
| C | Woods | 73 | | | 5.97 | 435.81 |
| D | Woods | 79 | | | 0.37 | 29.23 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | **Totals =** | 35.640 | 2451.68 |

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{2451.7}{35.64} = \underline{68.79}$

Use CN = **69**

**Runoff Curve Number**

Project: NLE 00028 By: EMB Date: 5/15/2024
Location: Kane County Checked: Date:
File: N:\NewLeaf\230040.00028 - 0 Dietrich Rd, Ka

Circle One: EXISTING (PROPOSED) Description: To Oulet 1

| Soil Name and Hydrologic Group (Appendix A) | Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio) | Curve Number Table 2-2 | Fig. 2-3 | Fig. 2-4 | Area X acres / sq. mi. / % | Product of Curve Number and Area |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| B | Meadow | 58 | | | 1.87 | 108.46 |
| C | Meadow | 71 | | | 4.64 | 329.44 |
| D | Meadow | 78 | | | 2.23 | 173.94 |
| - | Roadway | 98 | | | 0.8 | 78.4 |
| - | Water | 98 | | | 6.64 | 650.72 |
| B | Woods | 60 | | | | 0 |
| C | Woods | 73 | | | 3.32 | 242.36 |
| D | Woods | 79 | | | 0.3 | 23.7 |
| C | Open Space | 79 | | | 3.53 | 278.87 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | **Totals =** | 23.330 | 1885.89 |

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1885.9}{23.33} = \underline{80.84}$

Use CN = **81**

# *Calculations 3*

# *PV-SMaRT*

# Existing Conditions PV SMART

| | |
|---|---|
| Soil Texture | Silt Loam |
| Soil Depth (inches) | 46 |
| Bulk Density (g/cm$^3$) | 1.53 |
| Vegetation Present | Row Crop (Straight Row, Poor Management) |
| Are Solar Panels Present? | NO |
| Panel Width (feet) | 7 |
| Panel Spacing (feet) | 20 |
| Array Orientation | Combination |
| Percent Slope | 4 |

***BLUE CELLS REQUIRE USER INPUT***

***MAROON CELLS REPRESENT TOOL OUTPUTS***

| | |
|---|---|
| Runoff Curve Number | 73.8 |
| 24-Hr Precip Event (inches) | 10.00 |
| Expected Runoff (inches) | 6.72 |

# Proposed Conditions PV SMART

| | |
|---|---|
| Soil Texture | Silt Loam |
| Soil Depth (inches) | 46 |
| Bulk Density (g/cm$^3$) | 1.53 |
| Vegetation Present | Newly Established Pollinator |
| Are Solar Panels Present? | YES |
| Panel Width (feet) | 7 |
| Panel Spacing (feet) | 20 |
| Array Orientation | Combination |
| Percent Slope | 4 |

***BLUE CELLS REQUIRE USER INPUT***

***MAROON CELLS REPRESENT TOOL OUTPUTS***

| | |
|---|---|
| Runoff Curve Number | 72.8 |
| 24-Hr Precip Event (inches) | 10.00 |
| Expected Runoff (inches) | 6.59 |

| Weighted Averages to us in PVSMART | | | | | | | | | | SUM |
|---|---|---|---|---|---|---|---|---|---|---|
| Area | 10.22 | 1.28 | 9.26 | 2.90 | 0.93 | 1.93 | 0.35 | 1.94 | 0.23 | 29.04 |
| Color in CAD | Purple | Pink | Yellow | Peach | Orange | Teal | Green | Blue | Dark Yellow | - |
| NRCS Depth To Restriction | 112 | 74 | 81 | 200 | 200 | 81 | 81 | 200 | 200 | - |
| A* V | 1144.71 | 94.46 | 749.83 | 579.10 | 185.48 | 156.52 | 28.46 | 388.98 | 46.50 | 3374.04 |
| NRCS Bulk Density | 1.45 | 1.58 | 1.54 | 1.59 | 1.56 | 1.54 | 1.54 | 1.75 | 1.61 | - |
| A* V | 14.82 | 2.02 | 14.26 | 4.60 | 1.45 | 2.98 | 0.54 | 3.40 | 0.37 | 44.44 |

Weighted Depth to Restrictive layer

116.19 cm **45.75** inches

Weighted Bulk Density

**1.53** $g/cm^3$

Note: Enter Highligted value into PVSMART