R.A. Smith National
Beyond Surveying and Engineering

Preliminary
Stormwater Management Plan for

Monarch Subdivision

City of Waukesha, Wisconsin

RASN Project No. 3150342

August 3, 2017

Preliminary
Stormwater Management Plan
for
Monarch Subdivision

City of Waukesha, Wisconsin

Prepared by

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Prepared for

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Waukesha, WI 53188

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EXHIBITS

INTRODUCTION

R.A. Smith National, Inc. has been retained by Siepmann Realty Corporation to prepare a stormwater management plan for the proposed Monarch Subdivision residential subdivision development in the City of Waukesha, Waukesha County, Wisconsin. The property is approximately 29.8 acres and is located across from Waukesha West High School on the west side of CTH X. Two access points are being proposed, one from CTH X on the east side and the other from Stonegate Road on the west side of the development. The project is in Section 20, Town 6 North, Range 19 East.

Stormwater management for this site is regulated by the City of Waukesha Municipal Code Chapter 32: Stormwater Management and Erosion Control, as well as The Wisconsin Department of Natural Resources (WDNR) NR 151, Wisconsin Administrative Code. The analysis presented in this report addresses water quantity, water quality, and infiltration.

REGULATORY REQUIREMENTS

This project is considered new development by the City and WDNR.

Water Quantity Requirements

The City's ordinance is intended to meet the current NR 151 peak flow requirements of maintaining or reducing the 1- and 2-year, 24-hour post- development peak discharges not exceed the 1- and 2-year, 24-hour pre-development peak discharges, respectively, or to the maximum extent practicable. The City's ordinance also requires that the post-development peak storm water discharge rate shall not exceed the pre-development discharge rates for the 100-year, 24-hour design storm.

Water Quality Requirements

The City's ordinance is intended to meet the current NR 151 Total Suspended Solids (TSS) reduction requirement of 80% based on an average annual rainfall, as compared to no runoff management controls.

Infiltration Requirements

The City's ordinance is intended to meet the current NR 151 requirement that best management practices (BMPs) be designed, installed, and maintained to infiltrate runoff in accordance with the following or to the maximum extent practicable based on the site soil conditions:

> Moderate impervious, For development with more than 40% and up to 80% imperviousness, such as medium-density residential, infiltrate sufficient runoff volume so that the Post-development infiltration volume shall be at least 75% of the pre-development infiltration volume, based on an average annual rainfall. No more than 2% of the post-construction site is required as an effective infiltration area.

ANALYSIS METHODS

Water Quantity

Hydrologic analyses for the pre- and post-development conditions were performed using the Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v 10.3 hydrologic simulation computer model. The discharges were generated using the SCS TR-55 Dimensionless Unit Hydrograph Method for a 24-hour duration storm. Model parameters include drainage area, SCS runoff curve number (RCN), time of concentration, and NOAA Atlas 14 24-hour precipitation (see Table 1) with NRCS MSE3 rainfall distribution.

Table 1 – Design Storm Events

Storm Frequency	**1-year**	**2-year**	**10-year**	**100-year**
24-hour Rainfall Depth (inches)	2.4	2.7	3.81	6.18

Water Quality

The stormwater quality analysis utilized WinSLAMM version 10.3.1.

SOIL INFORMATION

According to the NRCS Web Soil Survey, underlying soils within the site contain soils belonging to NRCS Hydrologic Soil Groups identified below. However, infiltration rates of soils can vary widely across a site and are affected by subsurface permeability as well as surface cover and intake rates. See Table 2 for a brief description of the existing underlying soils according to the NRCS soil survey. Detailed soils information is provided in Exhibit A.

Table 2 – NRCS Soil Survey Summary

NRCS Soil Name	**% slope**	**NRCS Unit Symbol**	**Hydrologic Soil Group (HSG)**
Griswold Silt loam	2 - 6	GtB	B
Hochheim loam	2 - 6	HmB	D
Hochheim loam	2 - 6	HmB2	D
Hochheim loam	6 - 12	HmC2	D
Hochheim loam	12 - 20	HmD2	D
Pistakee silt loam	1 -3	PrA	C
Warsaw loam	2 -6	WeB	B
Warsaw silt loam	0 -2	WhA	B

WETLANDS

Wetlands have been identified along an existing drainage way on the site. The complete Wetland Delineation Report (August 10, 2015) is attached as Exhibit B, which includes a wetland boundary map (Figure 2A of the report).

PRE-DEVELOPMENT CONDITIONS

The existing land use is generally cropland and woods. Approximately 8.5 acres of existing off-site low-density residential subdivision located to the west flows overland to the east through the existing subbasin E1, which then ultimately discharges to the existing drainage way located near the proposed entrance approximately 150 feet west of the CTH X right-of way. The off-site and on-site pre-development drainage maps are provided in Exhibit C. On-site subbasins E2 and E3 drain off site to the northwest and southwest, respectively.

The City requires that the pre-development analysis use maximum runoff curve numbers provided in Chapter NR 151. The soils identified in Table 2 are hydrologic groups B, C, and D. The maximum woodland RCNs of 55 for B soils, 70 for C soils, and 77 for D soils were used for undeveloped areas. The maximum cropland RCNs of 69 for B soils, 78 for C soils, and 83 for D soils were used for undeveloped areas. The RCN of 68 for B soils, 79 for C soils, and 84 for D soils for the existing residential subdivision in Subbasin E1 was based on TR55 RCNs for urban areas. The composite RCNs and times of concentration calculation sheets are provided in Exhibit D. The pre-development parameters are provided in Table 3.

Table 3 – Pre-development Subbasin Data

Subbasin	Drainage Area (acres)	Runoff Curve Number	Time of Concentration (minutes)	Comments
E1	38.8	73	22	Onsite + offsite
E2	0.58	77	18	Onsite
E3	1.38	75	12	Onsite
Total	40.7			

Pre-Development Runoff Modeling

Design storms for the pre-development hydrology model include the 1, 2, 10, and 100-year, 24 hour storm events. A summary of peak discharges for the pre-development conditions is provided in Table 4. A full report is provided in Exhibit G.

Table 4 – Pre-development Hydrology Summary

Subbasin	Description	Peak Discharge (cfs)			
		1-year	2-year	10-year	100-year
E1	Pre-development cropland and woods plus existing offsite residential land use	18.5	25.9	57.6	137
E2	Pre-development woodland	0.4	0.6	1.1	2.5
E3	Pre-development woodland and cropland	1.1	1.5	3.0	6.9
Total Pre-development release		**19.8**	**27.6**	**60.8**	**145**

PROPOSED SITE CONDITIONS

The proposed condition drainage map is attached as Exhibit E. The subbasin boundaries for the proposed condition are the same as the existing subbasin boundaries. Offsite drainage from the west will continue to flow onsite through subbasin P1 and be captured by a new storm sewer and road drainage system. Subbasins P2 and P3 will continue to drain offsite without being captured. The proposed storm water BMPs are located on both sides of the existing drainage way and entrance road. Pond 1 is an interconnected wet pond and Pond 2 is a proposed infiltration basin. The wet pond will treat the storm water prior to entering the infiltration basin before discharging to the existing drainage way.

The RCNs and times of concentration for subbasins P2 and P3 are the same as for pre-development conditions. RCNs and times of concentration for subbasins P1, P2, and P3 area are provided in Exhibit F. The post-development subbasin parameters are summarized in Table 5.

Table 5 – Post-development Subbasin Data

Subbasin	Drainage Area (acres)	Runoff Curve Number	Time of Concentration (minutes)	Comments
P1	40.0	76	19	Onsite + Offsite directed to Pond 1
P2	0.58	77	18	Offsite
P3	1.18	73	12	Offsite
Total	40.7			

Post-Development Runoff Modeling

Water quantity requirements (peak discharge rates) are regulated by WDNR NR151, Wisconsin Administrative Code and the City Municipal Code Chapter 32. Both codes

require that the 1-year and 2-year post-development discharges not exceed the corresponding pre-development discharges. The City's ordinance also requires that the post-development peak storm water discharge rate shall not exceed the pre-development discharge rates for the 100-year, 24-hour design storm.

The proposed development includes a wet detention pond designed per WDNR Technical Standard 1001 for water quantity and quality control. The pond has two inflow locations from the storm sewer system and overland street flow proposed within the development. The pond outlet structure consists of a 36-inch culvert connected to a 48-inch diameter riser with a 6-inch orifice. The outlet pipe and orifice inverts are at the normal water elevation of 58.5. The riser top is at 60.5. The pond has an emergency overflow weir at 64.0 which will provide a controlled release point in the event the capacity of the primary outflow device is exceeded.

Storm sewer within the development is designed to accommodate 10-year storm intensities, based upon NOAA Atlas 14 rainfall and IDF curves supplied by SEWRPC. All disturbed areas of the site will be graded such that overland flow routes will direct runoff in excess of the storm sewer capacity safely to the pond.

The results of the post-development analysis are provided in Table 6 and the Hydraflow summary results are provided in Exhibit G.

Table 6– Post-Development Peak Discharge Rates

	Peak Discharge (cfs)			
Condition	**1-year**	**2-year**	**10-year**	**100-year**
P1	26.9	35.7	72.4	162
P2	0.4	0.6	1.1	2.5
P3	0.8	1.1	2.4	5.6
Total to wet pond (Pond 1)	26.9	35.7	72.4	162
Pond release to infiltration basin	1.2	4.3	32.0	66.4
Infiltration basin (Pond 2) release	1.0	2.0	28.5	66.1
P2 and P3 offsite flow	1.2	1.6	3.4	7.9
Total post-development release	**2.2**	**3.6**	**31.9**	**74.0**

Table 7 compares the pre- and post-development peak discharge rates, which shows that the City's peak flow reduction requirements are met.

Table 7– Peak Discharge Rate Comparison

Condition	Peak Discharge (cfs)			
	1-year	2-year	10-year	100-year
Pre-developed	19.8	27.6	60.8	145
Post-developed	2.2	3.6	31.9	74.0

INFILTRATION

As discussed in the previous section, an infiltration basin (Pond 2) is being proposed between the existing drainage way and CTH X as shown on Exhibit E. This basin has an emergency overflow weir at 56.5 and top elevation of 57.5.

As part of the geotechnical investigations, the subgrade soils were classified in general accordance with the USDA textural soil classification system. Estimated infiltration rates for various soil types, shown in the Site Evaluation for Stormwater Infiltration (1002) document, which is published by the Wisconsin Department of Natural Resources, are shown below.

Soil Texture (1)	Design Infiltration Rate Without Measurement Inches/Hour
Coarse sand or coarser (COS)	3.60
Loamy coarse sand (LCOS)	3.60
Sand (S)	3.60
Loamy sand (LS)	1.63
Sandy loam (SL)	**0.50**
Loam (L)	0.24
Silt loam (Si, L)	0.13
Sandy clay loam (SCL)	0.11
Clay loam (CL)	0.03
Silty Clay loam (Si, CL)	0.04
Sandy clay (SC)	0.04
Silty clay (Si, C)	0.07
Clay (C)	0.07

(1) Use sandy loam design infiltration for fine sand, very fine sand, and loamy fine sand soil textures.

The soils in the project site beneath the 12 to 24 inches of topsoil were generally found to be native silt loam to depths of 1 to 3 feet. The underlying soils consisted of silty clay to silty clay loam to depths between 3.5 and 4 feet. Below that, the deeper soils generally consisted of fine sandy loam, gravelly sandy loam, gravelly loamy sand to sand from 5.5 to 7 feet below grade. Based on the presence of wet soils, the seasonal high water level is estimated to be at depths ranging from about 1.5 to 4 feet below grade.

NR-151 guidelines indicate infiltration rates shall be based on the least permeable soil horizon within 5 feet of the bottom elevation of the proposed stormwater management device. In this area the soils in boring B-3 consisted of silty clay loam to a depth of 1 foot below existing grade; silt loam to a depth between 1 and 3 feet below grade; sandy loam

to a depth between 2 and 3.5 feet below grade; fine sandy loam to a depth between 3.5 and 4.5 feet below grade; gravelly loamy sand to a depth between 4.5 and 5 feet below grade; and gravelly sand to a depth between 5 and 6 feet (the end of test pit) below grade. Groundwater was encountered at a depth of 5 feet below ground surface. The sandy loam soil encountered in boring B-3 has the least permeable horizon within 5 feet of the bottom elevation with an estimated infiltration rate of 0.50 inches per hour based on the Technical Standard 1002 table.

The input and output data for the infiltration basin can be found in both the Hydraflow and SLAMM exhibits attached to this report.

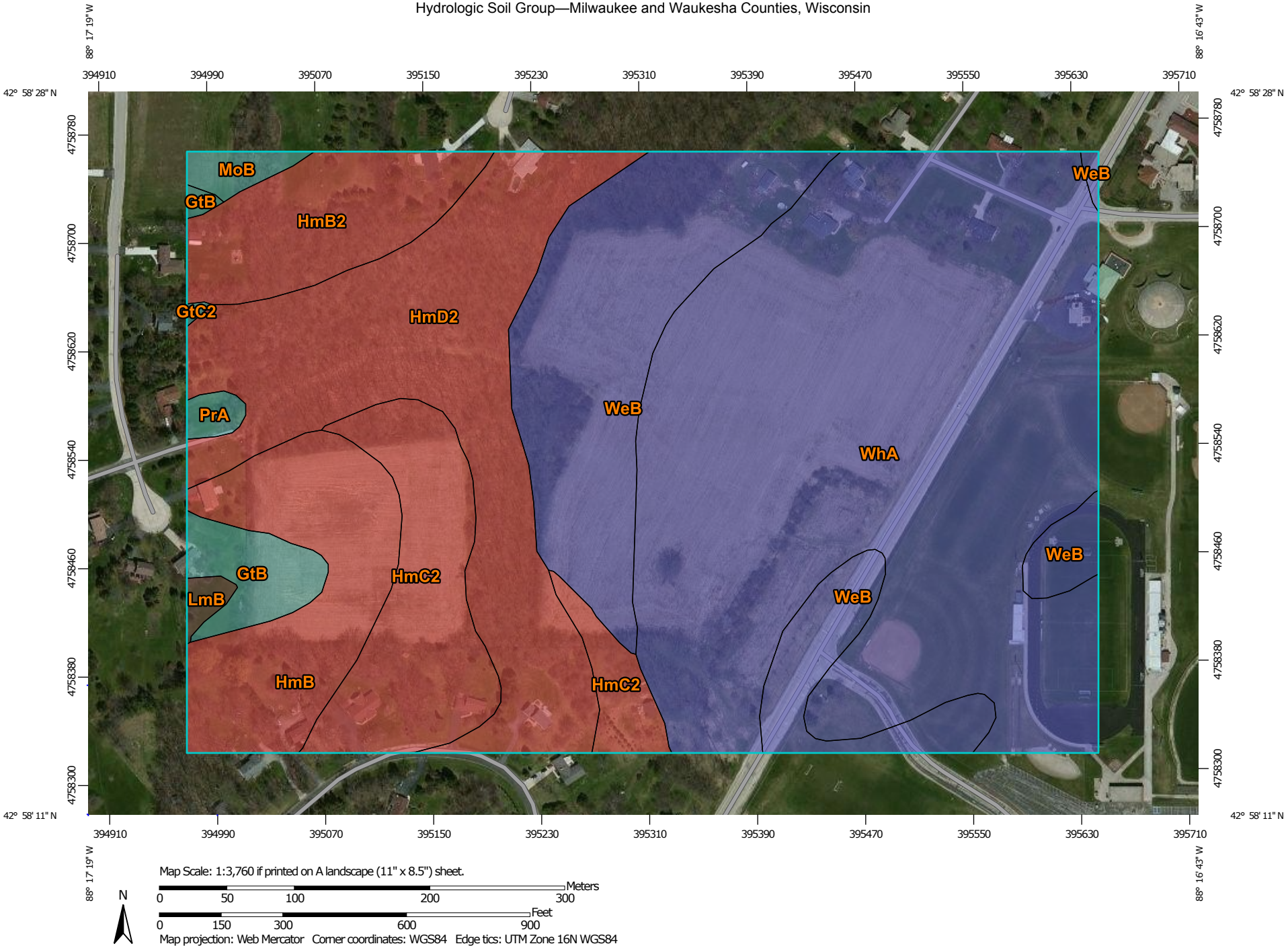
WATER QUALITY DESIGN

A proposed wet detention basin and infiltration basin (in series) best management practices were selected to reduce the total suspended solids (TSS) load from the project site by 80%, based on an average annual rainfall, as compared to no runoff management controls.

The pond outlet control structure contains an orifice to regulate pond discharge rates. In addition, a large, permanent pool water surface aids in the settling of suspended solids. An analysis was conducted using the WinSLAMM version 10.3.1 model to verify TSS removal rates. The model included evaluation of the total pollutants from P1, P2, and P3 with the on-site portion of subbasin P1 routed through the wet detention pond and infiltration basin. The results show 82.6% TSS removal. The detailed calculations are provided in Exhibit H.

Exhibit A

NRCS Soils Information and Geotechnical Reports


88° 17' 19" W
88° 16' 43" W
42° 58' 28" N
42° 58' 11" N
394910
394990
395070
395150
395230
395310
395390
395470
395550
395630
395710
4758780
4758700
4758620
4758540
4758460
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MoB
GtB
HmB2
GtC2
HmD2
PrA
WeB
WhA
GtB
HmC2
LmB
WeB
WeB
HmB
HmC2
Map Scale: 1:3,760 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 50 100 200 300
Feet
0 150 300 600 900
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 1:15,800.

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: http://websoilsurvey.nrcs.usda.gov
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: Milwaukee and Waukesha Counties, Wisconsin
Survey Area Data: Version 11, Sep 25, 2015

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

Date(s) aerial images were photographed: Data not available.

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

Hydrologic Soil Group— Summary by Map Unit — Milwaukee and Waukesha Counties, Wisconsin (WI602)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
GtB	Griswold silt loam, 2 to 6 percent slopes	C	1.5	2.1%
GtC2	Griswold silt loam, 6 to 12 percent slopes, eroded	C	0.0	0.1%
HmB	Hochheim loam, 2 to 6 percent slopes	D	5.7	7.7%
HmB2	Hochheim loam, 2 to 6 percent slopes, eroded	D	4.0	5.4%
HmC2	Hochheim loam, 6 to 12 percent slopes, eroded	D	6.2	8.3%
HmD2	Hochheim loam, 12 to 20 percent slopes, eroded	D	12.3	16.6%
LmB	Lamartine silt loam, 0 to 3 percent slopes	B/D	0.3	0.3%
MoB	Mayville silt loam, 2 to 6 percent slopes	C	0.5	0.7%
PrA	Pistakee silt loam, 1 to 3 percent slopes	C	0.3	0.4%
WeB	Warsaw loam, 2 to 6 percent slopes	B	12.1	16.2%
WhA	Warsaw silt loam, 0 to 2 percent slopes	B	31.4	42.2%
Totals for Area of Interest			**74.4**	**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

Map Scale: 1:1,830 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

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 1:15,800.

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

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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: Milwaukee and Waukesha Counties, Wisconsin
Survey Area Data: Version 12, Sep 28, 2016

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

Date(s) aerial images were photographed: Data not available.

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

Milwaukee and Waukesha Counties, Wisconsin (WI602)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
GtB	Griswold silt loam, 2 to 6 percent slopes	1.8	20.3%
GtC2	Griswold silt loam, 6 to 12 percent slopes, eroded	1.6	18.0%
HmB	Hochheim loam, 2 to 6 percent slopes	0.4	4.6%
HmB2	Hochheim loam, 2 to 6 percent slopes, eroded	0.0	0.0%
HmD2	Hochheim loam, 12 to 20 percent slopes, eroded	2.8	32.0%
PrA	Pistakee silt loam, 1 to 3 percent slopes	2.2	25.1%
Totals for Area of Interest		**8.8**	**100.0%**

Information To Build On
Engineering • Consulting • Testing

July 25, 2014

Mr. James Siepmann
Lake Country Land, LLC.
c/o: Siepmann Realty Corporation
W240 N1221 Pewaukee Road
Waukesha, WI 53188

Subject: Subsurface Exploration and Infiltration Evaluation
Proposed Overlook Farms Subdivision
Saylesville Road (CTH X) and Lawrence Lane
City of Waukesha, Wisconsin
PSI Project No. 0054809-1

Dear Mr. Siepmann,

INTRODUCTION

In accordance with your request, Professional Service Industries, Inc. (PSI) has performed a subsurface exploration to provide an evaluation of the soil and groundwater conditions at selected locations at the above referenced site. An electronic copy of this report is being provided via e-mail. Hard copies will be provided upon request.

These services were performed in accordance with an executed agreement (PSI Proposal No. 0054-126368, dated June 18, 2014) between PSI and Lake Country Land, LLC, and signed by Mr. James P. Siepmann, Member with Lake Country Land, LLC. This subsurface exploration letter report has been prepared on behalf of, and exclusively for the use of Lake Country Land, LLC. The information contained in this letter report may not be relied upon by any other parties without the written consent of PSI, and acceptance by such parties of PSI's General Conditions.

PURPOSE

The purpose of the subsurface exploration was to evaluate the soil and groundwater conditions encountered at selected locations on the subject site, and to provide subsurface information for preliminary design planning for proposed stormwater management of the proposed project. The locations of the infiltration test pits were chosen by, and staked in the field by the client and were supplied to PSI on a site diagram. The number, types, sizes, and bottom elevations of the planned stormwater management areas for the development were not provided to PSI at

the time of report preparation.

SCOPE

The scope of services included a site reconnaissance, the subsurface exploration, a determination of soil characteristics by field and laboratory testing, and an evaluation and analysis of the data obtained. The scope of the infiltration evaluation consisted of the excavation of four (4) test pits, to a depth of 10 feet below grade or to the approximate depth of groundwater, whichever was encountered first.

The field work for classification of the subgrade soils in accordance with the WDNR Technical Standard 1002 "Site Evaluation for Stormwater Infiltration" guidelines was performed to provide information for use by the basin design personnel when considering requirements of Chapter NR151 of the Wisconsin Administrative Code. The design of the proposed management devices was beyond the scope of services for this project. In addition, in-situ permeability testing was not included within the scope of services for this project.

SITE AND PROJECT DESCRIPTION

The project area consists of an approximate 28-acre agricultural field and woodland located on the southwest corner of Saylesville Road (CTH X) and Lawrence Lane in the City of Waukesha, Wisconsin. It is understood that the proposed development will consist of a residential subdivision with stormwater management areas. The four test pits performed for this project were generally located in the southeast portion of the subject site. However, the number, sizes, types, bottom elevations and other design details of the stormwater management areas were not provided at the time of the report preparation.

SOIL SURVEY MAP REVIEW

The U.S. Department of Agriculture *Soil Survey of Waukesha and Milwaukee Counties, Wisconsin*, dated July 1971, was reviewed for the pedological classification of the soils within the area of the project. The soil survey indicates that the Warsaw Silt Loam soil series are generally present.

The Warsaw Silt Loam reportedly has a seasonal high water table at a depth greater than 5 feet below grade.

FIELD EXPLORATION AND LABORATORY TESTING

Field Exploration

Four (4) test pits (referenced by the client as B-1 through B-4) were performed for this project. The test pits were extended to depths ranging from 5.5 to 7 feet below ground surface. The test pits were staked by the client at predetermined locations. The elevations indicated on the test pit logs were provided by the client. The approximate locations of the test pits are shown on the enclosed Test Pit Location Plan.

The soil test pits were excavated by a subcontractor with a backhoe. Representative soil samples were obtained from the backhoe bucket when color, texture and/or moisture changes were observed.

All soil samples were visually classified by a certified soil tester in general accordance with the USDA Soil Textural Classification System. Copies of the Test Pit Logs, DSPS Soil Evaluation Storm Form, and Test Pit Location Plan are enclosed in the Appendix. The soil stratification shown on the logs represents the soil conditions in the actual test pit locations at the time of the exploration. The terms and symbols used on the logs are described in the enclosed General Notes. Upon completion of the exploration activities, the test pits were backfilled to the ground surface with the excavated soils.

DESCRIPTION OF SUBSURFACE CONDITIONS

General

A description of the subsurface conditions encountered at the test pit locations is shown on the Test Pit Logs. The lines of demarcation shown on the logs represent approximate boundaries between the various soil classifications. It must be recognized that the soil descriptions are considered representative for the specific test locations, and that variations may occur between and beyond the test locations. Soil depths, topsoil and layer thicknesses, and demarcation lines can be utilized for preliminary budgeting, but their use in construction calculations should not be expected to yield exact and final quantities. A summary of the major soil profile components is described in the following paragraphs.

Soil Conditions

The soils encountered at the surface of test pits B-1, B-2, and B-3 consisted of about 12 to 24 inches of topsoil fill generally comprised of black to grayish brown silty clay loam. Underlying natural soils beneath the topsoil fill at these locations, and extending from the ground surface at test pit B-4, generally consisted black to very dark gray silt loam to depths of about 1 to 3 feet (EL. 54.4± to EL. 59±). The underlying soils in B-1 and B-4 generally consisted of gray to very dark brown and brown silty clay to silty clay loam to depths of about 3.5 and 4 feet (EL.

56.9± and EL. 56±), respectively. The deeper soils in these test pits and beneath the topsoil fill at B-2 and B-3, generally consisted of brown, light yellowish brown to gray fine sandy loam, gravelly sandy loam, gravelly loamy sand to sand, to the termination depths of about 5.5 to 7 feet below grade (EL. 50.4± to EL. 53.9±). However, as an exception, brown gravelly silt loam soils were encountered at depths between of about 4 to 4.5 feet below grade (EL. 56± to EL. 55.5±) within B-4.

Groundwater Observations

Groundwater observations were made during and upon completion of the excavation activities. Water was observed within all of the test pits at depths ranging from about 4.5 to 6.5 feet below grade (EL. 51.4± to EL. 55.4±). Gray colored soils and redoximorphic features indicative of the seasonal high water table were observed at depths between about 1.5 to 3 feet (EL. 58.8± to EL. 54.4±) within B-1, B-3, and B-4. It must be recognized that groundwater levels fluctuate with time due to variations in seasonal precipitation, lateral drainage conditions, and soil permeability characteristics.

Based on the presence of wet soils and observed redoximorphic features, the seasonal high water level is estimated to be at depths ranging from about 1.5 to 4 feet below grade (EL. 58.5± to 54.4±) at the test pit locations.

STORMWATER MANAGEMENT CONSIDERATIONS

The subgrade soils encountered in the borings have been classified in general accordance with the USDA textural soil classification system. Estimated infiltration rates for various soil types are shown. Table 2 of the Site Evaluation for Stormwater Infiltration (1002) document, which is published by the Wisconsin Department of Natural Resources Conservation Practice Standards, is shown below:

Soil Texture[1]	Design Infiltration Rate Without Measurement Inches/hour
Coarse sand or coarser (COS)	3.60
Loamy coarse sand (LCOS)	3.60
Sand (S)	3.60
Loamy sand (LS)	1.63
Sandy loam (SL)	0.50
Loam (L)	0.24
Silt loam (Si, L)	0.13
Sandy clay loam (SCL)	0.11
Clay loam (CL)	0.03
Silty Clay loam (Si, CL)	0.04
Sandy clay (SC)	0.04
Silty clay (Si, C)	0.07
Clay (C)	0.07

[1]Use sandy loam design infiltration rates for fine sand, very fine sand, and loamy fine sand soil textures.

NR-151 guidelines indicate infiltration rates shall be based on the least permeable soil horizon within 5 feet of the bottom elevation of the proposed infiltration system. Careful consideration by the infiltration device designer is required with regard to size, inflow volumes, retained volumes, and other factors. As such, it is recommended that additional evaluation, including in-situ infiltration testing, be performed as part of design planning.

The natural and fill soils encountered in the test pits generally consisted of silty clay, silty clay loam to silt loam to depths of about 2 to 4.5 feet below grade (EL. 54.4± to EL. 56.9±). The silty clay and silty clay loam soils have estimated infiltration rates of 0.07 and 0.04 inches per hour, respectively, based on Table 2 above. These infiltration rates are less than 0.6 inches per hour. Based on this and the soil classification of these soils, they are therefore exempt from the infiltration requirements of NR151.124 under NR151.124(4)(c)2.

The silt loam soils have an estimated infiltration rate of 0.13 inches per hour, based on Table 2 above. This infiltration rate is less than 0.6 inches per hour and these soils may be exempt from the infiltration requirements of NR151.124. However, field verification testing of the actual in-situ infiltration rate for these materials is required per NR151.124 under NR151.124(4)(c)1 and under Step C5 of the Site Evaluation for Stormwater Infiltration document, to confirm they are exempt from the infiltration requirements.

The deeper soils encountered in the test pits generally consisted of sandy loam, loamy sand and sand to termination depths of about 5.5 to 7 feet below grade (EL. 50.4± to EL. 53.9±). The sandy loam soils have an estimated infiltration rate of 0.5 inches per hour, based on Table 2 above. This infiltration rate is less than 0.6 inches per hour and these soils may be exempt from the infiltration requirements of NR151.124. However, field verification testing of the actual in-situ infiltration rate for these materials is required per NR151.124 under NR151.124(4)(c)1 and under Step C5 of the Site Evaluation for Stormwater Infiltration document, to confirm they are exempt from the infiltration requirements.

The loamy sand and sand soils have estimated infiltration rates of 1.63 and 3.6 inches per hour, respectively, based on Table 2 above. These infiltration rates are greater than 0.6 inches per hour, and these soils are therefore not exempt from the infiltration requirements of NR151.124 under NR151.124(4)(c)2. In-situ testing would be required to evaluate if they are exempt under NR151.124(4)(c)1.

It must be recognized that the areas of the test pits and other areas of the site may be exempt or excluded from the infiltration requirements of NR151.124 under other provisions (dependent upon the final bottom elevation), such as NR151.124(4)(b), due to insufficient separation distance between the bottom of the basin and the groundwater, or as defined in NR151.002(14r) due to the lack of a layer of sufficient thickness containing soils with sufficient fines content between the bottom of the basin and the groundwater. This layer of sufficient thickness containing soils with sufficient fines content is denoted by NR151.124(4)(b) as a "filtering layer". As indicated in NR151.002(14r), a "filtering layer" is defined as a layer at least

3 feet thick, with at least 20 percent fines; or at least 5 feet thick, with at least 10 percent fines.

General Stormwater Management Area Recommendations

It must be recognized that actual infiltration rates will be somewhat variable depending upon the uniformity, in-place density of the natural soils, and/or grading of the subsoils below the individual basin or trench footprint. At the time of report preparation, the number, types, sizes and bottom elevations of the planned stormwater management areas had not been provided to PSI.

It should be noted that the soil profile on this site is somewhat variable, with alternating and intermixed granular and cohesive layers. Estimated infiltration rates vary significantly based upon the soils and the soil density encountered in the test pits. Such varying conditions can have a substantial effect on the actual infiltration rates at the bottoms and along the sidewalls of any management area. It is strongly recommended that in-situ testing be performed on this site as part of design planning, for use in proper evaluation with respect to the type, size, bottom elevations, intended use and other factors related to the various stormwater management devices.

The preceding infiltration rate estimates are intended only for use in preliminary planning. In-situ testing, such as with a double ring infiltrometer, along with test pits in other areas of the basins are recommended to allow more detailed evaluation of subsurface conditions, including groundwater levels, and to provide more representative infiltration rates to be used in the final basin design. It is recommended that the bottom of the stormwater management area be observed by qualified geotechnical personnel at the time of construction to verify the soil types. The type of basin and intended use, such as being "wet" or "dry", must be carefully considered when evaluating infiltration rates.

If the proposed basins are planned to infiltrate collected stormwater, the performance of such devices could be affected by other factors such as densification by construction equipment, sedimentation, and the possible presence of variable fills. It is recommended that access of construction equipment to the bottom of the basins be minimized to reduce the potential for soil densification. A maintenance program must be developed to address the removal of sedimentation and or organic materials should they develop. Additionally, it is recommended that the basin design be performed by an experienced civil engineering firm, and that thorough review of applicable codes (especially NR151) and regulations be performed. Proper design and construction of sidewalls and berms will also be essential for proper device performance.

Wet soil conditions were observed at depths of about 4.5 to 7 feet below grade at the time of the exploration. Dependent upon the final bottom elevation(s) of the basin(s), major difficulty with groundwater is expected during excavation work on this site. If excavations extend only a few inches or so below the groundwater, filtered sump pumps or other conventional means may suffice to control the groundwater. However, for deeper excavations, or for substantial

perched zones, prolonged dewatering with a series of sumps or well points and high capacity sump pumps, or other more comprehensive means may be necessary to facilitate construction of the stormwater basins.

Care must be exercised in construction of basements in the vicinity of stormwater management basins. If basement floors are below the elevation of basin bottoms, lateral migration of water may result in increased sump pump activity. Granular backfill in utility trenches in the vicinity of stormwater management basins can act as drains, and carry water from basins into nearby basements. Consideration should be given to construction of clay collars around utility lines to prevent movement of water through the free draining backfill. Additionally, it must be recognized that some local building codes or municipal regulations require that basement floor elevations be a specified distance above the water level of nearby basins. It is therefore recommended that the design engineer (or other appropriate representative) review applicable city or town requirements, and if necessary, verify the design normal and design high water elevations of stormwater basins with respect to planned basement slab elevations. If raising of slabs is then required, the corresponding effect on final yard grades (and resulting changes in surface drainage patterns), for nearby lots must be considered.

GENERAL COMMENTS

The limited evaluation has been prepared on the basis of the subsurface conditions encountered in the borings discussed above. Preliminary recommendations presented herein are based on available soil information and test data collected. This study has been conducted in the manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. The findings and opinions contained herein have been promulgated in accordance with general accepted practices in the fields of soil mechanics and engineering geology. No other representations, expressed or applied, and no warranty or guarantee is included or intended in this report.

After you have had the opportunity of reading this report, please call at any time with any questions or comments you may have. PSI appreciates the opportunity to be of service on this project.

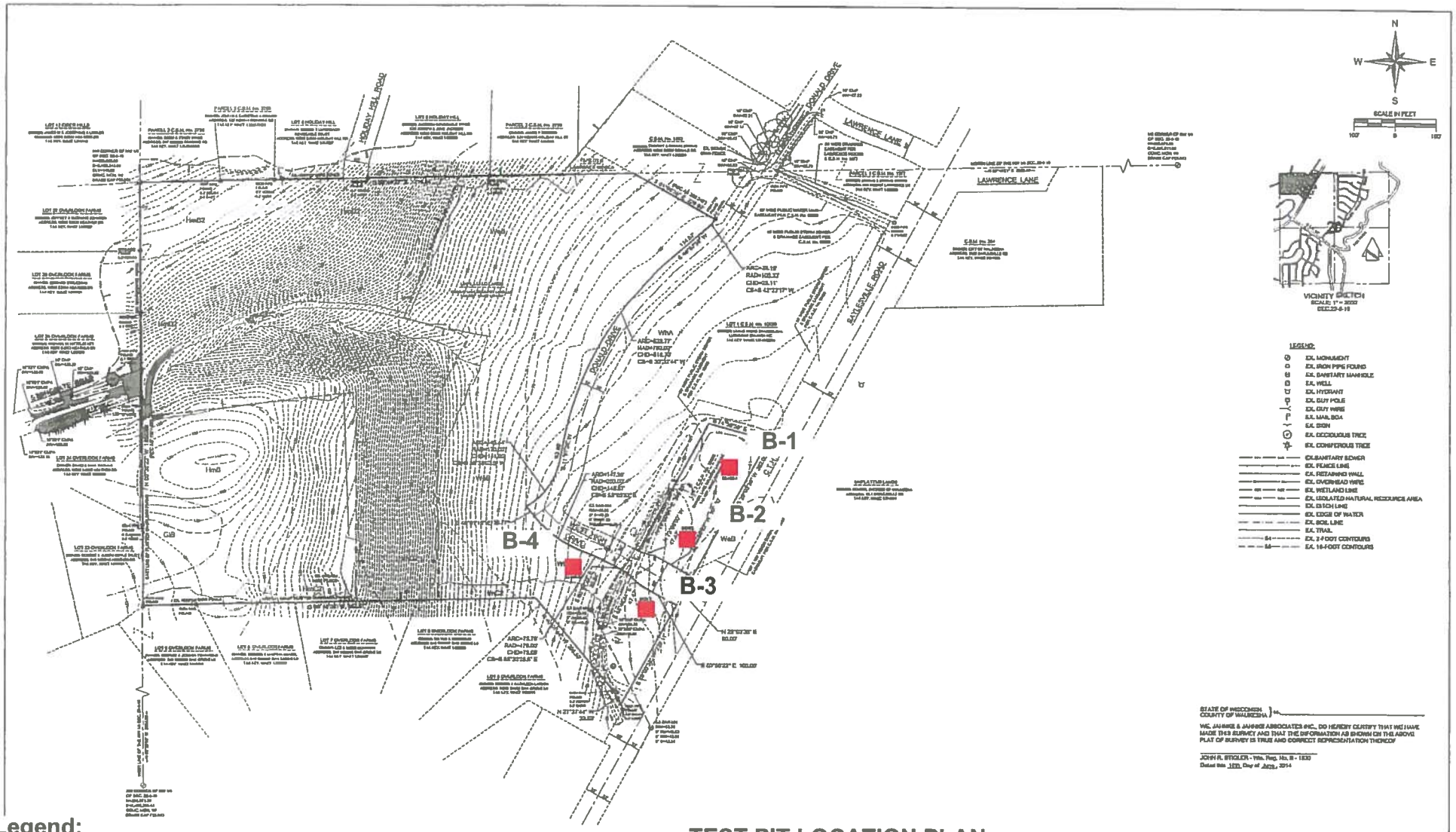
Sincerely yours,

PROFESSIONAL SERVICE INDUSTRIES, INC.

Patrick J. Patterson, P.E., P.G.
Senior Engineer
Certified Soil Tester #41631

James M. Becco, P.E.
District Manager

Enclosures: Test Pit Location Plan
Test Pit Logs
DSPS Soil Evaluation Storm Form
General Notes



STATE OF WISCONSIN)
COUNTY OF WAUKESHA)

WE, JAHNKE & JAHNKE ASSOCIATES INC., DO HEREBY CERTIFY THAT WE HAVE MADE THIS SURVEY AND THAT THE INFORMATION AS SHOWN ON THIS ABOVE PLAT OF SURVEY IS TRUE AND CORRECT REPRESENTATION THEREOF

JOHN R. STIGLER - Wis. Reg. No. S - 1830
Dated this 16th Day of June, 2014

Legend:

■ : Approximate Test Pit Location

Figure adapted from diagram furnished by client

SOIL CLASSIFICATION :
HmB=HOCHHEIM LOAM (B)
HmB2=HOCHHEIM LOAM (B)
OAA (B)
OAA (B)
T LOAM (B)
AA (B)
T LOAM (B)

TEST PIT LOCATION PLAN

C/O SIEPMANN REALTY CORP.
ATTN: JIM SIEPMANN
W240 N1221 PEWAUKEE ROAD
WAUKESHA, WI. 53188-1059

Proposed Overlook Farms Subdivision
Saylesville Road (CTH X)
City of Waukesha, Wisconsin
PSI Project No. 0054809

CALL DIGGERS HOTLINE
1-800-242-8511
TOLL FREE

RE: OVERLOOK HILL
PRELIMINARY PLAT
FOR: LAKE COUNTRY LAND LLC
PART OF THE NW 1/4 SEC. 20, T8N, R19E
CITY OF WAUKESHA, WAUKESHA COUNTY, WISCONSIN

JAHNKE & JAHNKE ASSOCIATES INC.
PLANNING & PROFESSIONAL ENGINEERS
711 W. MORELAND BLVD., WAUKESHA, WI 53188
TEL. (262) 542-0767 FAX (262) 542-7500

SCALE: 1"=100' | DATE: JUNE 16, 2014
DRAWN BY: SJS | CHECKED BY: AJS | FILE NO.: WAUKESHA 1157
BOOK NO.: WAUKESHA 169 | JOB: 0 0000 | SHEET 1 OF 1

THE NAME & SYMBOL(S) ARE PROTECTED BY COPYRIGHT LAW

psi Information To Build On
Engineering • Consulting • Testing

TEST PIT LOG: B-1

Project: Overlook Farms

Project No.: 0054809

Location: CTH X
City of Waukesha, WI

Date: June 19, 2014

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 60.4	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 59.4	10YR, 2/1, Black and 5/2, Grayish Brown, SILTY CLAY LOAM, roots (1,f), 1, abk, f, mfr - moist (FILL)	1-HS	-	-	-	-	-	
2 — 58.4	10YR, 2/1, Black, SILT LOAM, roots (1, f), 0, m, mfr - moist	2-HS	-	-	-	-	-	
3 — 57.4	10YR, 6/1, Gray, SILTY CLAY LOAM, with 10YR, 6/6, Brownish Yellow, c, 2, p, bands, 1, sbk, f, mfi - moist	3-HS	-	-	-	-	-	
4 — 56.4	10YR, 6/1, Gray, GRAVELLY SANDY LOAM, with 10YR, 6/6, Brownish Yellow, c, 2, p, bands, 1, sbk, f, mvfr - very moist	4-HS	-	-	-	-	-	
5 — 55.4								▽
6 — 54.4	10YR, 6/4, Light Yellowish Brown and 6/1 Gray, GRAVELLY SAND, 0, sg, ml - wet	5-HS	-	-	-	-	-	
53.9	**End of Test Pit: 6.5'**							

Notes:

Water Level / Caving Observations:

Water Level During Excavation: 5 ± ft (El. 55.4±) ▽

Additional Comments:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

psi Information To Build On
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TEST PIT LOG: B-2

Project: Overlook Farms

Project No.: 0054809

Location: CTH X
City of Waukesha, WI

Date: June 19, 2014

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 58.9	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
0 / 58.9	12"+/- 10YR, 2/1, Black and 5/2, Grayish Brown, SILTY CLAY LOAM, roots (1,f), 1, abk, f, mfr - moist (FILL)	1-HS	-	-	-	-	-	
1 / 57.9	10YR, 2/1, Black, SILT LOAM, roots (1, f), 0, m, mfr - moist	2-HS	-	-	-	-	-	
2 / 56.9								
3 / 55.9	10YR, 5/6, Yellowish Brown, GRAVELLY LOAMY SAND, 1, abk, f, mvfr - moist to wet	3-HS	-	-	-	-	-	
4 / 54.9								▽
5 / 53.9	10YR, 5/6, Yellowish Brown, GRAVELLY SAND, 0, sg, ml - wet	4-HS	-	-	-	-	-	
53.4	**End of Test Pit: 5.5'**							

Notes:

Water Level / Caving Observations:

Water Level During Excavation: 4.5 ± ft (El. 54.4±) ▽

Additional Comments:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

psi Information To Build On
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TEST PIT LOG: B-3

Project: Overlook Farms

Project No.: 0054809

Location: CTH X
City of Waukesha, WI

Date: June 19, 2014

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 56.4	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 55.4	13"+/- 10YR, 2/1, Black and 5/2, Grayish Brown, SILTY CLAY LOAM, roots (1,f), 1, abk, f, mfr - moist (FILL)	1-HS	-	-	-	-	-	
2 / 54.4	10YR, 2/1, Black, SILT LOAM, roots (1, f), 0, m, mfr - moist	2-HS	-	-	-	-	-	
3 / 53.4	10YR, 6/6, Brownish Yellow, SANDY LOAM, with 10YR, 6/1, Gray, m, 2, p, blotches, 2, pl, thin, mvfr - moist	3-HS	-	-	-	-	-	
4 / 52.4	10YR, 6/1, Gray, FINE SANDY LOAM, with 10YR, 2/1, Black, c, 1, p, spots, 0, m, mvfr - moist	4-HS	-	-	-	-	-	
5 / 51.4	10YR, 6/1, Gray, GRAVELLY LOAMY SAND, 0, m, mvfr - wet	5-HS	-	-	-	-	-	▽
6 / 50.4	10YR, 5/3, Brown, GRAVELLY SAND, 0, sg, ml - wet	6-HS	-	-	-	-	-	
	End of Test Pit: 6'							

Notes:

Water Level / Caving Observations:

Water Level During Excavation: 5 ± ft (El. 51.4±) ▽

Additional Comments:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

psi Information To Build On
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TEST PIT LOG: B-4

Project: Overlook Farms

Project No.: 0054809

Location: CTH X
City of Waukesha, WI

Date: June 19, 2014

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 60.0	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 / 59.0	10YR, 3/1, Very Dark Gray, SILT LOAM, roots (1, f), 0, m, mfr - moist	1-HS	-	-	-	-	-	
	10YR, 2/2, Very Dark Brown, SILTY CLAY LOAM, roots (1,vf), 1, sbk, f, mfr - moist	2-HS	-	-	-	-	-	
2 / 58.0 3 / 57.0	10YR, 5/3, Brown, SILTY CLAY, with 10YR, 5/6 Yellowish Brown and 6/1, Gray, c, 2, d, streaks, 1 abk f, mfi - very moist	3-HS	-	-	-	-	-	
4 / 56.0	10YR, 5/3, Brown, GRAVELLY SILT LOAM, with 10YR, 5/6, Yellowish Brown & 6/1, Gray, c, 2, d, streaks, 1, abk, f, mfr - very moist	4-HS	-	-	-	-	-	
5 / 55.0 6 / 54.0	10YR, 5/6, Yellowish Brown, SAND, with 10YR, 6/6, Brownish Yellow, f, 2, d, streaks, 0, sg, ml - moist to wet	5-HS	-	-	-	-	-	▽
7 / 53.0	**End of Test Pit: 7'**							

Notes:

Water Level / Caving Observations:

Water Level During Excavation: 6.5 ± ft (El. 53.5±) ▽

Additional Comments:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.*

Wisconsin Dept. of Safety and Professional Services

Division of Safety and Buildings

SOIL EVALUATION - STORM

in accordance with SPS 382.365 & 385, Wis. Adm. Code

Attach complete site plan on paper not less that 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and BM referenced to nearest road.

Please print all information.

Personal information you provide may be used for secondary purposes (Privacy Law, s. 15.04 (1) (m)).

County	
Waukesha	
Parcel I.D.	
Reviewed by	Date

Property Owner	Property Location		
Lake Country LLC	Govt. Lot	NW 1/4 Section 20 T 6 N, R 19 E	
Property Owner's Mailing Address	Lot #	Block #	Subd. Name or CSM#
W240 N1221 Pewaukee Road			Overlook Farms

City	State	Zip Code	Phone Number	x City ☐ Village ☐ Town	Nearest Road
Waukesha	WI	53188	262 650 9700	Waukesha	Sayesville Road

Drainage area _____ ☐ sq. ft. ☐ acres

Optional:

Test Site Suitable for (check all that apply)

☐ Irrigation ☐ Bioretention trench ☐ Trench(es)

☐ Rain Garden ☐ Grassed swale ☐ Reuse

☐ Infiltration trench ☐ SDS (> 15' wide) ☐ Other _____

Hydraulic Application Test Method:

☒ Morphological Evaluation

☐ Double Ring Infiltrometer

☐ Other (specify) _____

1 Obs. # ☐ Boring ☒ Pit MES B-1 Ground surface elev.60.4 Fill to 24 inches Saturation at 54 inches Depth to limiting factor 36 inches

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Roots	% Rock Frag.	Hydraulic App. Rate Inches/Hr.
1	0-24	10YR 2/1 & 5/2		sicl	1 f abk	mfr	1 f	<15	0.04
2	24-36	10YR 2/1		sil	0 m	mfr	1 f	<15	0.13
3	36-42	10YR 6/1	c 2 p 10YR 6/6	sicl	1 f sbk	mfi		<15	0.04
4	42-66	10YR 6/1	c 2 p 10YR 6/6	grsl	1 f sbk	mvfr		>15	0.5
5	66-78	10YR 6/4 & 6/1		grs	0 sg	ml		>15	3.6

2 Obs. # ☐ Boring ☒ Pit MES B-2 Ground surface elev. 58.9 Fill to 12 inches Saturation at 54 inches Depth to limiting factor 54 inches

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Roots	% Rock Frag.	Hydraulic App. Rate Inches/Hr.
1	0-12	10YR 2/1 & 5/2		sicl	1 f abk	mfr	1 f	<15	0.04
2	12-24	10YR 2/1		sil	0 m	mfr	1 f	<15	0.07
3	24-54	10YR 5/6		grls	1 f abk	mvfr		>15	1.63
4	54-66	10YR 5/6		grs	0 sg	ml		>15	3.6

CST/PSS Name (Please Print)	Signature	CST/PSS Number
Patrick J. Patterson		41631
Address	Date Evaluation Conducted	Telephone Number
821 Corporate Court, Suite 102, Waukesha, WI 53189	6/19/2014	262 521 2125

3 Obs. # ☐ Boring MES B-3 Fill to 13 inches Saturation at 54 inches
☒ Pit Ground surface elev. 56.4 Depth to limiting factor 24 inches

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Roots	% Rock Frag.	Hydraulic App. Rate Inches/Hr.
1	0-13	10YR 2/1 & 5/2		sicl	1 f abk	mfr	1 f	<15	0.04
2	13-24	10YR 2/1		sil	0 m	mfr	1 f	<15	0.13
3	24-42	10YR 6/6	m 2 p 10YR 6/1	sl	2 thin pl	mvfr		<15	0.5
4	42-54	10YR 6/1	c 1 p 10YR 2/1	fsl	0 m	mvfr		<15	0.5
5	54-60	10YR 6/1		grls	0 m	mvfr		>15	1.63
6	60-72	10YR 5/3		grs	0 sg	ml		>15	3.6

4 Obs. # ☐ Boring MES B-4 Saturation at 78 inches
☒ Pit Ground surface elev. 60.0 Depth to limiting factor 18 inches

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Roots	% Rock Frag.	Hydraulic App. Rate Inches/Hr.
1	0-12	10YR 3/1		sil	0 m	mfr	2 f	<15	0.13
2	12-18	10YR 2/2		sicl	1 f sbk	mfi	1 f	<15	0.04
3	18-48	10YR 5/3	c 2 d 10YR 5/6 & 6/1	sic	1 f abk	mfi		<15	0.07
4	48-54	10YR 5/3	c 2 d 10YR 5/6 & 6/1	grsil	0 m	mfi		>15	0.13
5	54-84	10YR 5/6	f 2 d 10YR 6/6	s	0 sg	ml		>15	3.6

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System (USCS), AASHTO 1988 and ASTM designations D2487 and D-2488 are used to identify the encountered materials unless otherwise noted. Coarse-grained soils are defined as having more than 50% of their dry weight retained on a #200 sieve (0.075mm); they are described as: boulders, cobbles, gravel or sand. Fine-grained soils have less than 50% of their dry weight retained on a #200 sieve; they are defined as silts or clay depending on their Atterberg Limit attributes. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size.

DRILLING AND SAMPLING SYMBOLS

SFA: Solid Flight Auger - typically 4" diameter flights, except where noted.
HSA: Hollow Stem Auger - typically 3¼" or 4¼ I.D. openings, except where noted.
M.R.: Mud Rotary - Uses a rotary head with Bentonite or Polymer Slurry
R.C.: Diamond Bit Core Sampler
H.A.: Hand Auger
P.A.: Power Auger - Handheld motorized auger

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
RC: Rock Core
TC: Texas Cone
BS: Bulk Sample
PM: Pressuremeter
CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. Split-Spoon.
N_{60}: A "N" penetration value corrected to an equivalent 60% hammer energy transfer efficiency (ETR)
Q_u: Unconfined compressive strength, TSF
Q_p: Pocket penetrometer value, unconfined compressive strength, TSF
w%: Moisture/water content, %
LL: Liquid Limit, %
PL: Plastic Limit, %
PI: Plasticity Index = (LL-PL),%
DD: Dry unit weight, pcf
▼,▽,▼ Apparent groundwater level at time noted

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	N - Blows/foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	50 - 80
Extremely Dense	80+

ANGULARITY OF COARSE-GRAINED PARTICLES

Description	Criteria
Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular:	Particles are similar to angular description, but have rounded edges
Subrounded:	Particles have nearly plane sides, but have well-rounded corners and edges
Rounded:	Particles have smoothly curved sides and no edges

GRAIN-SIZE TERMINOLOGY

Component	Size Range
Boulders:	Over 300 mm (>12 in.)
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)
Fine-Grained Gravel:	4.75 mm to 19 mm (No.4 to ¾ in.)
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)
Medium-Grained Sand:	0.42 mm to 2 mm (No.40 to No.10)
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.40)
Silt:	0.005 mm to 0.075 mm
Clay:	<0.005 mm

PARTICLE SHAPE

Description	Criteria
Flat:	Particles with width/thickness ratio > 3
Elongated:	Particles with length/width ratio > 3
Flat & Elongated:	Particles meet criteria for both flat and elongated

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% Dry Weight
Trace:	< 5%
With:	5% to 12%
Modifier:	>12%

GENERAL NOTES

(Continued)

CONSISTENCY OF FINE-GRAINED SOILS

Q_u - TSF	N - Blows/foot	Consistency
0 - 0.25	0 - 2	Very Soft
0.25 - 0.50	2 - 4	Soft
0.50 - 1.00	4 - 8	Firm (Medium Stiff)
1.00 - 2.00	8 - 15	Stiff
2.00 - 4.00	15 - 30	Very Stiff
4.00 - 8.00	30 - 50	Hard
8.00+	50+	Very Hard

MOISTURE CONDITION DESCRIPTION

Description	Criteria
Dry:	Absence of moisture, dusty, dry to the touch
Moist:	Damp but no visible water
Wet:	Visible free water, usually soil is below water table

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term	% Dry Weight
Trace:	< 15%
With:	15% to 30%
Modifier:	>30%

STRUCTURE DESCRIPTION

Description	Criteria
Stratified:	Alternating layers of varying material or color with layers at least ¼-inch (6 mm) thick
Laminated:	Alternating layers of varying material or color with layers less than ¼-inch (6 mm) thick
Fissured:	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided:	Fracture planes appear polished or glossy, sometimes striated
Blocky:	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed:	Inclusion of small pockets of different soils
Layer:	Inclusion greater than 3 inches thick (75 mm)
Seam:	Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample
Parting:	Inclusion less than 1/8-inch (3 mm) thick

SCALE OF RELATIVE ROCK HARDNESS

Q_u - TSF	Consistency
2.5 - 10	Extremely Soft
10 - 50	Very Soft
50 - 250	Soft
250 - 525	Medium Hard
525 - 1,050	Moderately Hard
1,050 - 2,600	Hard
>2,600	Very Hard

ROCK BEDDING THICKNESSES

Description	Criteria
Very Thick Bedded	Greater than 3-foot (>1.0 m)
Thick Bedded	1-foot to 3-foot (0.3 m to 1.0 m)
Medium Bedded	4-inch to 1-foot (0.1 m to 0.3 m)
Thin Bedded	1¼-inch to 4-inch (30 mm to 100 mm)
Very Thin Bedded	½-inch to 1¼-inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to ½-inch (3 mm to 10 mm)
Thinly Laminated	1/8-inch or less "paper thin" (<3 mm)

ROCK VOIDS

Voids	Void Diameter
Pit	<6 mm (<0.25 in)
Vug	6 mm to 50 mm (0.25 in to 2 in)
Cavity	50 mm to 600 mm (2 in to 24 in)
Cave	>600 mm (>24 in)

GRAIN-SIZED TERMINOLOGY

(Typically Sedimentary Rock)

Component	Size Range
Very Coarse Grained	>4.76 mm
Coarse Grained	2.0 mm - 4.76 mm
Medium Grained	0.42 mm - 2.0 mm
Fine Grained	0.075 mm - 0.42 mm
Very Fine Grained	<0.075 mm

ROCK QUALITY DESCRIPTION

Rock Mass Description	RQD Value
Excellent	90 -100
Good	75 - 90
Fair	50 - 75
Poor	25 -50
Very Poor	Less than 25

DEGREE OF WEATHERING

Slightly Weathered: Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact.

Weathered: Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.

Highly Weathered: Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

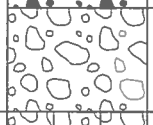
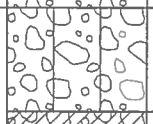
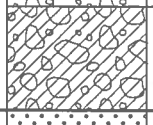
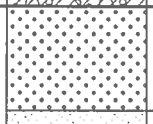
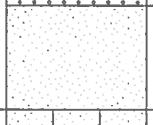
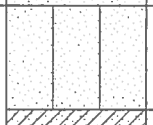
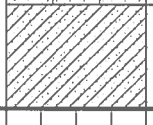
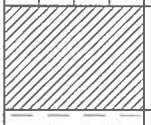
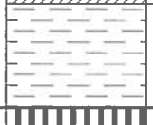
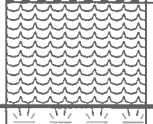
MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

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Exhibit B

Wetland Delineation Report

Wetland Delineation Report

Overlook Hill Subdivision

City of Waukesha, Waukesha County, Wisconsin

RASN Project No. 3150342

August 10th, 2015

Prepared by:

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R.A. Smith National
Beyond Surveying and Engineering

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R.A. Smith National
Beyond Surveying and Engineering

August 10th, 2015

INTRODUCTION

R.A. Smith National, Inc. (RASN) is pleased to provide this Wetland Delineation Report for an approximately 31-acre Study Area west of Saylesville Road (CTH X) in the City of Waukesha, Waukesha County, Wisconsin (Figure 1). The Study Area is more specifically located in the NW ¼ of Section 20, Township 6 North, Range 19 East. The delineation was completed at the request of Siepmann Realty Corporation for the proposed Overlook Hill Subdivision.

The purpose of the wetland delineation was to identify the proximity and extent of wetlands for the planned development of a new subdivision. One (1) wetland, hereby referred to as "W-1", was identified within the Study Area (Figures 2A-B) by Senior Wetland Scientist Tina Myers on June 30th, 2015. The total acreage of W-1 within the Study Area is 0.19 acre (8,104 square feet). The wetland is associated with a waterway that was deemed navigable by the Wisconsin Department of Natural Resources (WDNR) in 2007. Thus, the wetland is assumed to be under the jurisdiction of both the WDNR and US Army Corps of Engineers (Corps). The delineation is presented here in terms of qualifications, methodology, results, and conclusions.

STATEMENT OF QUALIFICATIONS

Ms. Tina Myers has over 14 years of multidisciplinary ecological experience and has been recognized as a Professional Wetland Scientist (PWS) by the Society of Wetland Scientists (SWS) since 2004. She is also recognized as a Certified Wetland Specialist (CWS) in Illinois. Tina earned a Bachelor's degree in Conservation Biology from the University of Milwaukee in 1998 and has taken a multitude of ongoing educational courses including the Corps Wetland Delineation Training which she took in 2006, Regional Supplement and Field Practicum which she took in 2012, Advanced Wetland Delineation Training which she took in 2013, and Critical Methods in Wetland Delineation which she takes annually. She has performed hundreds of wetlands delineations throughout Wisconsin and Illinois and is also experienced in wetland restoration, wetland and waterway permitting, wetland assessment, vegetation surveys including rare species surveys, wildlife surveys, and environmental monitoring.

WETLAND DELINEATION METHODOLOGY

The wetland delineation consisted of a review of available maps and information followed by a site visit to document field conditions. The presence and absence of hydrophytic vegetation, wetland hydrology, and hydric soil indicators were documented using methodology defined in the *US Army Corps of Engineers* (USACE) *1987 Wetland Delineation Manual*, *Regional Supplement to the 1987 Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (Northcentral/Northeast Supplement) (USACE ERDC, 2012) and *Guidance for Submittal of Delineation Reports to the St. Paul District Army Corps of Engineers and the Wisconsin Department of Natural Resources* (USACE St. Paul District, 2015). See References section for a complete list of guidance and sources utilized.

Vegetation
At the sample plots, herbaceous, shrub/sapling, tree and vine strata were typically measured using 5-foot, 15-foot and 30-foot radius plots, respectively. However, plot sizes were adjusted to fit the plant community represented. Percent cover was visually estimated within the plots and dominant species were determined by applying the 50/20 rule and/or Prevalence Index. *The National Wetland Plant List: 2013 wetland ratings* (Lichvar, 2013) was used to determine the wetland indicator status of observed vegetation.

Hydrology
The nearest available Natural Resource Conservation Service (NRCS) WETS Table and the National Atmospheric and Oceanic Organization (NOAA) Advanced Hydrologic Prediction Service were analyzed to determine the antecedent hydrologic condition of the Study Area. Inundation, water table and/or saturation were measured at the sample plots, if present. Soil pits were generally left open for at least one hour prior to measurement to allow for the normalization of water level. Primary and secondary indicators of wetland hydrology were investigated and if present were noted on the data sheets.

Soils
At the sample plots, a soil pit was excavated to a depth of at least 20 to 24 inches, where possible. The color and texture of the soil matrix and associated mottling was recorded for each observed soil layer within the pit. The Munsell Soil Color Book was used to determine the color of observed moist soils. The soil was analyzed for hydric soil characteristics and, if met, hydric soil(s) was/were indicated on the data sheets.

Sources Reviewed
The United States Geological Survey (USGS) Topographic Map (Figure 1), a one-foot contour map (Figures 2A-B), the WDNR Surface Water Data Viewer Map which includes the NRCS Soil Survey and Wisconsin Wetland Inventory (WWI) (Figure 3), aerial photos from the years 2000, 2005, and 2010 (Figures 4A-C), and a NOAA 90-Day Percent of Normal Precipitation Map (Figure 5), were reviewed prior to the wetland delineation in order to gain familiarity with the site's topography, wetland history, soils, and past land uses.

RESULTS

Existing Environmental Mapping
The USGS topographic map shows the general location of the Study Area and shows that the nearest mapped waterway, the Fox River, is approximately one-half mile east of the Study Area (Figure 1). The on-site drainageway, deemed navigable by the WDNR in 2007, is not shown; however the waterway generally flows in a slight southwest direction within the site and then traverses east towards the Fox River upon exiting the site. As shown on the one-foot contour map (Figures 2A-B), site drainage within the Study Area is easterly with the highest point at the 147-foot contour in the western portion of the Study Area and the lowest point at the 51-foot contour within W-1. The majority of the site contains moderately steep to steep grades except for the agricultural area surrounding W-1 which is relatively flat.

The WDNR Surface Water Data Viewer map (Figure 3) indicates the presence of three mapped wetlands within the Study Area depicted as a green line. All shown as E2K, meaning Emergent/Wet Meadow (E); Narrow-leaved Persistent (2), Wet Soil, Palustrine (K). The three mapped wetlands are depicted in the same approximate location as the three separate segments of W-1 with only minor discrepancies. Farm roads with culverts separate the wetland into three separate areas, but that are all connected hydrologically. The minor discrepancies between the WWI map and RASN's delineated boundaries are attributed to the level of wetland delineation employed during the investigation. The presence of wetlands and the location of wetland boundaries as determined by examination of aerial photography are not as accurate as physical examination of site conditions using methods outlined in the 1987 Corps annual and its Northcentral/Northeast Supplement.

The NRCS Web Soil Survey indicates the presence of seven mapped soils within the site (Table 1 and Figure 3).

Table 1. Mapped Soils within Study Area.

Soil Unit Name (Symbol)	Hydric Inclusion	Drainage Class	Percent of Study Area
Griswold silt loam, 2-6% slopes (GtB)	--	Well drained	2.4
Hochheim loam, 2-6% slopes(HmB)	--	Well drained	10.3
Hochheim loam, 2-6% slopes, eroded (HmB2)	—	Well drained	3.6
Hochheim loam, 6-12% slopes, eroded (HmC2)	—	Well drained	10.2
Hochheim loam, 12-20% slopes, eroded (HmD2)	—	Well drained	26.8
Warsaw silt loam, 2-6% slopes (WeB)	--	Well drained	22.5
Warsaw silt loam, 0-2% slopes (WhA)	--	Well drained	24.2

$ WDNR Wetland Indicator Soil
† NRCS Listed Hydric Soil

As shown on the table, there are no mapped hydric or partially hydric soils within the Study Area.

Based on a review of aerial photographs from 2000, 2005, and 2010, it appears that approximately half of the site is wooded, while the other half is annually farmed (Figures 4A-C). The wetland makes up a very small percentage of the overall site. The dark linear tone, which is the waterway associated with W-1, is only slightly visible on all three aerials.

Antecedent Hydrologic Condition

Based on the WETS Analysis Worksheet in Appendix 2, precipitation was within the normal range for the months of April through June. Additionally, NOAA's Advanced Hydrologic Prediction Service Map (Figure 5) which analyzes precipitation data exactly 90 days prior to the date of the site visit indicates that climatic conditions were considered to be within 90-100% of normal precipitation. According to the Daily Precipitation Table in Appendix 2, there was 3.07 inches of precipitation recorded during the month of June prior to the site visit. The most recent rainfall events occurred on June 23rd and 26th when 0.06 inches and 0.40 inches were recorded respectively, totaling 0.46 inches.

Field Investigation

All areas called out as wetland or containing wetland indicators on the above-mentioned maps were evaluated in the field during the site visit. Photos were taken of W-1, its associated waterway, and the upland agricultural fields and mixed hardwood plant community and are included in Appendix 3. A total of six (6) sample plots were examined and one (1) wetland with three segments was delineated by RASN (Figures 2A-B). Pink wire flags with the words "Wetland Delineation" were used to mark wetland boundaries. Consecutively numbered orange wire flags were used to mark sample plots along the wetland boundary and other areas examined. In some areas, especially on the southernmost segment of W-1, the wetland flags were simply used to mark the Ordinary High Water Mark (OHWM) of the waterway as no wetlands were present. RASN surveyors subsequently located the wetland boundary and sample plot flags and prepared a wetland boundary map overlaid onto a one-foot contour map. The data sheets were compiled and are included in Appendix 4. The following is a detailed description of the delineated wetland:

Wetland 1 – Wooded Wetland Drainageway

As shown on Figures 2A and B in Appendix 1, W-1 is a 0.19 acre (8,104 square feet) wooded wetland drainageway located west of Saylesville Road (CTH X) and is surrounded by agricultural fields with planted soybean (*Glycine max*). Dominant wetland vegetation within W-1 includes various willow species (*Salix spp.)* silky dogwood (*Cornus amomum*), red-osier dogwood (*Cornus alba*), common buckthorn *(Rhamnus cathartica)*, reed canary grass (*Phalaris arundinacea*), field horsetail (*Equisetum arvense*), and Canada clearweed (*Pilea pumila*). The immediate adjacent non-agricultural upland adjacent to the ditch included steep slopes dominated by black walnut (*Juglans nigra*), quaking aspen (*Populus temuloides*), common buckthorn, hybrid bush honeysuckle (*Lonicera x bella*), reed canary grass, smooth brome (*Bromus inermis*), Canada goldenrod (*Solidago canadensis*), and black raspberry (*Rubus occidentalis*),

The upland plant community within the non-agricultural portions of the parcel is a native mesic forest dominated by black walnut and sugar maple (*Acer saccharum*) with a dense understory in some areas that is dominated by common buckthorn, hybrid bush honeysuckle, and black raspberry. Other tree species present included red oak (*Quercus rubra*), shagbark hickory (*Carya ovata*), black cherry (*Prunus serotina*) and American elm (*Ulmus americana).* The herbaceous stratum contained a diversity of species, but most commonly observed were sugar maple seedlings, jack-in-the-pulpit (*Arisaema triphyllum*), garlic mustard (*Alliaria petiolata*), American hog peanut (*Amphicarpaea bracteata*), Virginia creeper (*Parthenocissus quinquefolia*), broad-leaf enchanter's nightshade (*Circaea canadensis*), mayapple (*Podophyllum pelltatum*) and Pennsylvania sedge (*Carex pensylvanica*).

Hydrology in W-1 is likely sustained by surface water runoff from the surrounding upland landscape. A series of culverts were observed that connect the three wetland segments and direct flow underneath CTH X towards the Root River. No culvert was observed on the far northern end of the wetland. Most of the wetland drainageway was saturated to slightly inundated at the time of the site visit. Physical on-site evidence of wetland hydrology within W-1 included a high water table, saturation, inundation visible on aerial photography, a sparsely vegetated concave surface, a drainage pattern, geomorphic position, and a positive FAC-Neutral test.

According to the NRCS Soil Survey of Waukesha County, Warsaw silt loam is the dominant mapped soil type within W-1 and most of the immediate adjacent upland. The NRCS hydric soil list classifies Warsaw silt loam as a well-drained non-hydric soil. Two wetland data points were examined within W-1 and four were examined on the immediate adjacent upland (Appendix 4). The wetland soil profiles observed met the S5 (Sandy Redox), F3 (Depleted Matrix), and F2 (Loamy Gleyed Matrix) NRCS Hydric Soil Indicators. Of the four upland data points examined, three of them met a hydric soil indicator including A11 (Depleted Below a Dark Surface), A12 (Thick Dark Surface), and F3 (Depleted Matrix). Although three of the four upland data points also met the criteria for hydrophytic vegetation, all of the upland data points were located on a steep embankment adjacent to the wetland drainage ditch and lacked wetland hydrology indicators.

In general, there was distinct shift in topography and plant community composition along the wetland drainageway where a steep drop in grade was apparent and dominant wetland vegetation gave way to a mix of wetland and upland vegetation common to disturbed upland areas. Additionally, hydrology indicators were absent in the representative upland data points (DP-1, DP-3, DP-4, and DP-6) versus the two wetland data points (DP-2 and DP-5). Please refer to the site photos in Appendix 3 for various depictions of W-1 and its adjacent upland plant community.

CONCLUSION

Based on the wetland assessment completed by RASN, one (1) wetland associated a WDNR-determined navigable waterway was identified within the Study Area (Figures 2A-B). The total acreage of W-1 within the Study Area is 0.19 acre (8,104 square feet) acre. The wetland is associated with a waterway that was deemed navigable by the Wisconsin Department of Natural Resources (WDNR) in 2007. Thus, the wetland is assumed to be under the jurisdiction of both the WDNR and US Army Corps of Engineers (Corps).

RASN ecologists are required by the WDNR to provide their professional judgment on wetland susceptibility per revised NR 151 guidance (Guidance #3800-2015-02) (Appendix 5). In general, RASN believes W-1 would best fit into the moderately susceptible category.

The wetland boundary staked in the field by R.A. Smith National, Inc. is a professional finding based on accepted USACE and WDNR methodology at the time the wetlands were delineated. This wetland delineation field work and report is not intended to meet the requirements of an SEWRPC Environmental Corridor, WDNR Endangered Species Review, a navigability determination, or the location of either the Ordinary High Water Mark or floodplain.

Wetlands and waterways that are considered waters of the U.S. are subject to regulation under Section 404 of the Clean Water Act (CWA) and the jurisdictional regulatory authority lies with the USACE. Additionally, the WDNR has regulatory authority over wetlands, navigable waters, and adjacent lands under Chapters 30 and 281 Wisconsin State Statutes, and Wisconsin Administrative Codes NR 103, 299, 350, and 353. In addition, the USACE and WDNR have jurisdictional authority to determine which features are exempt including stormwater ponds and conveyance features. If the client proposes to modify an existing stormwater feature, an Artificial Determination Exemption would need to be submitted. See the form on the WDNR Wetland Identification website (fee involved) http://dnr.wi.gov/topic/wetlands/identification.html. Furthermore, municipalities, townships and counties may have local zoning authority over certain areas or types of wetland and waterways. The determination that a wetland or waterway is subject to regulatory jurisdiction is made independently by the agencies.

Any activity in the delineated wetland may require U.S. Army Corps of Engineers permits and State of Wisconsin Department of Natural Resources Water Quality Certification, and local government permits. If the Client proceeds to change, modify or utilize the property in question without obtaining authorization from the appropriate regulatory agency, it will be done at the Client's own risk and R.A. Smith National, Inc shall not be responsible or liable for any resulting damages.

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Appendices

Appendix 1: Figures

Appendix 2: WETS Table Analysis, NRCS WETS Table & Daily Precipitation Table

Appendix 3: Site Photographs

Appendix 4: Wetland Determination Data Forms – Northcentral/Northeast Region

Appendix 5: NR 151 Wetland Susceptibility Table

Appendix 1: Figures

Figure 1: USGS Map/Site Location Map

Figure 2A-B: Wetland Boundary Maps

Figure 3: WDNR Surface Water Data Viewer Map

Figures 4A-C: Aerial Photographs (2000, 2005, & 2010)

Figure 5: 90-day Departure from Normal Precipitation Map

Map Legend

Study Area *31.27 Acres*

Data Sources:
U.S. Geological Survey

R.A. Smith National
Beyond Surveying and Engineering

0 1,000 2,000

1 inch = 2,000 feet

July 06, 2015

3150342

Overlook Hill Subdivision
City of Waukesha
Waukesha County, WI

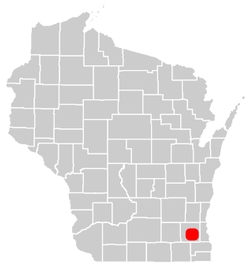

Figure 1
Topographic/
Site Location
Map

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WETLAND BOUNDARY MAP

Situated on Saylesville Road, in the City of Waukesha, Waukesha County, Wisconsin.

Part of the Northwest 1/4 of Section 20, Town 6 North, Range 19 East, in the City of Waukesha, Waukesha County, Wisconsin.

July , 2015 Siepmann reality Corporation Drawing No. 166454-RMK

LEGEND

- SAMPLE POINT
- WETLAND BOUNDARY
- WETLAND BOUNDARY FLAGGED OUTSIDE PROJECT AREA
- WETLAND DELINEATION PROJECT AREA

FIGURE 2A
WETLAND BOUNDARY MAP

R.A. Smith National, Inc.

Beyond Surveying and Engineering

16745 W. Bluemound Road, Brookfield WI 53005
262-781-1000 Fax 262-797-7373 www.rasmithnational.com
Appleton, WI Orange County, CA Pittsburgh, PA

S:\5166454\dwg\
WX101B150.dwg\SHEET 1

WETLAND BOUNDARY MAP

Situated on Saylesville Road, in the City of Waukesha, Waukesha County, Wisconsin.

Part of the Northwest 1/4 of Section 20, Town 6 North, Range 19 East, in the City of Waukesha, Waukesha County, Wisconsin.

July , 2015 Siepmann reality Corporation Drawing No. 166454-RMK

LEGEND

- SAMPLE POINT
- WETLAND BOUNDARY
- WETLAND BOUNDARY FLAGGED OUTSIDE PROJECT AREA
- WETLAND DELINEATION PROJECT AREA

FIGURE 2B
WETLAND BOUNDARY MAP

R.A. Smith National, Inc.

Beyond Surveying and Engineering

16745 W. Bluemound Road, Brookfield WI 53005
262-781-1000 Fax 262-797-7373 www.rasmithnational.com
Appleton, WI Orange County, CA Pittsburgh, PA

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WX101B150.dwg\SHEET 2

MoB - Mayville silt loam, 2 to 6 percent slopes

GtB - Griswold silt loam, 2 to 6 percent slopes

HmB2 - Hochheim loam, 2 to 6 percent slopes, eroded

WeB - Warsaw loam, 2 to 6 percent slopes

GtC2 - Griswold silt loam, 6 to 12 percent slopes, eroded

HmD2 - Hochheim loam, 12 to 20 percent slopes, eroded

WhA - Warsaw silt loam, 0 to 2 percent slopes

PrA - Pistakee silt loam, 1 to 3 percent slopes

E2K - Emergent/wet meadow

WeB - Warsaw loam, 2 to 6 percent slopes

GtB - Griswold silt loam, 2 to 6 percent slopes

LmB - Lamartine silt loam, 1 to 4 percent slopes

E2K - Emergent/wet meadow

HmC2 - Hochheim loam, 6 to 12 percent slopes, eroded

HmB - Hochheim loam, 2 to 6 percent slopes

E2K

HmC2 - Hochheim loam, 6 to 12 percent slopes, eroded

WeB - Warsaw loam, 2 to 6 percent slopes

Map Legend

- Study Area 31.27 Acres
- WWI Wetlands
- Wetland Indicator Soils
- NRCS Wisconsin Soils

Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors

Document Path: P:\3150342\GIS\Wetland Figures\Figure 3 - Existing Conditions Map.mxd

Data Sources:
Wisconsin Department of Natural Resources
U.S. Department of Agriculture Natural Resources Conservation Service

R.A. Smith National
Beyond Surveying and Engineering

0 75 150
1 inch = 150 feet

July 06, 2015

3150342

Overlook Hill Subdivision
City of Waukesha
Waukesha County, WI

Figure 3
WDNR Surface Water Data Viewer Map

Map Legend

Study Area 31.27 Acres

Data Source:
Southeastern Wisconsin Regional Planning Commission, Waukesha County GIS

R.A. Smith National
Beyond Surveying and Engineering

0 75 150

1 inch = 150 feet

July 06, 2015

{Project #}

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Overlook Hill Subdivsion
City of Waukesha
Waukesha County, WI

Figure 4A
2000 Aerial Photo Map

Map Legend

Study Area 31.27 Acres

Data Source:
Southeastern Wisconsin Regional Planning Commission, Waukesha County GIS

R.A. Smith National
Beyond Surveying and Engineering

0 75 150

1 inch = 150 feet

July 06, 2015

{Project #}

Document Path: P:\3150342\GIS\Wetland Figures\Figure 4 - Aerial Photo Map.mxd

Overlook Hill Subdivsion
City of Waukesha
Waukesha County, WI

Figure 4B
2005 Aerial Photo Map

Data Source:
Southeastern Wisconsin Regional Planning Commission, Waukesha County GIS

R.A. Smith National
Beyond Surveying and Engineering

0 75 150
1 inch = 150 feet

July 06, 2015

{Project #}

Overlook Hill Subdivision
City of Waukesha
Waukesha County, WI

Figure 4C
2010 Aerial Photo Map

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Appendix 2:

WETS Table Analysis, NRCS WETS Table & Daily Precipitation Table

WETS Analysis Worksheet

Project Name: Overlook Hill Subdivision
Project Number: 3150342
Period of interest: April through June, 2015
County: Waukesha

Long-term rainfall records (from WETS table)

	Month	3 years in 10 less than	Normal	3 years in 10 greater than
1st month prior:	June	2.46	3.78	4.54
2nd month prior:	May	2.03	3.02	3.61
3rd month prior:	April	2.46	3.53	4.20
		Sum =	**10.33**	

Site determination

Site Rainfall (in)	Condition Dry/Normal*/Wet	Condition** Value	Month Weight	Product
3.26	Normal	2	3	6
2.63	Normal	2	2	4
4.07	Normal	2	1	2
Sum = **9.96**			Sum*** =	**12**

*Normal precipitation with 30% to 70% probability of occurrence

**Condition value:

Dry = 1
Normal = 2
Wet = 3

***If sum is:

6 to 9	then period has been drier than normal
10 to 14	then period has been normal
15 to 18	then period has been wetter than normal

Determination:

	Wet
	Dry
X	Normal

Precipitation data source: WETS Table: Waukesha, WI8937, Waukesha County, WI

Reference: Donald E.Woodward, ed. 1997. *Hydrology Tools for Wetland Determination* , Chapter 19. Engineering Field Handbook. U.S. Department of Agriculture, Natural Resources Conservation Service, Fort Worth, TX.

WETS Table

USDA Field Office Climate Data

WETS Station : WAUKESHA, WI8937 Creation Date: 07/01/2015
Latitude: 4300 Longitude: 08815 Elevation: 00830
State FIPS/County(FIPS): 55133 County Name: Waukesha
Start yr. - 1971 End yr. - 2000

Month	Temperature (Degrees F.)			Precipitation (Inches)				
					30% chance will have		avg # of days	avg total
	avg daily max	avg daily min	avg	avg	less than	more than	w/.1 or more	snow fall
January	27.5	11.4	19.5	1.48	0.87	1.79	5	13.0
February	32.8	16.5	24.7	1.31	0.74	1.62	4	7.9
March	43.9	26.6	35.3	2.28	1.34	2.77	5	6.9
April	57.0	37.5	47.3	3.53	2.46	4.20	7	2.9
May	70.1	48.5	59.3	3.02	2.03	3.61	7	0.0
June	80.0	58.1	69.1	3.78	2.46	4.54	7	0.0
July	84.2	63.4	73.8	3.83	2.82	4.49	7	0.0
August	81.5	61.8	71.7	4.77	3.28	5.69	8	0.0
September	73.4	53.0	63.2	3.52	2.00	4.34	6	0.0
October	61.0	41.8	51.4	2.62	1.59	3.17	5	0.1
November	45.4	29.8	37.6	2.63	1.64	3.18	5	2.9
December	32.6	17.8	25.2	1.87	1.13	2.26	5	9.8
Annual	-----	-----	-----	------	32.36	36.66	--	----
Average	57.5	38.9	48.2	------	------	------	--	----
Average	-----	-----	-----	34.64	------	------	59	44.9

GROWING SEASON DATES

Probability	Temperature		
	24 F or higher	28 F or higher	32 F or higher
	Beginning and Ending Dates Growing Season Length		
50 percent *	4/ 6 to 11/ 2 209 days	4/13 to 10/24 194 days	4/25 to 10/12 169 days
70 percent *	4/ 3 to 11/ 5 216 days	4/ 8 to 10/29 203 days	4/20 to 10/17 179 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

total 1893-2015 prcp

Station : WI8937, WAUKESHA
Unit = inches

yr	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	annl
93	M1.52	1.21	2.95	5.64	2.11	4.32	3.05	1.32	2.87	2.41	1.47	2.61	31.48
94	1.34	0.81	2.49	2.94	3.68	2.22	M1.16	1.73	M4.55	2.37	2.08	0.51	25.88
95	1.55	0.42	0.53	0.78	5.01	2.29	1.79	2.61	1.56	0.67	2.11	1.82	21.14
96	0.43	0.89	M1.82	M4.11	4.12	2.59	2.59	2.67	5.71	0.68	2.05	0.56	28.22
97	2.73	1.03	M3.28	M4.14	1.01	3.14	3.20	3.02	1.35	1.11	1.25	1.58	26.84
98	2.34	1.60	M3.24	2.05	1.92	1.54	2.81	4.08	1.55	4.10	0.98	0.50	26.71
99	0.64	0.77	1.47	M1.19	3.92	3.99	2.14	2.50	3.18	1.21	2.20	1.18	24.39
0	1.43	1.87	0.91	2.34	1.21	1.21	7.03	5.67	2.02	2.34	1.86	0.45	28.34
1	M1.02	1.23	2.95	0.35	1.88	1.35	2.01	0.77	2.67	M1.00	0.58	1.49	17.30
2	0.29	1.39	1.33	1.11	5.96	4.53	8.82	0.64	3.95	1.73	2.39	2.31	34.45
3	M0.48	0.72	M2.86	2.51	4.57	3.30	6.93	7.39	5.04	2.50	1.01	0.99	38.30
4	M0.81	0.86	3.54	M1.97	3.70	2.07	3.17	3.70	4.33	3.28	M0.22	M1.38	29.03
5	0.86	M1.21	2.50	1.49	6.71	5.69	2.77	4.33	1.44	3.19	2.19	M1.02	33.40
6	M3.54	1.23	1.61	1.69	2.08	3.47	4.29	2.40	2.84	2.36	2.54	M1.31	29.36
7	2.15	0.11	2.20	3.14	M3.22	5.03	6.35	4.07	5.21	1.25	1.26	1.45	35.44
8	1.03	1.20	M2.61	4.24	4.86	3.11	1.08	1.85	0.81	0.82	2.03	1.15	24.79
9	2.44	M0.93	0.75	6.84	2.28	2.63	0.46	3.73	3.32	0.48	2.19	2.96	29.01
10	1.48	0.46	0.13	3.92	3.81	1.57	1.34	3.27	2.58	1.02	M2.63	M0.26	22.47
11	0.29	2.50	0.42	3.08	1.80	2.78	3.30	2.33	4.78	3.58	4.17	M0.98	30.01
12	1.36	M1.66	1.38	2.26	8.24	0.92	4.93	3.11	5.05	3.09	M1.03	2.20	35.23
13	1.40	1.10	3.36	3.29	7.06	5.21	5.40	5.37	2.49	2.60	1.90	M0.49	39.67
14	1.02	1.85	2.70	2.29	6.90	6.41	1.32	1.80	6.15	4.43	M0.33	1.98	37.18
15	1.48	M1.62	1.38	0.75	7.95	3.84	2.40	2.86	10.00	0.95	2.72	0.65	36.60
16	3.09	1.37	3.69	4.60	3.07	5.92	0.41	4.46	M6.60	4.64	M2.15	2.34	42.34
17	1.30	M0.10	1.67	3.67	3.94	7.44	3.51	1.04	4.91	6.00	0.38	0.55	34.51
18	5.60	1.45	1.63	3.51	4.23	1.42	1.40	1.60	1.29	2.83	2.90	2.51	30.37
19	M0.32	2.93	4.09	3.45	2.93	3.16	2.93	1.41	6.97	4.39	M2.76	1.64	36.98
20	1.53	0.38	4.71	2.30	2.12	3.58	2.17	4.23	1.75	2.17	1.86	3.75	30.55
21	0.30	0.35	2.89	5.73	2.74	1.52	1.28	6.78	9.50	5.02	1.42	2.89	40.42
22	0.22	M2.37	M1.02	2.66	3.80	2.64	2.54	2.73	4.79	1.53	2.54	M1.26	28.10
23	1.92	0.83	M3.89	2.89	1.83	3.90	1.74	3.31	4.85	4.18	1.55	1.28	32.17
24	1.36	2.53	3.80	2.16	4.11	5.30	2.45	8.07	2.21	0.06	2.33	0.93	35.31
25	0.90	1.35	M1.33	2.66	1.77	3.65	3.82	2.53	5.30	3.08	1.60	1.65	29.64
26	1.16	1.95	2.14	M2.05	4.09	M3.30	2.12	1.35	4.65	3.01	M3.52	1.05	30.39
27	1.38	1.39	M2.52	4.63	3.96	2.65	3.48	0.75	4.03	5.07	M4.44	0.67	34.97
28	0.18	0.95	2.03	1.42	3.35	5.82	1.84	4.19	1.36	2.90	4.45	2.50	30.99
29	3.93	1.18	2.04	6.25	2.46	2.96	5.85	1.68	2.95	M2.71	0.58	M1.01	33.60
30	1.35	0.58	2.67	2.71	2.59	1.73	2.28	1.01	2.43	2.38	0.65	0.75	21.13
31	1.25	0.48	M1.89	1.24	2.65	2.68	1.30	2.79	4.16	3.11	4.95	0.77	27.27
32	1.94	1.00	1.67	0.21	1.16	1.82	1.80	1.86	0.53	3.50	2.65	1.38	19.52
33	0.99	1.36	2.81	2.37	8.74	3.27	4.43	2.73	3.46	1.61	1.01	0.83	33.61
34	0.50	0.65	2.21	1.49	5.60	2.26	1.75	0.66	4.23	1.75	6.47	0.88	28.45
35	1.55	1.97	1.55	3.12	2.25	3.58	2.67	3.69	1.73	1.57	3.66	1.16	28.50
36	M1.32	1.19	0.47	1.19	1.82	2.73	M0.72	6.32	4.40	3.12	0.48	2.57	26.33
37	3.27	1.99	1.17	3.90	1.47	3.33	2.72	1.75	1.19	2.59	0.45	2.10	25.93
38	3.91	2.82	2.43	1.36	3.91	5.11	4.58	7.30	7.77	1.52	1.97	0.89	43.57
39	2.05	1.88	M1.52	2.71	2.35	3.87		3.56	1.30	2.53	0.38	0.35	22.50
40	1.75	1.66	1.44	2.37	5.01	7.11	1.79	6.15	0.77	1.53	2.89	1.07	33.54
41	2.53	0.56	1.90	1.33	3.75	1.92	2.66	0.91	9.20	3.15	0.88	1.26	30.05
42	1.31	0.55	1.74	0.71	4.65	4.45	3.20	3.82	3.73	M2.38	4.50	3.40	34.44
43	2.21	0.68	3.18	1.58	4.86	4.28	3.50	3.29	0.51	0.91	2.27	0.66	27.93
44	1.33	1.94	2.40	3.23	2.34	3.80	2.84	2.35	2.16	0.41	2.29	1.33	26.42
45	0.42	1.23	1.42	2.86	6.09	2.80	2.58	3.75	5.97	0.75	2.94	1.06	31.87
46	2.63	1.64	2.81	1.40	2.24	3.61	1.10	2.00	2.67	1.78	2.24	1.75	25.87
47	3.27	0.25	1.43	3.68	6.07	4.30	2.73	3.26	4.74	2.93	3.10	1.48	37.24
48	1.52	1.80	3.48	2.75	3.47	2.98	2.68	0.89	1.17	0.62	2.87	2.62	26.85

49	2.12	2.10	1.90	1.59	3.01	5.72	4.60	1.24	1.59	1.72	0.37	1.97	27.93
50	2.59	1.10	2.68	3.77	2.09	4.74	5.68	2.14	2.81	0.65	1.00	2.83	32.08
51	1.76	1.87	4.02	5.00	2.68	3.18	3.37	3.13	2.68	5.68	3.92	2.39	39.68
52	2.17	0.93	4.22	2.09	3.50	4.10	11.41	3.10	0.90	0.12	3.41	2.05	38.00
53	1.35	1.90	1.51	3.46	2.94	2.81	4.12	4.00	2.05	0.60	0.47	1.93	27.14
54	1.30	1.06	1.63	3.80	2.71	7.52	7.13	5.18	3.39	2.87	1.47	2.67	40.73
55	0.84	1.16	1.21	3.49	2.81	5.51	M1.82	1.08	1.68	3.12	0.67	0.97	24.36
56	0.39	0.90	M2.00	3.99	4.04	2.50	6.80	3.75	0.30	0.51	1.76	1.44	28.38
57	1.06	0.69	1.63	2.94	4.87	5.45	1.89	2.08	M0.52	1.53	3.19	2.28	28.13
58	0.99	0.15	0.40	1.92	2.71	1.63	1.58	4.04	4.55	2.38	3.97	0.45	24.77
59	1.35	1.62	4.38	3.44	1.30	2.90	4.38	3.91	5.15	5.32	2.14	1.58	37.47
60	2.32	1.62	2.27	3.95	4.74	1.59	4.60	6.39	3.10	3.51	2.73	0.25	37.07
61	0.22	0.80	3.43	3.45	1.70	2.57	2.13	2.43	10.21	3.32	2.42	1.15	33.83
62	2.08	1.69	1.73	1.50	2.63	1.80	3.65	2.17	1.68	1.81	0.80	0.75	22.29
63	0.94	0.40	1.99	2.57	1.70	2.93	1.33	3.75	2.79	0.51	1.79	0.66	21.36
64	1.33	0.26	2.41	4.81	3.82	2.74	4.74	2.43	1.91	0.17	2.74	0.73	28.09
65	3.14	0.88	3.86	3.17	2.24	1.54	3.03	8.06	6.88	3.42	1.58	3.16	40.96
66	1.59	1.31	2.95	2.87	2.28	1.14	2.18	2.68	0.60	1.48	2.46	2.34	23.88
67	1.30	1.23	1.21	1.98	3.21	5.23	1.65	2.55	1.29	3.73	1.66	1.06	26.10
68	0.76	0.64	0.19	4.15	3.15	6.92	4.14	3.96	3.58	1.32	2.02	2.67	33.50
69	1.82	0.11	1.03	3.35	2.89	7.94	4.29	0.56	2.22	5.07	0.93	1.24	31.45
70	0.46	0.22	1.43	2.14	6.63	3.84	3.62	0.93	5.78	2.13	2.12	2.87	32.17
71	1.50	2.50	1.65	1.68	1.91	3.57	2.71	3.98	1.21	2.98	3.67	4.21	31.57
72	0.61	0.55	2.35	2.23	3.13	3.54	4.58	6.31	8.40	2.80	1.07	2.84	38.41
73	0.92	1.56	2.69	7.88	4.60	2.95	1.86	1.10	4.50	3.39	1.78	2.86	36.09
74	3.23	2.26	3.81	3.98	3.63	2.52	2.55	4.12	1.85	2.37	1.76	1.93	34.01
75	2.06	1.79	3.56	3.69	1.73	4.64	3.21	5.45	0.95	0.54	3.65	0.68	31.95
76	1.13	2.41	5.54	5.42	4.02	2.40	2.14	2.08	1.07	2.25	0.53	0.34	29.33
77	0.51	0.65	4.44	1.92	1.02	4.22	5.55	5.78	3.00	2.27	3.64	2.23	35.23
78	1.18	0.24	0.64	4.27	3.92	4.84	4.80	2.55	6.34	2.08	2.18	2.80	35.84
79	2.50	0.81	3.74	4.50	1.86	2.77	2.74	8.14	0.00	2.38	2.53	1.69	33.66
80	1.22	0.85	0.46	3.82	1.81	3.62	3.54	7.95	5.92	1.43	1.38	2.25	34.25
81	0.23	1.73	M0.43		1.37	2.67	3.02	7.43	5.10	3.09	2.41	1.02	28.50
82	2.79	0.75	2.03	3.27	3.11	2.62	3.60	3.04	0.57	2.72	5.41	3.52	33.43
83	0.48	1.60	M4.49	2.67	M3.80	1.76	2.46	4.34	4.63	M3.25	3.84	1.86	35.18
84	0.56	1.00	1.56	4.26	4.83	4.28	2.97	2.77	M2.74	5.43	3.18	3.92	37.50
85	1.35	1.93	2.89	1.52	1.84	2.46	1.95	2.81	4.48	M5.79	5.99	1.29	34.30
86	0.80	1.95	1.63	2.19	2.38	6.30	5.18	5.16	7.85	M1.69	0.57	0.74	36.44
87		M0.00	2.31	4.09	4.23	3.08	6.19	8.17	3.72	1.01	M1.24		34.04
88													
89													
90													
91							4.19	1.97	M5.78	M5.60	M3.07	1.47	22.08
92	M0.64	1.28	M1.88	2.25	M1.20	M1.87	4.24	M3.54	5.18	1.81	4.53	2.33	30.75
93	2.15	0.99	M1.39	6.45	1.97	7.33	5.64	4.34	4.28	0.60	1.56	0.38	37.08
94	1.95	2.70	0.64	1.60	0.99	3.52	6.64	5.10	1.43	0.63	3.68	0.93	29.81
95	1.52	0.10	2.00	3.83	3.29	0.53	3.08	10.83	0.93	4.26	3.10	0.64	34.11
96	1.71	0.82	0.52	3.19	2.78	7.83	3.88	2.54	2.23	5.02	0.80	1.57	32.89
97	1.78	3.20	0.92	2.46	2.38	6.78	4.04	5.53	1.80	1.43	1.09	M1.24	32.65
98	2.92	2.14	3.55	3.57	4.16	3.92	1.40	6.41	2.32	3.39	2.39	0.98	37.15
99	4.27	1.22	0.83	5.45	3.82	6.14	6.48	1.86	3.87	0.77	0.78	1.77	37.26
0	1.01	1.26	1.34	2.97	8.05	4.15	7.54	5.78	7.00	0.92	M2.41	M2.30	44.73
1	1.28	3.12	0.35	4.75	5.42	4.62	1.87	4.82	4.66	3.59	M1.54	M1.30	37.32
2	0.87	1.56	1.73	3.96	2.89	3.30	3.32	8.50	3.32	2.76	0.73	0.69	33.63
3	0.22	M0.11	1.49	1.35	5.67	2.22	3.33	0.51	1.90	1.64	M4.12	2.35	24.91
4	0.76	M0.72	2.84	2.31	9.44	5.11	2.02	M4.35	0.13	2.39	2.26	M1.35	33.68
5	M2.33	1.57	0.69	1.03	2.86	M2.19	M2.69	1.18	M3.64	0.43	M3.23	M0.87	22.71
6	0.97	0.68	1.55	3.22	M4.63	M2.18	M3.74	4.49	M2.98	M2.89	M2.56	M2.48	32.37
7	M0.97	M1.42	1.65	M3.88	2.05	4.01	M2.95	9.62	1.51	2.41	0.21	3.11	33.79
8	0.96	M2.08	2.38	5.58	2.23	10.27	4.08	1.04	4.07	2.97	1.03	4.12	40.81
9	1.05	2.11	3.89	5.51	3.39	7.31	0.87	3.67	1.82	4.98	1.80	3.53	39.93
10	0.86	0.99	0.49	3.86	3.75	11.11	9.23	1.48	2.70	1.81	1.09	0.96	38.33
11	0.85	2.26	2.69	3.38	2.44	5.29	2.98	3.16	4.27	1.49	2.59	1.59	32.99

12	1.74	0.98	3.42	2.37	5.03	0.58	3.06	2.10	2.33	4.00	0.62	3.70	29.93
13	2.71	3.84	1.64	7.57	7.24	7.29	2.29	3.54	2.38	2.73	2.85	1.09	45.17
14	1.24	1.50	1.21	4.04	5.20	5.80	3.21	5.23	1.22	2.60	1.97	0.69	33.91
15	0.88	M0.79	0.70	4.07	2.63	3.26							12.33

Product generated by ACIS - NOAA Regional Climate Centers.

Daily Data

USDA Field Office Climate Data

WAUKESHA (478937)
Observed Daily Data
Month: Jun 2015

Day	Max Temp	Min Temp	Avg Temp	GDD B50	GDD B40	Total Prcpn	New Snow	Snow Depth
1						0.00		
2						0.00		
3						0.00		
4						0.00		
5						0.00		
6						0.00		
7						0.00		
8						0.10		
9						0.15		
10						0.00		
11						0.00		
12						1.19		
13						0.02		
14						0.38		
15						0.65		
16						0.05		
17						0.00		
18						0.07		
19						0.00		
20						0.00		
21						0.00		
22						0.00		
23						0.40		
24						0.00		
25						0.00		
26						0.06		
27						0.00		
28						0.00		
29						0.00		
30						0.19		
Smry						3.26		

Product generated by ACIS - NOAA Regional Climate Centers.

Appendix 3:

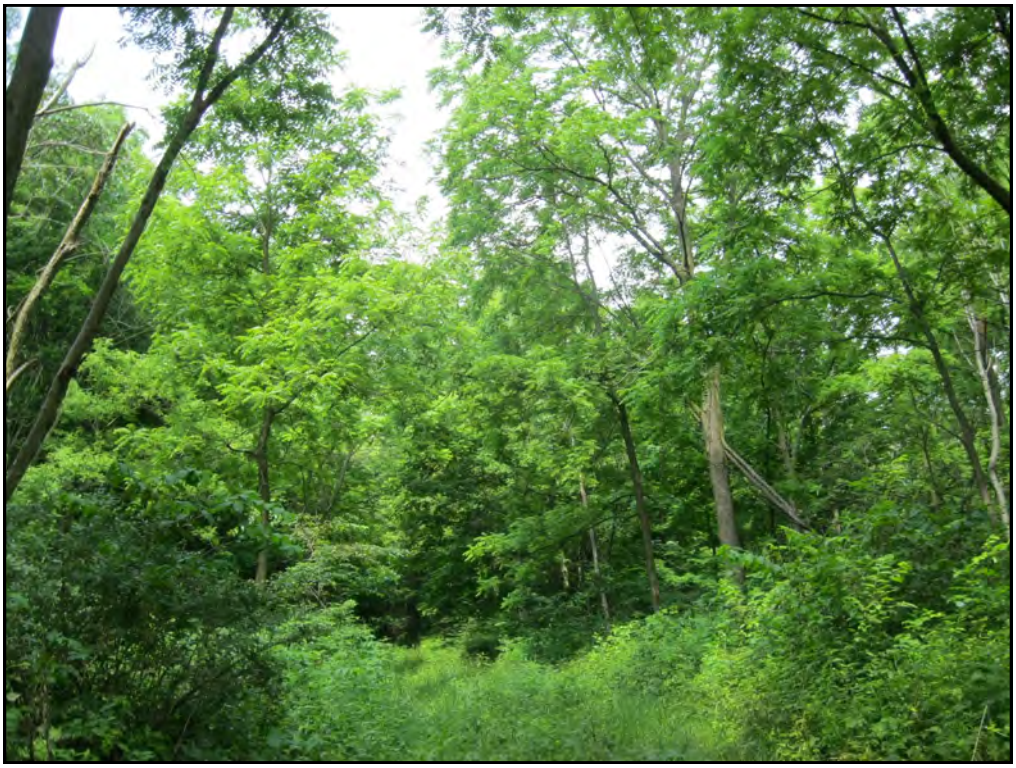
Site Photographs

Photograph 1 (6/30/15): View of the drainage channel associated with W-1 that was deemed navigable by the WDNR in 2007.

Photograph 2 (6/30/15): View of the drainage channel and adjacent W-1 on each side of the channel.

Photograph 3 (6/30/15): View of the upland mixed hardwoods forest just south of the farm road. This area was dominated by sugar maple (*Acer saccharum*).

Photograph 4 (6/30/15): A slightly more degraded portion of the upland woodland with a shrubby understory of invasive common buckthorn (*Rhamnus cathartica*) and hybrid honeysuckle (*Lonicera x bella*).



Photograph 5 (6/30/15): General view of the upland woods that is dominated by black walnut (*Juglans nigra*) alongside the farm road. No wetlands were identified in the woodland.

Photograph 6 (6/30/15): View of the southwest farm field planted in soybean. No wetlands were identified here.

Photograph 7 (6/30/15): East view of the farm field facing towards the school parcel. No wetlands were identified here.

Photograph 8 (6/30/15): Southeast view of the farm field taken from the wooded area. No wetlands were identified here.

Photograph 9 (6/30/15): North view of the farm field between W-1 and CTH X which was planted in soybean. No wetlands were identified here.

Photograph 10 (6/30/15): South view of the farm field between W-1 and CTH X which was planted in soybean. No wetlands were identified here.

Appendix 4:

Wetland Determination Data Forms – Northcentral/Northeast Region

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Overlook Hill Subdivision City/County: City of Waukesha/Waukesha Sampling Date: 6/30/15
Applicant/Owner: Siepmann Realty Corporation State: WI Sampling Point: DP-1
Investigator(s): Tina M. Myers, PWS Section, Township, Range: NW 1/4 Sec 20, T6N, R19E
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): convex
Slope (%): 20% Lat: Long: Datum:
Soil Map Unit Name: Warsaw silt loam, 0-2% slopes (WhA), non-hydric WWI classification: E2K
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ____ (If needed, explain any answers in Remarks.)
Are Vegetation N Soil N or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation N Soil N or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?**	**Yes**	**No X**
Hydric Soil Present?	Yes	No X	If yes, optional Wetland Site ID:		**none - upland**
Wetland Hydrology Present?	Yes	No X			

Remarks: (Explain alternative procedures here or in a separate report.) **Historical changes to hydrology due to adjacent ditching.**

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: equiv to 30' X 40')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus tremuloides*	60%	Y	FAC*
2.			
3.			
4.			
5.			
6.			
7.			
	60%	= Total Cover	
Sapling/Shrub Stratum (Plot size: equiv to 15' radius)			
1. *Rhamnus cathartica*	30%	Y	FAC
2. *Lonicera X bella*	25%	Y	FACU
3. *Populus tremuloides*	3%	N	FAC*
4. *Salix amygdaloides*	3%	N	FACW
5. *Morus alba*	3%	N	FACU
6. *Salix interior*	2%	N	FACW
7.			
	66%	= Total Cover	
Herb Stratum (Plot size: equiv to 5' radius)			
1. *Bromus inermis*	60%	Y	UPL
2. *Solidago canadensis*	30%	Y	FACU
3. *Phalaris arundinacea*	10%	N	FACW
4. *Asclepias syriaca*	5%	N	UPL
5. *Ambrosia trifida*	5%	N	FAC
6. *Equisetum arvense*	5%	N	FAC
7. *Symphyotrichum drummondii*	3%	N	UPL
8. *Geum canadense*	2%	N	FAC
9. *Rhamnus cathartica*	2%	N	FAC
10.			
11.			
12.			
	122%	= Total Cover	
Woody Vine Stratum (Plot size: equiv to 30' radius)			
1. *Vitis riparia*	5%	Y	FAC
2.			
3.			
4.			
	5%	= Total Cover	

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 6 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	15	x 2 =	30
FAC species	112	x 3 =	336
FACU species	58	x 4 =	232
UPL species	68	x 5 =	340
Column Totals:	253 (A)		938 (B)

Prevalence Index = B/A = 3.71

Hydrophytic Vegetation Indicators:
__ Rapid Test for Hydrophytic Vegetation
__ Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:
Tree - Woody plants 3 in. (7.6cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 (1m) tall.
Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vines - All woody vines greater than 3.28 ft in height.

Is Hydrophytic Vegetation Present? **Yes** ____ **No X**

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

SOIL

Sampling Point: DP-1

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR 3/1	100%					silt loam	
11-18	10YR 3/1	45%					silty clay loam	
11-18	10YR 4/2	45%	10YR 5/6	10%	C	M	silty clay loam	
18-24	2.5Y 5/3	80%	10YR 5/6	20%	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Mesic Spodic (TA6)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: **none**

Depth (inches): **n/a**

Is Hydric Soil Present? Yes ___ No **X**

Remarks: **Hydric soil criterion is not met.**

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No **X** Depth (inches): ___

Water Table Present? Yes ___ No **X** Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No **X** Depth (inches): ___

Is Wetland Hydrology Present? Yes ___ No **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: **USGS Map (Figure 1, Appendix 1), WDNR Surface Water Data Viewer Map (Figure 3, Appendix 1), aerial photos from 2000, 2005, and 2010 (Figures 4A-C, Appendix 1), NOAA Precip Map (Figure 5, Appendix 1), WET Data (Appendix 2)**

Remarks: **Data point is located on a well-drained steep slope adjacent to a deeply excavated ditch. NOAA Precipitation Map (Figure 5, Appendix 1) and WETS Analysis (Appendix 2) shows that climatic conditions were within the normal range before the site visit.**

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: **Overlook Hill Subdivision** City/County: **City of Waukesha/Waukesha** Sampling Date: **6/30/15**
Applicant/Owner: **Siepmann Realty Corporation** State: **WI** Sampling Point: **DP-2**
Investigator(s): **Tina M. Myers, PWS** Section, Township, Range: **NW 1/4 Sec 20, T6N, R19E**
Landform (hillslope, terrace, etc.): **drainage ditch** Local relief (concave, convex, none): **concave ditch**
Slope (%): **0%** Lat: _____ Long: _____ Datum: _____
Soil Map Unit Name: **Warsaw silt loam, 0-2% slopes (WhA), non-hydric** WWI classification: **E2K**
Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No _____ (If needed, explain any answers in Remarks.)
Are Vegetation **N** Soil **N** or Hydrology **N** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No _____
Are Vegetation **N** Soil **N** or Hydrology **N** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X** No _____	**Is the Sampled Area within a Wetland?**	**Yes X No** _____
Hydric Soil Present?	Yes **X** No _____	If yes, optional Wetland Site ID:	**W-1**
Wetland Hydrology Present?	Yes **X** No _____		

Remarks: (Explain alternative procedures here or in a separate report.) **Wetland is associated with a drainage channel that was deemed navigable by WDNR in 2007.**

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: equiv to 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0%	= Total Cover	
Sapling/Shrub Stratum (Plot size: equiv to 15' radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0%	= Total Cover	
Herb Stratum (Plot size: equiv to 5' radius)			
1. ***Rhamnus cathartica***	**10%**	**Y**	**FAC**
2. ***Equisetum arvense***	**10%**	**Y**	**FAC**
3. ***Phalaris arundinacea***	**5%**	**N**	**FACW**
4. ***Solanum dulcamara***	**5%**	**N**	**FAC**
5. ***Geum canadense***	**2%**	**N**	**FAC**
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	32%	= Total Cover	
Woody Vine Stratum (Plot size: equiv to 30' radius)			
1.			
2.			
3.			
4.			
	0%	= Total Cover	

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)
Total Number of Dominant Species Across All Strata: **2** (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
__ Rapid Test for Hydrophytic Vegetation
X Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:
Tree - Woody plants 3 in. (7.6cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 (1m) tall.
Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vines - All woody vines greater than 3.28 ft in height.

Is Hydrophytic Vegetation Present? **Yes X No** _____

Remarks: (Include photo numbers here or on a separate sheet.) **Approximately a 5' to 6' wide drainage channel with some narrow wetland "shelves" alongside it. This area was mostly void of vegetation due to water flow.**

SOIL

Sampling Point: DP-2

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/1	100%					silt loam	
1-16	2.5Y 5/2	40%	5YR 5/8	60%	C	M	sand/gravel/cobble mix	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Mesic Spodic (TA6)
- ___ Other (Explain in Remarks)

Restrictive Layer (if observed):

Type: **cobble**

Depth (inches): **16"**

Is Hydric Soil Present? Yes X No ___

Remarks: **Shovel refusal at 16" due to extensive cobble.**

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- *X Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	
Water Table Present?	Yes X	No ___	Depth (inches):	1"
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	0"

Is Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: **USGS Map (Figure 1, Appendix 1), WDNR Surface Water Data Viewer Map (Figure 3, Appendix 1), aerial photos from 2000, 2005, and 2010 (Figures 4A-C, Appendix 1), NOAA Precip Map (Figure 5, Appendix 1), WET Data (Appendix 2)**

Remarks: ***Drainage pattern is somewhat visible on the 2000, 2005, and 2010 aerials. NOAA Precipitation Map (Figure 5, Appendix 1) and WETS Analysis (Appendix 2) shows that climatic conditions were within the normal range before the site visit.**

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: **Overlook Hill Subdivision** City/County: **City of Waukesha/Waukesha** Sampling Date: **6/30/15**
Applicant/Owner: **Siepmann Realty Corporation** State: **WI** Sampling Point: **DP-3**
Investigator(s): **Tina M. Myers, PWS** Section, Township, Range: **NW 1/4 Sec 20, T6N, R19E**
Landform (hillslope, terrace, etc.): **hillslope** Local relief (concave, convex, none): **convex**
Slope (%): **20%** Lat: Long: Datum:
Soil Map Unit Name: **Warsaw silt loam, 0-2% slopes (WhA), non-hydric** WWI classification: **E2K**
Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (If needed, explain any answers in Remarks.)
Are Vegetation **N** Soil **N** or Hydrology **N** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No ____
Are Vegetation **N** Soil **N** or Hydrology **N** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes **X** No ____
Hydric Soil Present? Yes **X** No ____
Wetland Hydrology Present? Yes ____ No **X**

Is the Sampled Area within a Wetland? Yes ____ No **X**
If yes, optional Wetland Site ID: **none - upland**

Remarks: (Explain alternative procedures here or in a separate report.) **Previoulsy drained hydric soils due to historic hydrology changes - ditching.**

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: equiv to 30' X 40')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus deltoides*	30%	Y	FAC
2. *Rhamnus cathartica*	20%	Y	FAC
3. *Salix bebbiana*	20%	Y	FACW
4.			
5.			
6.			
7.			
	70%	= Total Cover	
Sapling/Shrub Stratum (Plot size: equiv to 15' radius)			
1. *Rhamnus cathartica*	50%	Y	FAC
2. *Salix interior*	10%	N	FACW
3. *Viburnum opulus*	5%	N	FACW
4.			
5.			
6.			
7.			
	65%	= Total Cover	
Herb Stratum (Plot size: equiv to 5' radius)			
1. *Rhamnus cathartica*	60%	Y	FAC
2. *Phalaris arundinacea*	20%	Y	FACW
3. *Equisetum arvense*	5%	N	FAC
4. *Circaea canadensis*	3%	N	FACU
5. *Cirsium arvense*	3%	N	FACU
6. *Alliaria petiolata*	2%	N	FACU
7.			
8.			
9.			
10.			
11.			
12.			
	93%	= Total Cover	
Woody Vine Stratum (Plot size: equiv to 30' radius)			
1.			
2.			
3.			
4.			
	0%	= Total Cover	

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: **5** (A)
Total Number of Dominant Species Across All Strata: **5** (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
__ Rapid Test for Hydrophytic Vegetation
X Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:
Tree - Woody plants 3 in. (7.6cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 (1m) tall.
Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vines - All woody vines greater than 3.28 ft in height.

Is Hydrophytic Vegetation Present? Yes **X** No ____

Remarks: (Include photo numbers here or on a separate sheet.) **Degraded wooded plant community with many FAC species that are commonly found in both uplands and wetlands.**

SOIL

Sampling Point: DP-3

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/1	100%					silt loam	
8-24	10YR 4/2	50%	10YR 5/8	50%	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L, M**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Mesic Spodic (TA6)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: **none**

Depth (inches): **n/a**

Is Hydric Soil Present? Yes X No ___

Remarks: **Hydric soil criterion is met.**

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Is Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: **USGS Map (Figure 1, Appendix 1), WDNR Surface Water Data Viewer Map (Figure 3, Appendix 1), aerial photos from 2000, 2005, and 2010 (Figures 4A-C, Appendix 1), NOAA Precip Map (Figure 5, Appendix 1), WET Data (Appendix 2)**

Remarks: **Data point is located on a well-drained steep slope adjacent to a deeply excavated ditch. No hydrology indiactors present other than FAC-Neutral. NOAA Precipitation Map (Figure 5, Appendix 1) and WETS Analysis (Appendix 2) shows that climatic conditions were within the normal range before the site visit.**

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: **Overlook Hill Subdivision** City/County: **City of Waukesha/Waukesha** Sampling Date: **6/30/15**
Applicant/Owner: **Siepmann Realty Corporation** State: **WI** Sampling Point: **DP-4**
Investigator(s): **Tina M. Myers, PWS** Section, Township, Range: **NW 1/4 Sec 20, T6N, R19E**
Landform (hillslope, terrace, etc.): **hillslope** Local relief (concave, convex, none): **convex**
Slope (%): **20%** Lat: Long: Datum:
Soil Map Unit Name: **Warsaw silt loam, 0-2% slopes (WhA), non-hydric** WWI classification: **E2K**
Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (If needed, explain any answers in Remarks.)
Are Vegetation **N** Soil **N** or Hydrology **N** significantly disturbed? Are "Normal Circumstances" present? Yes **X** No ____
Are Vegetation **N** Soil **N** or Hydrology **N** naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	X	No		
Hydric Soil Present?	Yes	X	No	**Is the Sampled Area within a Wetland?**	Yes ____ No **X**
Wetland Hydrology Present?	Yes		No	If yes, optional Wetland Site ID:	**none - upland**

Remarks: (Explain alternative procedures here or in a separate report.) **Drained hydric soils due to historic hydrology changes - ditching.**

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: equiv to 30' X 40')	Absolute % Cover	Dominant Species?	Indicator Status
1. ***Juglans nigra***	30%	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	30%	= Total Cover	
Sapling/Shrub Stratum (Plot size: equiv to 15' radius)			
1. ***Cornus racemosa***	20%	Y	FAC
2. ***Acer negundo***	3%	N	FAC
3.			
4.			
5.			
6.			
7.			
	23%	= Total Cover	
Herb Stratum (Plot size: equiv to 5' radius)			
1. ***Phalaris arundinacea***	75%	Y	FACW
2. ***Circaea canadensis***	30%	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	105%	= Total Cover	
Woody Vine Stratum (Plot size: equiv to 30' radius)			
1.			
2.			
3.			
4.			
	0%	= Total Cover	

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: **2** (A)
Total Number of Dominant Species Across All Strata: **4** (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	23	x 3 =	69
FACU species	60	x 4 =	240
UPL species	0	x 5 =	0
Column Totals:	158	(A)	459 (B)
Prevalence Index = B/A =			2.91

Hydrophytic Vegetation Indicators:
__ Rapid Test for Hydrophytic Vegetation
__ Dominance Test is >50%
X Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:
Tree - Woody plants 3 in. (7.6cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 (1m) tall.
Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vines - All woody vines greater than 3.28 ft in height.

Is Hydrophytic Vegetation Present? Yes **X** No ____

Remarks: (Include photo numbers here or on a separate sheet.) **Degraded plant community with FAC and FACW species that are commonly found in both uplands and wetlands.**

SOIL

Sampling Point: **DP-4**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 2/1	100%					silt loam	
15-24	10YR 4/1	85%	10YR 5/8	15%	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Mesic Spodic (TA6)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: **none**

Depth (inches): **n/a**

Is Hydric Soil Present? Yes **X** No ___

Remarks: **Hydric soil criterion is met.**

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Is Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: **USGS Map (Figure 1, Appendix 1), WDNR Surface Water Data Viewer Map (Figure 3, Appendix 1), aerial photos from 2000, 2005, and 2010 (Figures 4A-C, Appendix 1), NOAA Precip Map (Figure 5, Appendix 1), WET Data (Appendix 2)**

Remarks: **Data point is located on a well-drained steep slope adjacent to a deeply excavated ditch. No hydrology indicators are present. NOAA Precipitation Map (Figure 5, Appendix 1) and WETS Analysis (Appendix 2) shows that climatic conditions were within the normal range before the site visit.**

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Overlook Hill Subdivision City/County: City of Waukesha/Waukesha Sampling Date: 6/30/15
Applicant/Owner: Siepmann Realty Corporation State: WI Sampling Point: DP-5
Investigator(s): Tina M. Myers, PWS Section, Township, Range: NW 1/4 Sec 20, T6N, R19E
Landform (hillslope, terrace, etc.): drainage ditch Local relief (concave, convex, none): concave ditch
Slope (%): 0% Lat: Long: Datum:
Soil Map Unit Name: Warsaw silt loam, 0-2% slopes (WhA), non-hydric WWI classification: E2K
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ____ (If needed, explain any answers in Remarks.)
Are Vegetation N Soil N or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation N Soil N or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____
If yes, optional Wetland Site ID: W-1

Remarks: (Explain alternative procedures here or in a separate report.) **Wetland is associated with a drainage channel that was deemed navigable by WDNR in 2007.**

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: equiv to 25' X 60')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix amygdaloides*	30%	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	30%	= Total Cover	
Sapling/Shrub Stratum (Plot size: equiv to 20' X 40')			
1. *Rhamnus cathartica*	40%	Y	FAC
2. *Cornus alba*	15%	Y	FACW
3.			
4.			
5.			
6.			
7.			
	55%	= Total Cover	
Herb Stratum (Plot size: equiv to 5' radius)			
1. *Rhamnus cathartica*	30%	Y	FAC
2. *Equisetum arvense*	25%	Y	FAC
3. *Phalaris arundinacea*	20%	N	FACW
4. *Solanum dulcamara*	20%	N	FAC
5. *Carex stricta*	10%	N	OBL
6. *Geum canadense*	5%	N	FAC
7.			
8.			
9.			
10.			
11.			
12.			
	110%	= Total Cover	
Woody Vine Stratum (Plot size: equiv to 30' radius)			
1.			
2.			
3.			
4.			
	0%	= Total Cover	

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
__ Rapid Test for Hydrophytic Vegetation
X Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:
Tree - Woody plants 3 in. (7.6cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 (1m) tall.
Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vines - All woody vines greater than 3.28 ft in height.

Is Hydrophytic Vegetation Present? Yes X No ____

Remarks: (Include photo numbers here or on a separate sheet.) **Approximately a 5' to 6' wide drainage channel with some narrow wetland "shelves" alongside it.**

SOIL

Sampling Point: DP-5

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/1	100%					silt loam	
2-16	10Y 5/1	100%					sandy clay loam	mixed with gravel/cobble & variegated colors from rock minerals

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR R, MLRA 149B)**
- ___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
- ___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
- ___ Loamy Mucky Mineral (F1) **(LRR K, L)**
- X Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
- ___ Coast Prairie Redox (A16) **(LRR K, L, R)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
- ___ Dark Surface (S7) **(LRR K, L, M)**
- ___ Polyvalue Below Surface (S8) **(LRR K, L)**
- ___ Thin Dark Surface (S9) **(LRR K, L)**
- ___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Mesic Spodic (TA6)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: **cobble**

Depth (inches): **16"**

Is Hydric Soil Present? Yes X No ___

Remarks: **Shovel refusal at 16" due to extensive cobble. Gley soil indicates prolonged inundation.**

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- *X Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	
Water Table Present?	Yes X	No ___	Depth (inches):	5"
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	0"

Is Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: **USGS Map (Figure 1, Appendix 1), WDNR Surface Water Data Viewer Map (Figure 3, Appendix 1), aerial photos from 2000, 2005, and 2010 (Figures 4A-C, Appendix 1), NOAA Precip Map (Figure 5, Appendix 1), WET Data (Appendix 2)**

Remarks: ***Drainage pattern is somewhat visible on the 2000, 2005, and 2010 aerials. NOAA Precipitation Map (Figure 5, Appendix 1) and WETS Analysis (Appendix 2) shows that climatic conditions were within the normal range before the site visit.**

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Overlook Hill Subdivision | City/County: City of Waukesha/Waukesha | Sampling Date: 6/30/15
Applicant/Owner: Siepmann Realty Corporation | State: WI | Sampling Point: DP-6
Investigator(s): Tina M. Myers, PWS | Section, Township, Range: NW 1/4 Sec 20, T6N, R19E
Landform (hillslope, terrace, etc.): hillslope | Local relief (concave, convex, none): convex
Slope (%): 25% | Lat: | Long: | Datum:
Soil Map Unit Name: Warsaw silt loam, 0-2% slopes (WhA), non-hydric | WWI classification: E2K
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ____ (If needed, explain any answers in Remarks.)
Are Vegetation N Soil N or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation N Soil N or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes X No ____	If yes, optional Wetland Site ID: none - upland
Wetland Hydrology Present?	Yes ____ No X	

Remarks: (Explain alternative procedures here or in a separate report.) **Drained hydric soils due to historic hydrology changes - ditching.**

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: equiv to 30' X 40')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus tremuloides*	60%	Y	FAC*
2. *Rhamnus cathartica*	15%	N	FAC
3. *Populus deltoides*	10%	N	FAC
4.			
5.			
6.			
7.			
	85%	= Total Cover	
Sapling/Shrub Stratum (Plot size: equiv to 15' radius)			
1. *Rhamnus cathartica*	60%	Y	FAC
2. *Lonicera x bella*	10%	N	FACU
3.			
4.			
5.			
6.			
7.			
	70%	= Total Cover	
Herb Stratum (Plot size: equiv to 5' radius)			
1. *Rhamnus cathartica*	40%	Y	FAC
2. *Geum canadense*	15%	Y	FAC
3. *Solidago canadensis*	15%	Y	FACU
4. *Equisetum arvense*	10%	N	FAC
5. *Circaea canadensis*	10%	N	FACU
6. *Cirsium arvense*	3%	N	FACU
7. *Populus tremuloides*	3%	N	FAC*
8.			
9.			
10.			
11.			
12.			
	96%	= Total Cover	
Woody Vine Stratum (Plot size: equiv to 30' radius)			
1.			
2.			
3.			
4.			
	0%	= Total Cover	

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
__ Rapid Test for Hydrophytic Vegetation
X Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:
Tree - Woody plants 3 in. (7.6cm) or more in diameter at breast height (DBH), regardless of height.
Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 (1m) tall.
Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.
Woody vines - All woody vines greater than 3.28 ft in height.

Is Hydrophytic Vegetation Present? Yes X No ____

Remarks: (Include photo numbers here or on a separate sheet.) **Degraded plant community with FAC species that are commonly found in both uplands and wetlands.**

SOIL

Sampling Point: **DP-6**

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 2/1	100%					silt loam	
10-24	10YR 5/1	80%	10YR 5/8	20%	C	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L, M**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Mesic Spodic (TA6)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: **none**

Depth (inches): **n/a**

Is Hydric Soil Present? Yes **X** No ___

Remarks: **Hydric soil criterion is met.**

HYDROLOGY

Wetland Hydrology Indicators:

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

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Is Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: **USGS Map (Figure 1, Appendix 1), WDNR Surface Water Data Viewer Map (Figure 3, Appendix 1), aerial photos from 2000, 2005, and 2010 (Figures 4A-C, Appendix 1), NOAA Precip Map (Figure 5, Appendix 1), WET Data (Appendix 2)**

Remarks: **Data point is located on a well-drained steep slope adjacent to a deeply excavated ditch. No hydrology indicators are present. NOAA Precipitation Map (Figure 5, Appendix 1) and WETS Analysis (Appendix 2) shows that climatic conditions were within the normal range before the site visit.**

Appendix 5:

NR 151 Wetland Susceptibility Table

Wetland Category for Stormwater Permitting *			
Wetland	Highly Susceptible	Moderately Susceptible	Less Susceptible
W-1		X	

Less Susceptible: Dominated by 90% or greater invasive species

Moderately Susceptible: Sedge meadows, fens, bogs, forested wetlands, fresh wet meadows, shallow/deep marshes, various swamps

Highly Susceptible: Trout streams, threatened and endangered species, fish and wildlife refuges, calcareous fens, wild and scenic rivers

* These designations apply to any project requiring NR 151 stormwater permitting and are based on wetland delineation field work and the professional opinion of R.A. Smith National, Inc. Final determination of wetland susceptibilty rests with the WDNR. Some of the characteristics of a Highly Susceptible wetland may not be apparent to RASN due to confidential data or data beyond the scope of this delineation (i.e. rare species, high quality trout stream etc). Navigable waterways may also be subject to NR 151 protective area standards.

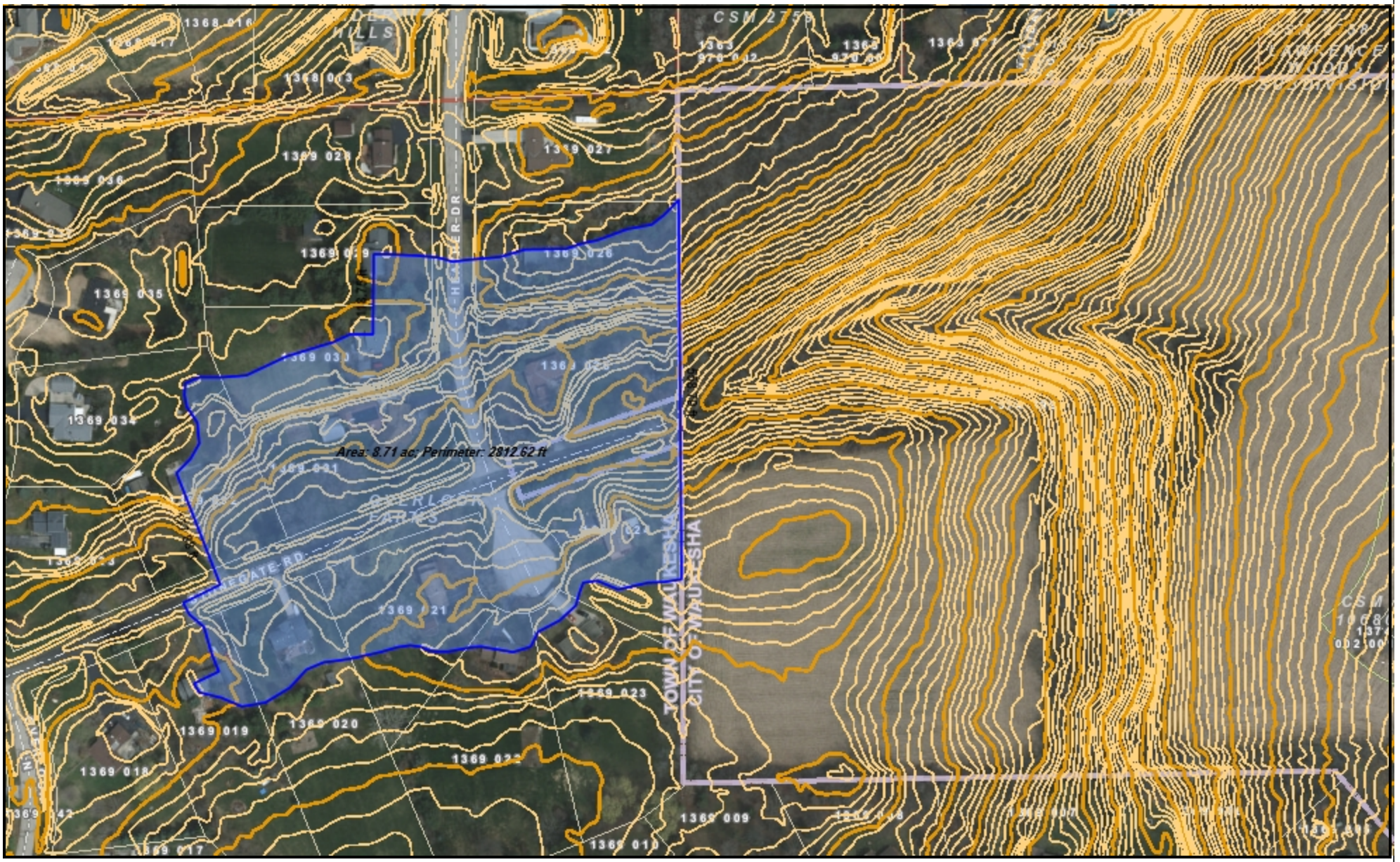
Exhibit C

Pre-development Subbasin Map

WAUKESHA COUNTY

LAND INFORMATION SYSTEMS DIVISION

Offisite Drainage



0 200.00 Feet

The information and depictions herein are for informational purposes and Waukesha County specifically disclaims accuracy in this reproduction and specifically admonishes and advises that if specific and precise accuracy is required, the same should be determined by procurement of certified maps, surveys, plats, Flood Insurance Studies, or orther official means. Waukesha County will not be responsible for any damages which result from third party use of the information and depictions herein, or for use which ignores this warning.

Notes:

Printed: 7/24/2017

WATERSHED E2
AREA=0.6 ACRES
RCN=77
Tc=18 MIN

WATERSHED E1
ONSITE AREA=30.1 ACRES
OFFSITE AREA=8.71 ACRES (SEE ATTACHED GIS EXHIBIT)
RCN=73
Tc=22 MIN

WATERSHED E3
AREA=1.4 ACRES
RCN=75
Tc=12 MIN

STONEGATE RD
DONALD DRIVE
SAYLESVILLE ROAD
C.T.H. "X"
W. HIGHLDR

LEGEND

- 100 — EXISTING 5-FT CONTOUR
- 101 — EXISTING 1-FT CONTOUR
- INDICATES SITE BOUNDARY
- EXISTING WATERSHED DIVIDE
- EXISTING Tc TRAVEL PATH
- Ⓐ EXISTING Tc SEGMENT ID
- HmD2 — EXISTING SOIL BOUNDARY

SOIL DESCRIPTION

DATE	DESCRIPTION

R.A. Smith National
Beyond Surveying and Engineering
www.rasmithnational.com

MONARCH SUBDIVISION
CITY OF WAUKESHA

PRE-DEVELOPED HYDROLOGY

DATE: 08/03/2017
SCALE: 1" = 80'
JOB NO. 3150342
PROJECT MANAGER: GARY RAASCH, P.E.
DESIGNED BY:
CHECKED BY:

SHEET NUMBER
HX100

P:\3150342\Dwg\Construction Plans\H00101H_KJB.dwg, HX100, 8/3/2017 4:48:10 PM, KJb

Exhibit D

Pre-development RCN and Time of Concentration Calculations

Technical Release 55 (TR-55)

Runoff Curve Number and Time of Concentration

Subbasin Name	Project Name	Prepared By	Date
E1	Overlook Farms	KJB	08/03/17
Project Location (County)	Project Number	Checked By	Date
Waukesha	3150342		

Land Use Condition (Existing / Developed)
Existing

ssumed minimum time of concentration (min.) = 10
sumed minimum storm sewer inlet time (min.) = 10
Assumed storm sewer flow velocity (ft/sec) = 4

CN :	**73**
Tc (min.):	**22.0**
Lag Time (hr.):	**0.220**
Average Slope (%):	**5.73**
Total Hydraulic lengh (ft):	**1097**
TR-55 Duration:	**3**

RUNOFF CURVE NUMBER

Soil Name and Hydrologic Soil Group	**Ground Cover description**	**Curve #** CN	**Area**	**Product of CN x area**
Type B	Woodland - Good Condition	55	2.38	130.90
Type D	Woodland - Good Condition	77	9.44	726.88
Type B	Cropland - Good Condition	69	13.21	911.49
Type C	Cropland - Good Condition	78	0.03	2.34
Type D	Cropland - Good Condition	83	5.01	415.83
Type B	Residential - 1 acre	68	3.4	231.20
Type C	Residential - 1 acre	79	3.1	244.90
Type D	Residential - 1 acre	84	2.2	184.80
		Total:	38.77	2848.34

CN (weighted) = Total product / Total area = 73.47 Use: 73.00

TIME OF CONCENTRATION

Sheet flow	Segment ID	A to B			
1. Surface description (table 3-1)		Woods: Light			
2. Manning's roughness coeff., n (table 3-1)		0.4			
3. Flow length, Total L<300.	ft	100			
4. Two-year 24-hour rainfall	in	2.7			
5. Land slope, s	ft/ft	0.040			
6. Travel Time, Tt	hr	0.295			
					0.30

Shallow concentrated flow	Segment ID	B to C			
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	387			
9. Watercourse slope, s	ft/ft	0.132			
10. Average velocity, V	ft/s	5.862			
11. Travel Time, Tt	hr	0.018			
					0.02

Channel flow	Segment ID	C to D			
12. Cross sectional flow area	ft²				
13. Wetted perimeter, Pw	ft				
14. Hydraulic radius, r=a/Pw	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	4.000			
18. Flow length, L	ft	610			
19. Travel Time, Tt	hr	0.042			
20. Watershed or subbasin Tc in steps 6, 11, and 19					0.04
				Tc (hr)	0.36
				Tc (min.)	21.36
				Use (min.)	22

Technical Release 55 (TR-55)

Runoff Curve Number and Time of Concentration

Subbasin Name	Project Name	Prepared By	Date
E2	Overlook Farms	KJB	08/03/17
Project Location (County)	Project Number	Checked By	Date
Waukesha	3150342		

Land Use Condition (Existing / Developed)
Existing

ssumed minimum time of concentration (min.) = 10
sumed minimum storm sewer inlet time (min.) = 10
Assumed storm sewer flow velocity (ft/sec) = 4

CN :	**77**
Tc (min.):	**18.0**
Lag Time (hr.):	**0.180**
Average Slope (%):	**3.67**
Total Hydraulic lengh (ft):	**150**
TR-55 Duration:	**2**

RUNOFF CURVE NUMBER

Soil Name and Hydrologic Soil Group	**Ground Cover description**	**Curve #** CN	**Area**	**Product of CN x area**
Type D	Woodland - Good Condition	77	0.58	44.66
		Total:	0.58	44.66

CN (weighted) = Total product / Total area = 77.00 Use: 77.00

TIME OF CONCENTRATION

Sheet flow	Segment ID	A to B			
1. Surface description (table 3-1)		Woods: Light			
2. Manning's roughness coeff., n (table 3-1)		0.4			
3. Flow length, Total L<300.	ft	100			
4. Two-year 24-hour rainfall	in	2.7			
5. Land slope, s	ft/ft	0.045			
6. Travel Time, Tt	hr	0.282			
					0.28

Shallow concentrated flow	Segment ID	B to C			
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	50			
9. Watercourse slope, s	ft/ft	0.065			
10. Average velocity, V	ft/s	4.114			
11. Travel Time, Tt	hr	0.003			
					0.00

Channel flow	Segment ID				
12. Cross sectional flow area	ft²				
13. Wetted perimeter, Pw	ft				
14. Hydraulic radius, r=a/Pw	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				
18. Flow length, L	ft				
19. Travel Time, Tt	hr				
20. Watershed or subbasin Tc in steps 6, 11, and 19					0.00
				Tc (hr)	0.29
				Tc (min.)	17.10
				Use (min.)	18

Technical Release 55 (TR-55)

Runoff Curve Number and Time of Concentration

Subbasin Name	Project Name	Prepared By	Date
E3	Overlook Farms	KJB	08/03/17
Project Location (County)	Project Number	Checked By	Date
Waukesha	3150342		

Land Use Condition (Existing / Developed)
Existing

ssumed minimum time of concentration (min.) = 10
sumed minimum storm sewer inlet time (min.) = 10
Assumed storm sewer flow velocity (ft/sec) = 4

CN :	**75**
Tc (min.):	**12.0**
Lag Time (hr.):	**0.120**
Average Slope (%):	**1.60**
Total Hydraulic lengh (ft):	**397**
TR-55 Duration:	**2**

RUNOFF CURVE NUMBER

Soil Name and Hydrologic Soil Group	**Ground Cover description**	**Curve #** CN	**Area**	**Product of CN x area**
Type B	Woodland - Good Condition	55	0.06	3.30
Type D	Woodland - Good Condition	77	0.14	10.78
Type B	Cropland - Good Condition	69	0.64	44.16
Type D	Cropland - Good Condition	83	0.54	44.82
		Total:	1.38	103.06

CN (weighted) = Total product / Total area = 74.68 Use: 75.00

TIME OF CONCENTRATION

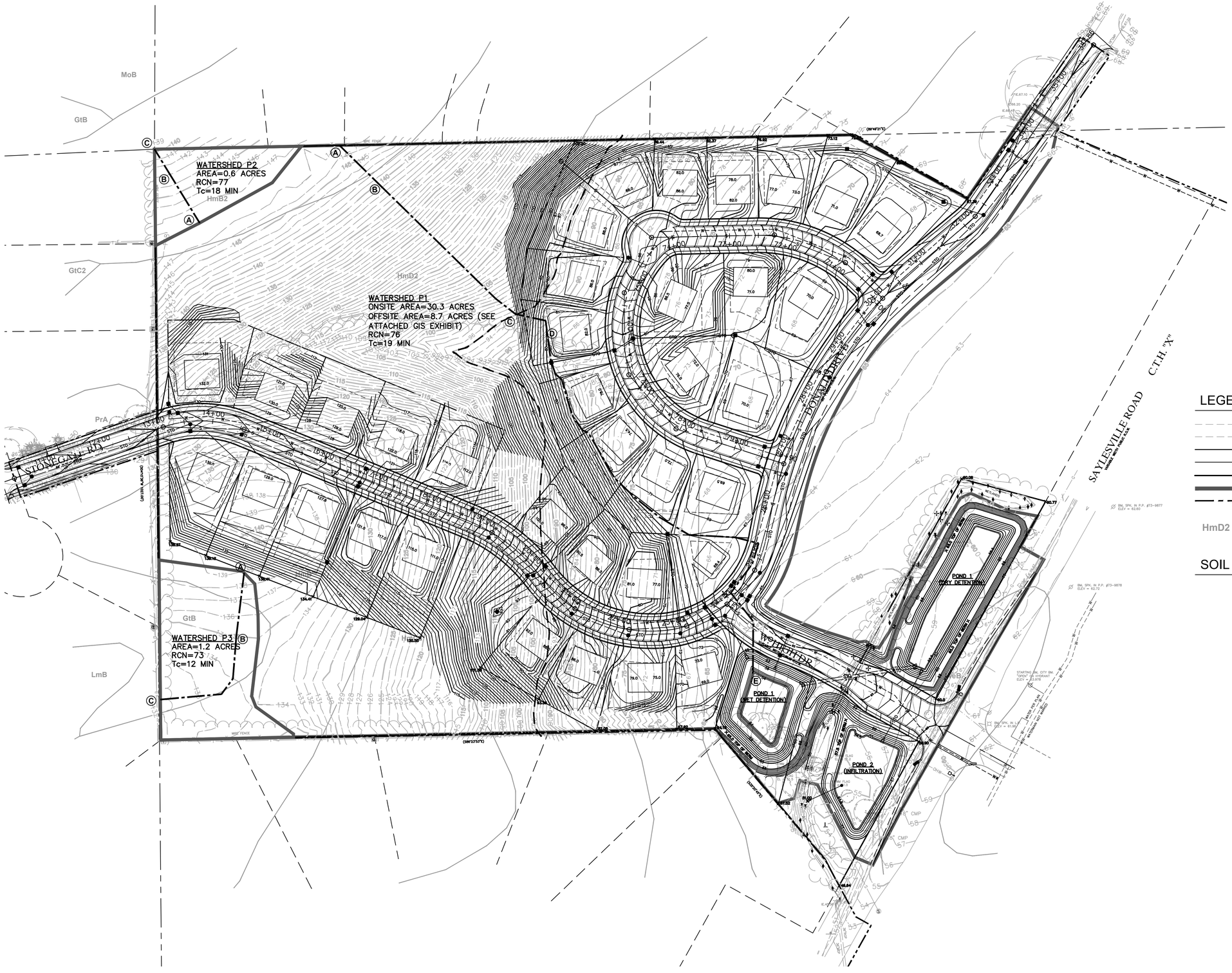
Sheet flow	Segment ID	A to B			
1. Surface description (table 3-1)		Cultivated Soils: Residue cover >20%			
2. Manning's roughness coeff., n (table 3-1)		0.17			
3. Flow length, Total L<300.	ft	100			
4. Two-year 24-hour rainfall	in	2.7			
5. Land slope, s	ft/ft	0.030			
6. Travel Time, Tt	hr	0.167			
					0.17

Shallow concentrated flow	Segment ID	B to C			
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	297			
9. Watercourse slope, s	ft/ft	0.018			
10. Average velocity, V	ft/s	2.165			
11. Travel Time, Tt	hr	0.038			
					0.04

Channel flow	Segment ID				
12. Cross sectional flow area	ft²				
13. Wetted perimeter, Pw	ft				
14. Hydraulic radius, r=a/Pw	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				
18. Flow length, L	ft				
19. Travel Time, Tt	hr				
20. Watershed or subbasin Tc in steps 6, 11, and 19					0.00
				Tc (hr)	0.21
				Tc (min.)	12.31
				Use (min.)	12

Exhibit E

Post-development Subbasin Map



LEGEND

- EXISTING 5-FT CONTOUR
- EXISTING 1-FT CONTOUR
- PROPOSED 5-FT CONTOUR
- PROPOSED 1-FT CONTOUR
- INDICATES SITE BOUNDARY
- PROPOSED WATERSHED DIVIDE
- PROPOSED Tc TRAVEL PATH
- PROPOSED Tc SEGMENT ID
- EXISTING SOIL BOUNDARY

SOIL DESCRIPTION

DATE	DESCRIPTION

R.A. Smith National
Beyond Surveying and Engineering
www.rasmithnational.com

MONARCH SUBDIVISION
CITY OF WAUKESHA

POST-DEVELOPED HYDROLOGY

DATE: 07/13/2017

SCALE: 1" = 80'

JOB NO. 3150342

PROJECT MANAGER:
GARY RAASCH, P.E.

DESIGNED BY: KJB

CHECKED BY:

SHEET NUMBER
HX200

Exhibit F

Post-development RCN and Time of Concentration Calculations

Technical Release 55 (TR-55)

Runoff Curve Number and Time of Concentration

Subbasin Name	Project Name	Prepared By	Date
P1	Overlook Farms	KJB	08/03/17
Project Location (County)	**Project Number**	**Checked By**	**Date**
Waukesha	3150342		

Land Use Condition (Existing / Developed)
Developed

Assumed minimum time of concentration (min.) = 10
Assumed minimum storm sewer inlet time (min.) = 10
Assumed storm sewer flow velocity (ft/sec) = 4

CN :	**76**
Tc (min.):	**19.0**
Lag Time (hr.):	**0.190**
Average Slope (%):	**7.27**
Total Hydraulic lengh (ft):	**1313**
TR-55 Duration:	**3**

RUNOFF CURVE NUMBER

Soil Name and Hydrologic Soil Group	**Ground Cover description**	**Curve #** CN	**Area**	**Product of CN x area**
Type B	Open Space - Good Condition	61	2.64	161.03
Type D	Open Space - Good Condition	80	2.50	199.76
Type B	Residential - 1/3 Acre	72	12.78	920.42
Type D	Residential - 1/3 Acre	86	6.59	566.55
Type D	Woodland - Good Condition	77	5.55	427.60
	Impervious Areas	98	0.20	19.67
Type B	Residential - 1 acre	68	3.4	231.20
Type C	Residential - 1 acre	79	3.1	244.90
Type D	Residential - 1 acre	84	2.2	184.80
		Total:	38.96	2955.93

CN (weighted) = Total product / Total area = 75.87 Use: 76.00

TIME OF CONCENTRATION

Sheet flow	Segment ID	A to B			
1. Surface description (table 3-1)		Woods: Light			
2. Manning's roughness coeff., n (table 3-1)		0.4			
3. Flow length, Total L<300	ft	100			
4. Two-year 24-hour rainfall	in	2.7			
5. Land slope, s	ft/ft	0.080			
6. Travel Time, Tt	hr	0.224			
					0.22

Shallow concentrated flow	Segment ID	B to C			
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	320			
9. Watercourse slope, s	ft/ft	0.138			
10. Average velocity, V	ft/s	5.994			
11. Travel Time, Tt	hr	0.015			
					0.01

Channel flow	Segment ID	C to D	D to E		
12. Cross sectional flow area	ft²	3.14	3.14		
13. Wetted perimeter, Pw	ft				
14. Hydraulic radius, r=a/Pw	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	4.000	4.000		
18. Flow length, L	ft	53	840		
19. Travel Time, Tt	hr	0.004	0.058		
20. Watershed or subbasin Tc in steps 6, 11, and 19					0.06
				Tc (hr)	0.30
				Tc (min.)	18.04
				Use (min.)	19

Technical Release 55 (TR-55)

Runoff Curve Number and Time of Concentration

Subbasin Name	Project Name	Prepared By	Date
P2	Overlook Farms	KJB	08/03/17
Project Location (County)	Project Number	Checked By	Date
Waukesha	3150342		

Land Use Condition (Existing / Developed)
Existing

Assumed minimum time of concentration (min.) = 10
Assumed minimum storm sewer inlet time (min.) = 10
Assumed storm sewer flow velocity (ft/sec) = 4

CN :	**77**
Tc (min.):	**18.0**
Lag Time (hr.):	**0.180**
Average Slope (%):	**3.67**
Total Hydraulic lengh (ft):	**150**
TR-55 Duration:	**2**

RUNOFF CURVE NUMBER

Soil Name and Hydrologic Soil Group	**Ground Cover description**	**Curve #** CN	**Area**	**Product of CN x area**
Type D	Woodland - Good Condition	77	0.58	44.66
		Total:	0.58	44.66

CN (weighted) = Total product / Total area = 77.00 Use: 77.00

TIME OF CONCENTRATION

Sheet flow	Segment ID	A to B			
1. Surface description (table 3-1)		Woods: Light			
2. Manning's roughness coeff., n (table 3-1)		0.4			
3. Flow length, Total L<300.	ft	100			
4. Two-year 24-hour rainfall	in	2.7			
5. Land slope, s	ft/ft	0.045			
6. Travel Time, Tt	hr	0.282			
					0.28

Shallow concentrated flow	Segment ID	B to C			
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	50			
9. Watercourse slope, s	ft/ft	0.065			
10. Average velocity, V	ft/s	4.114			
11. Travel Time, Tt	hr	0.003			
					0.00

Channel flow	Segment ID				
12. Cross sectional flow area	ft²				
13. Wetted perimeter, Pw	ft				
14. Hydraulic radius, r=a/Pw	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				
18. Flow length, L	ft				
19. Travel Time, Tt	hr				
20. Watershed or subbasin Tc in steps 6, 11, and 19					0.00
				Tc (hr)	0.29
				Tc (min.)	17.10
				Use (min.)	18

Technical Release 55 (TR-55)

Runoff Curve Number and Time of Concentration

Subbasin Name	Project Name	Prepared By	Date
P3	Overlook Farms	KJB	08/03/17
Project Location (County)	Project Number	Checked By	Date
Waukesha	3150342		

Land Use Condition (Existing / Developed)
Existing

ssumed minimum time of concentration (min.) = 10
sumed minimum storm sewer inlet time (min.) = 10
Assumed storm sewer flow velocity (ft/sec) = 4

CN :	**73**
Tc (min.):	**12.0**
Lag Time (hr.):	**0.120**
Average Slope (%):	**1.67**
Total Hydraulic lengh (ft):	**324**
TR-55 Duration:	**2**

RUNOFF CURVE NUMBER

Soil Name and Hydrologic Soil Group	**Ground Cover description**	**Curve #** CN	**Area**	**Product of CN x area**
Type B	Woodland - Good Condition	55	0.06	3.30
Type D	Woodland - Good Condition	77	0.14	10.78
Type B	Open Space - Good Condition	69	0.64	44.16
Type D	Open Space - Good Condition	83	0.34	28.22
	Impervious Areas			
		Total:	1.18	86.46

CN (weighted) = Total product / Total area = 73.27 Use: 73.00

TIME OF CONCENTRATION

Sheet flow	Segment ID	A to B			
1. Surface description (table 3-1)		Short Grass Prairie			
2. Manning's roughness coeff., n (table 3-1)		0.15			
3. Flow length, Total L<300.	ft	112			
4. Two-year 24-hour rainfall	in	2.7			
5. Land slope, s	ft/ft	0.036			
6. Travel Time, Tt	hr	0.154			
					0.15

Shallow concentrated flow	Segment ID	B to C			
7. Surface description (paved or unpaved)		unpaved			
8. Flow length, L	ft	212			
9. Watercourse slope, s	ft/ft	0.014			
10. Average velocity, V	ft/s	1.909			
11. Travel Time, Tt	hr	0.031			
					0.03

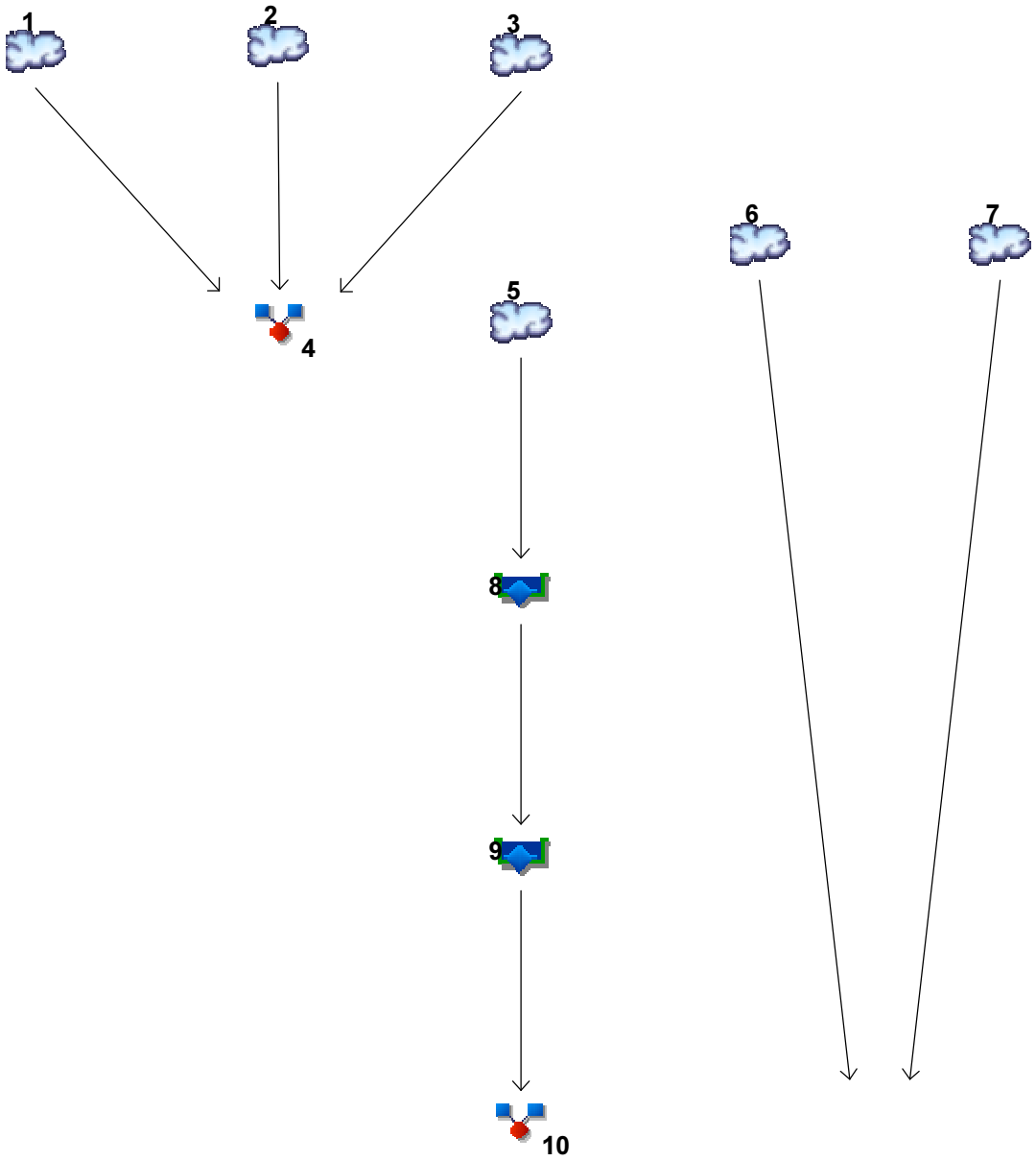
Channel flow	Segment ID				
12. Cross sectional flow area	ft²				
13. Wetted perimeter, Pw	ft				
14. Hydraulic radius, r=a/Pw	ft				
15. Channel slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. V=1.49*r^(2/3)s^(1/2)/n	ft/s				
18. Flow length, L	ft				
19. Travel Time, Tt	hr				
20. Watershed or subbasin Tc in steps 6, 11, and 19					0.00
				Tc (hr)	0.18
				Tc (min.)	11.08
				Use (min.)	12

Exhibit G

Hydraflow Results

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3



Legend

Hyd.	Origin	Description
1	SCS Runoff	E1
2	SCS Runoff	E2
3	SCS Runoff	E3
4	Combine	E TOTAL
5	SCS Runoff	P1
6	SCS Runoff	P2
7	SCS Runoff	P3
8	Reservoir	RTE POND 1
9	Reservoir	RTE INFILTRATION BASIN
10	Combine	P TOTAL
11	Combine	P2 and P3 Offsite drainage areas

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	18.52	25.93	-------	41.21	57.60	84.52	108.86	137.16	E1
2	SCS Runoff	------	0.434	0.570	-------	0.842	1.128	1.587	2.001	2.477	E2
3	SCS Runoff	------	1.102	1.476	-------	2.233	3.033	4.343	5.529	6.900	E3
4	Combine	1, 2, 3	19.79	27.58	-------	43.63	60.83	89.04	114.51	144.57	E TOTAL
5	SCS Runoff	------	26.88	35.72	-------	53.57	72.38	102.73	130.17	161.90	P1
6	SCS Runoff	------	0.434	0.570	-------	0.842	1.128	1.587	2.001	2.477	P2
7	SCS Runoff	------	0.785	1.084	-------	1.697	2.353	3.425	4.413	5.563	P3
8	Reservoir	5	1.176	4.330	-------	16.03	31.95	47.72	57.40	66.35	RTE POND 1
9	Reservoir	8	0.963	2.031	-------	10.59	28.52	47.31	57.12	66.08	RTE INFILTRATION BASIN
10	Combine	9	0.963	2.031	-------	10.59	28.52	47.31	57.12	66.08	P TOTAL
11	Combine	6, 7,	1.174	1.603	-------	2.481	3.415	4.938	6.305	7.889	P2 and P3 Offsite drainage areas

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

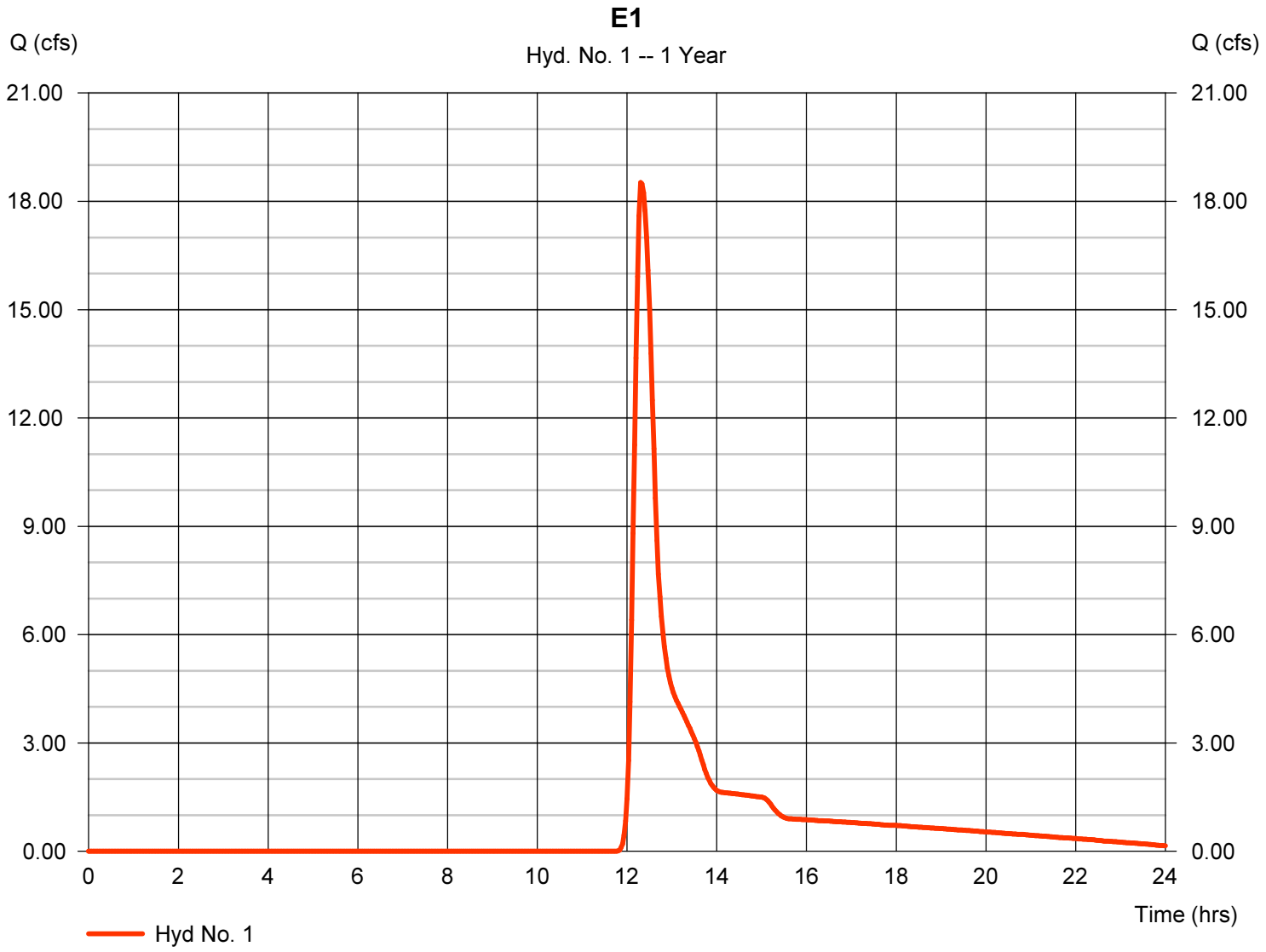
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	18.52	2	738	73,678	------	------	------	E1
2	SCS Runoff	0.434	2	736	1,428	------	------	------	E2
3	SCS Runoff	1.102	2	732	3,063	------	------	------	E3
4	Combine	19.79	2	738	78,170	1, 2, 3	------	------	E TOTAL
5	SCS Runoff	26.88	2	736	89,777	------	------	------	P1
6	SCS Runoff	0.434	2	736	1,428	------	------	------	P2
7	SCS Runoff	0.785	2	732	2,272	------	------	------	P3
8	Reservoir	1.176	2	918	88,570	5	60.44	58,070	RTE POND 1
9	Reservoir	0.963	2	1184	41,676	8	56.52	25,390	RTE INFILTRATION BASIN
10	Combine	0.963	2	1184	41,676	9	------	------	P TOTAL
11	Combine	1.174	2	732	3,700	6, 7,	------	------	P2 and P3 Offsite drainage areas

Hydrograph Report

Hyd. No. 1

E1

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.52 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.30 hrs
Time interval	=	2 min	Hyd. volume	=	73,678 cuft
Drainage area	=	38.770 ac	Curve number	=	73
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.00 min
Total precip.	=	2.40 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hyd factor\MSE3_2min.CSS	SCS factor	=	484

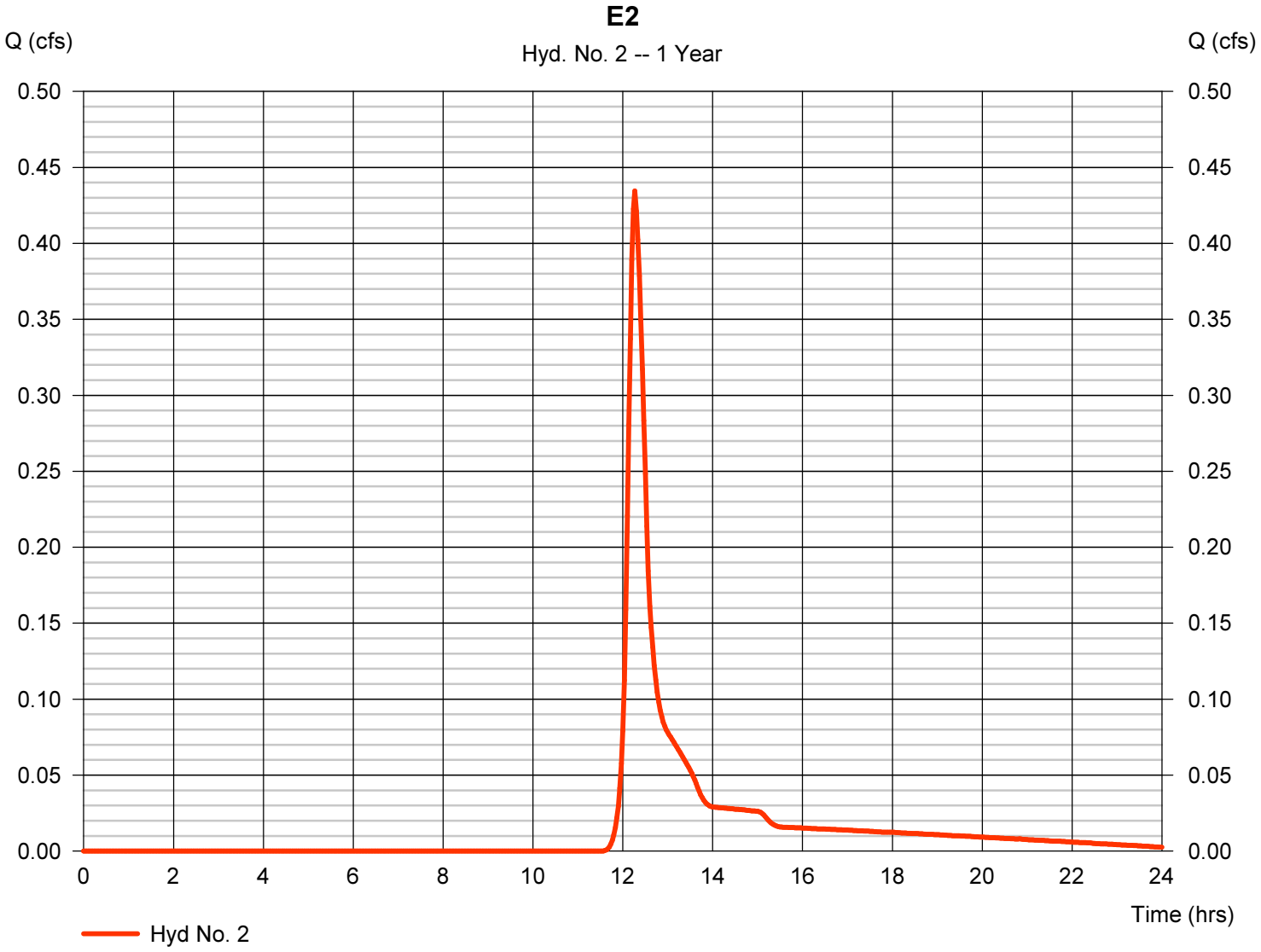


Hydrograph Report

Hyd. No. 2

E2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.434 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	1,428 cuft
Drainage area	=	0.580 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.00 min
Total precip.	=	2.40 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS factor	=	484

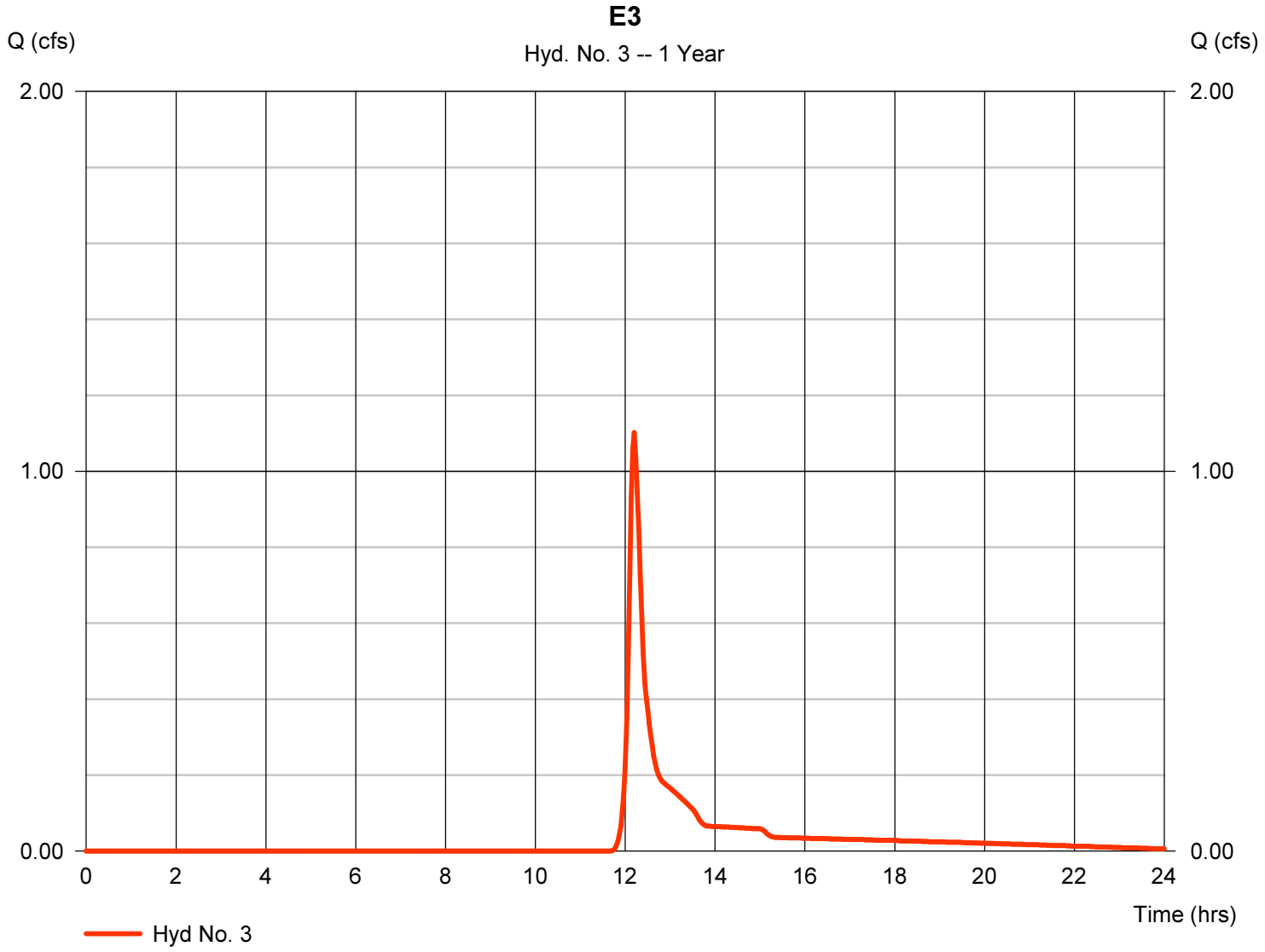


Hydrograph Report

Hyd. No. 3

E3

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.102 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	3,063 cuft
Drainage area	=	1.380 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.00 min
Total precip.	=	2.40 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS factor	=	484

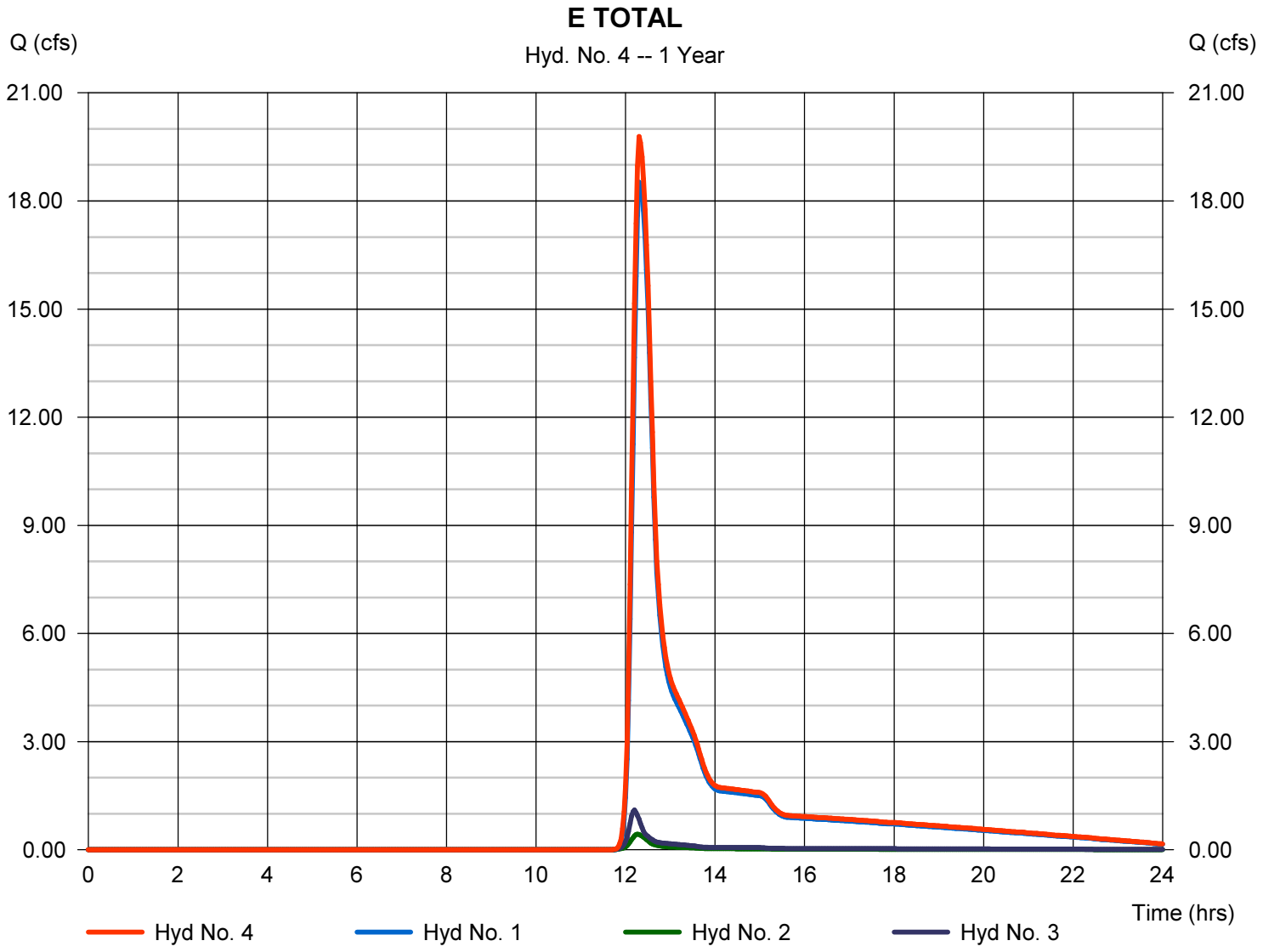


Hydrograph Report

Hyd. No. 4

E TOTAL

Hydrograph type	= Combine	Peak discharge	= 19.79 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 78,170 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 40.730 ac

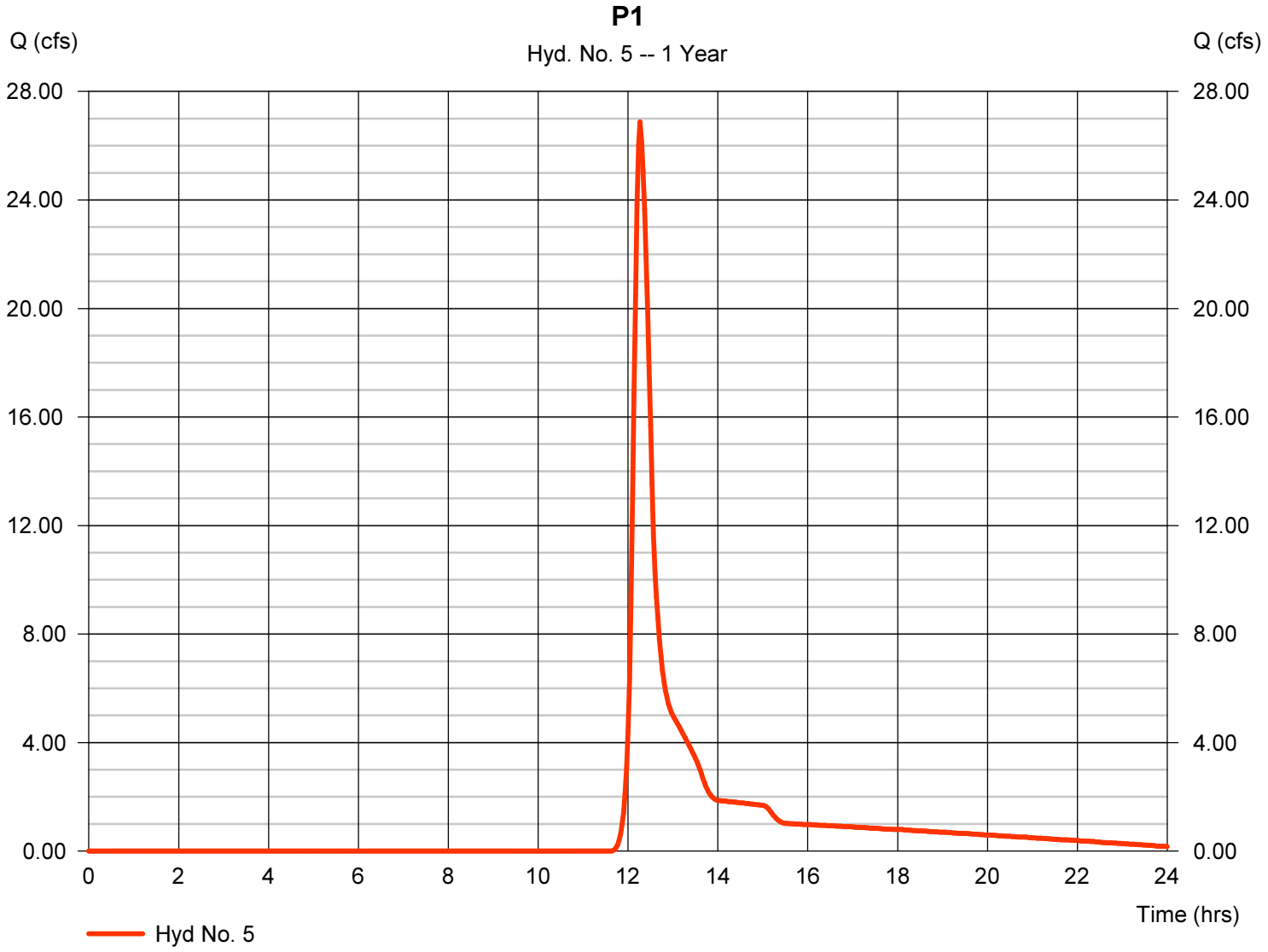


Hydrograph Report

Hyd. No. 5

P1

Hydrograph type	=	SCS Runoff	Peak discharge	=	26.88 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	89,777 cuft
Drainage area	=	38.960 ac	Curve number	=	76
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.00 min
Total precip.	=	2.40 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	Shape factor	=	484

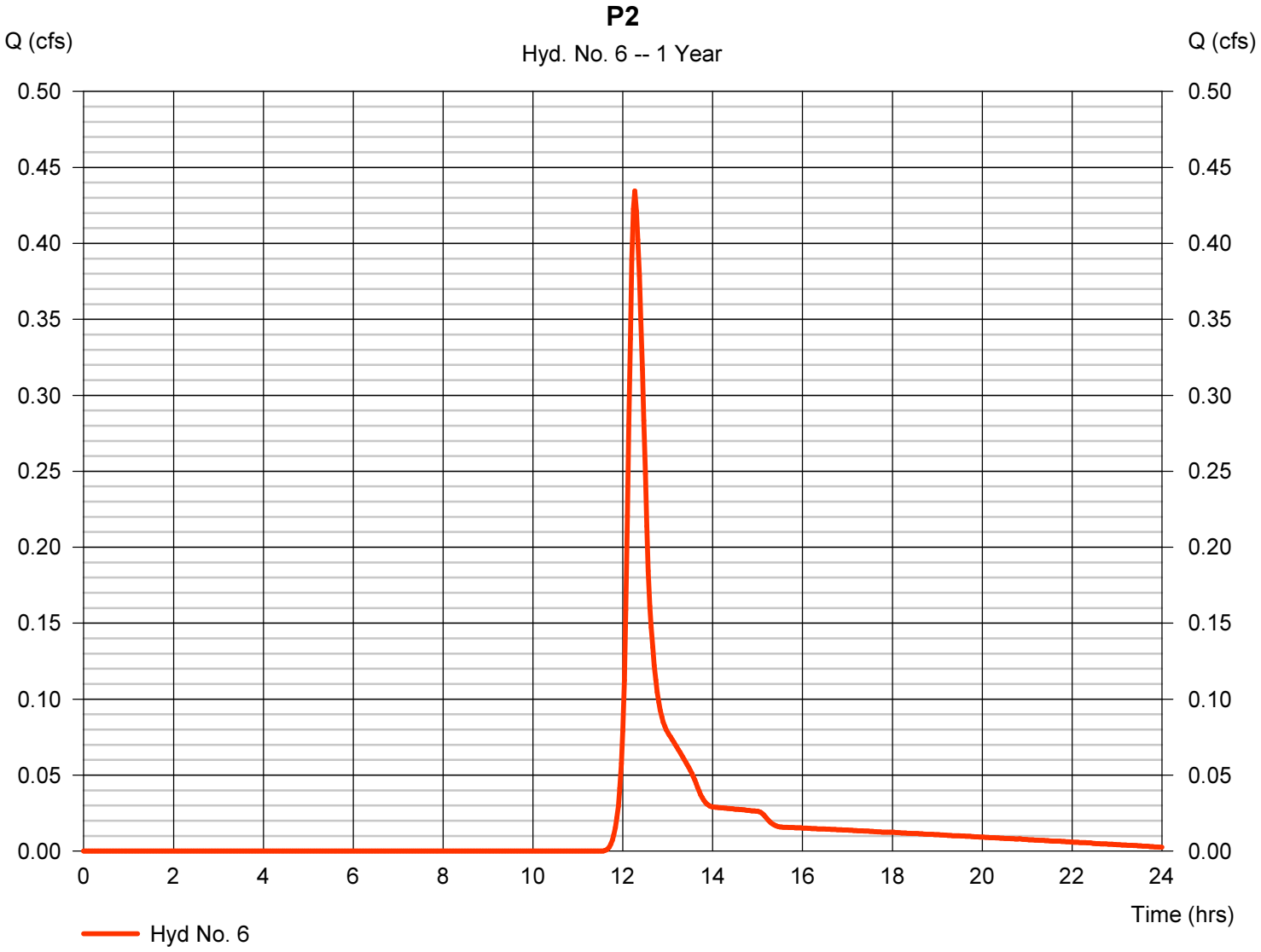


Hydrograph Report

Hyd. No. 6

P2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.434 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	1,428 cuft
Drainage area	=	0.580 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.00 min
Total precip.	=	2.40 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS factor	=	484

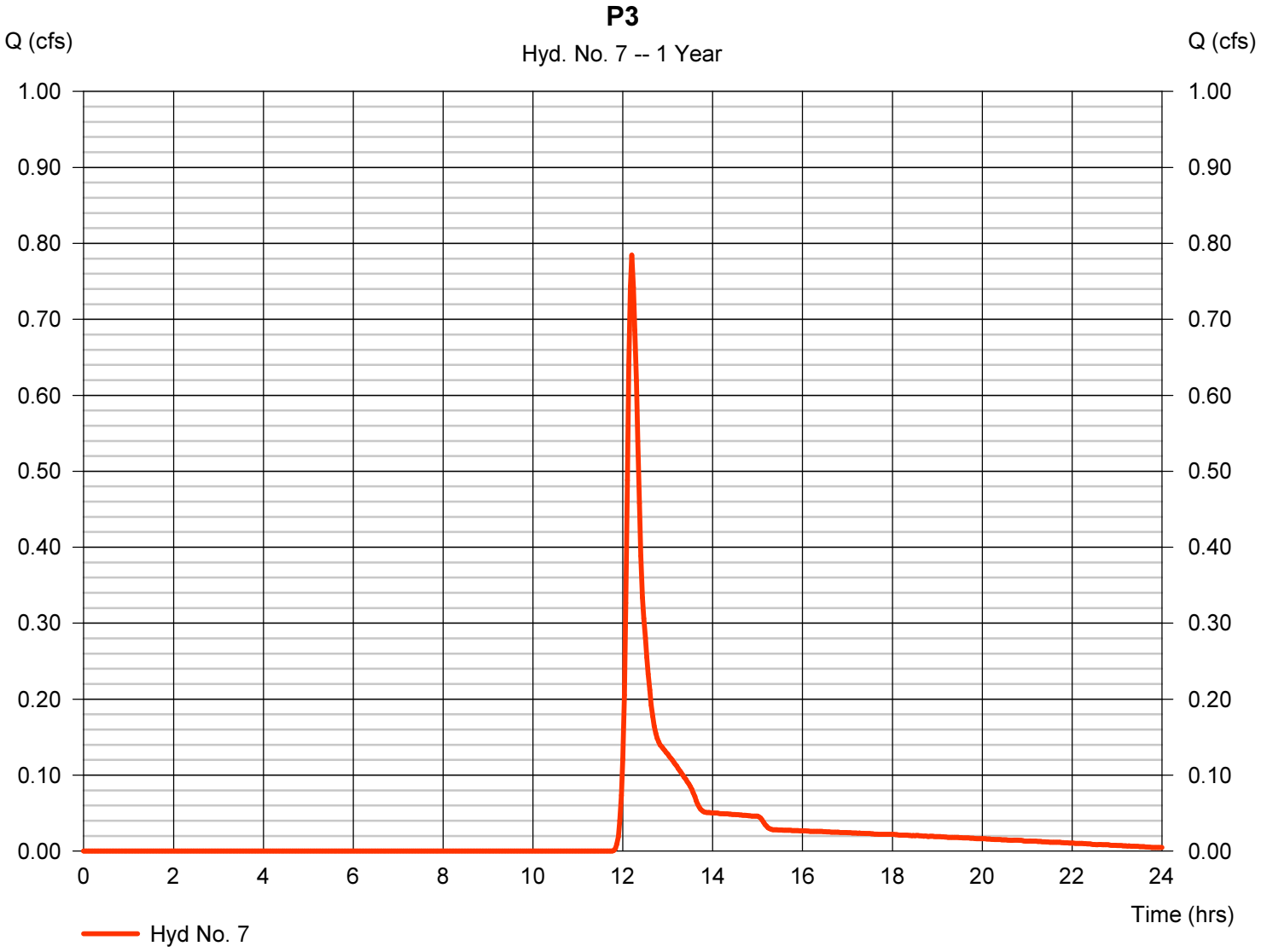


Hydrograph Report

Hyd. No. 7

P3

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.785 cfs
Storm frequency	=	1 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	2,272 cuft
Drainage area	=	1.180 ac	Curve number	=	73
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.00 min
Total precip.	=	2.40 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS Temporal factor	=	484



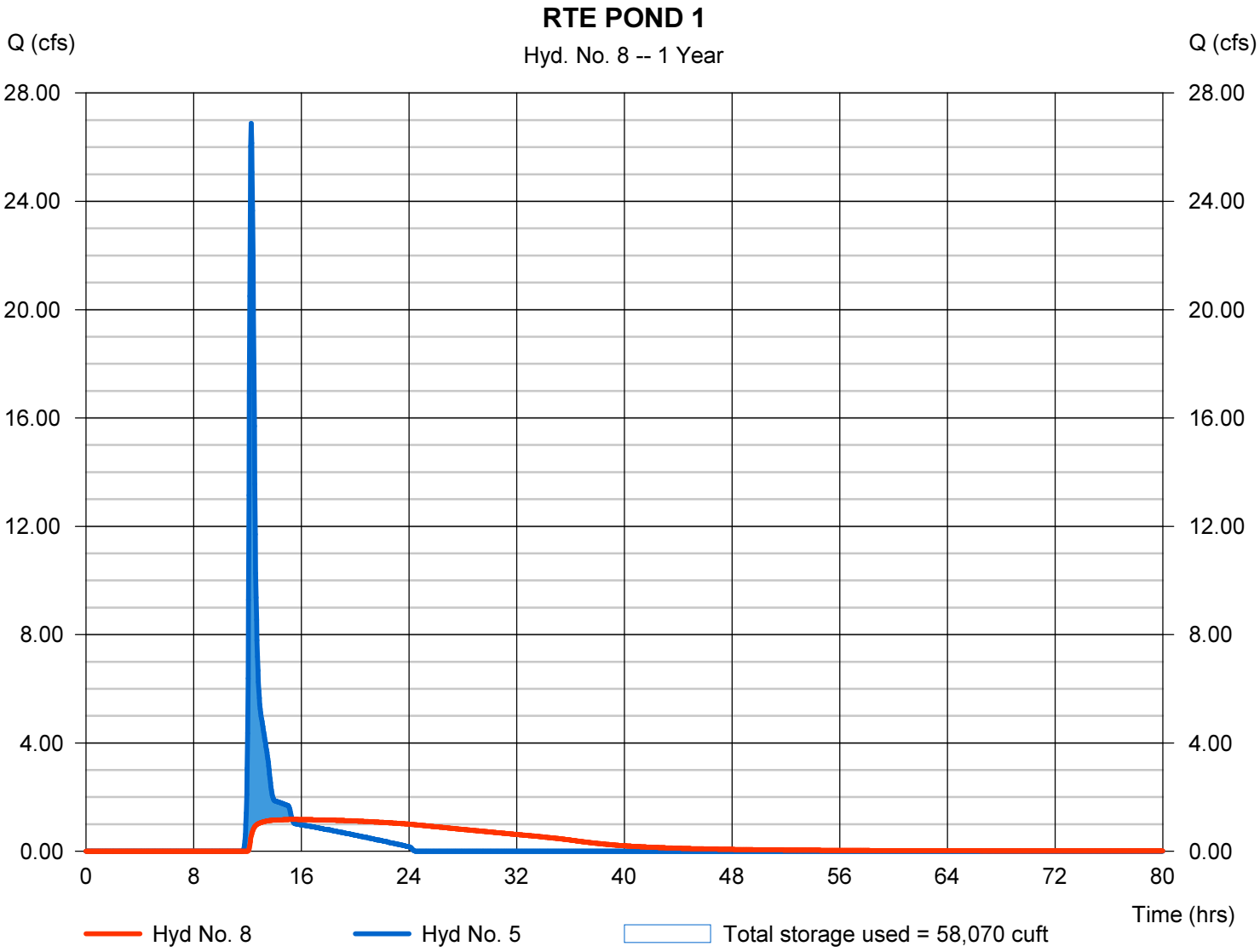
Hydrograph Report

Hyd. No. 8

RTE POND 1

Hydrograph type	= Reservoir	Peak discharge	= 1.176 cfs
Storm frequency	= 1 yrs	Time to peak	= 15.30 hrs
Time interval	= 2 min	Hyd. volume	= 88,570 cuft
Inflow hyd. No.	= 5 - P1	Max. Elevation	= 60.44 ft
Reservoir name	= POND 1	Max. Storage	= 58,070 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - POND 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 58.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	58.50	25,172	0	0
0.50	59.00	28,319	13,364	13,364
1.50	60.00	31,721	30,001	43,365
2.50	61.00	35,246	33,465	76,829
3.50	62.00	38,892	37,050	113,880
4.50	63.00	42,653	40,754	154,634
5.50	64.00	46,532	44,574	199,208
6.50	65.00	50,528	48,511	247,719

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 36.00	6.00	0.00	0.00
Span (in)	= 36.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 58.50	58.51	0.00	0.00
Length (ft)	= 149.50	0.25	0.00	0.00
Slope (%)	= 2.68	0.10	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.56	80.00	Inactive	0.00
Crest El. (ft)	= 60.50	64.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	Rect	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	58.50	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.05	1,336	58.55	0.01 ic	0.01 ic	---	---	0.00	0.00	---	---	---	---	0.005
0.10	2,673	58.60	0.03 ic	0.02 ic	---	---	0.00	0.00	---	---	---	---	0.025
0.15	4,009	58.65	0.06 ic	0.06 ic	---	---	0.00	0.00	---	---	---	---	0.057
0.20	5,345	58.70	0.10 ic	0.10 ic	---	---	0.00	0.00	---	---	---	---	0.100
0.25	6,682	58.75	0.15 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.154
0.30	8,018	58.80	0.23 ic	0.21 ic	---	---	0.00	0.00	---	---	---	---	0.213
0.35	9,355	58.85	0.29 ic	0.28 ic	---	---	0.00	0.00	---	---	---	---	0.279
0.40	10,691	58.90	0.37 ic	0.35 ic	---	---	0.00	0.00	---	---	---	---	0.346
0.45	12,027	58.95	0.41 ic	0.41 ic	---	---	0.00	0.00	---	---	---	---	0.413
0.50	13,364	59.00	0.50 ic	0.47 ic	---	---	0.00	0.00	---	---	---	---	0.466
0.60	16,364	59.10	0.55 ic	0.55 ic	---	---	0.00	0.00	---	---	---	---	0.551
0.70	19,364	59.20	0.62 ic	0.62 ic	---	---	0.00	0.00	---	---	---	---	0.615
0.80	22,364	59.30	0.68 ic	0.68 ic	---	---	0.00	0.00	---	---	---	---	0.675
0.90	25,364	59.40	0.74 ic	0.73 ic	---	---	0.00	0.00	---	---	---	---	0.732
1.00	28,364	59.50	0.81 ic	0.78 ic	---	---	0.00	0.00	---	---	---	---	0.782
1.10	31,364	59.60	0.88 ic	0.83 ic	---	---	0.00	0.00	---	---	---	---	0.830
1.20	34,364	59.70	0.88 ic	0.88 ic	---	---	0.00	0.00	---	---	---	---	0.881
1.30	37,364	59.80	0.96 ic	0.92 ic	---	---	0.00	0.00	---	---	---	---	0.924
1.40	40,365	59.90	0.97 ic	0.97 ic	---	---	0.00	0.00	---	---	---	---	0.968
1.50	43,365	60.00	1.04 ic	1.01 ic	---	---	0.00	0.00	---	---	---	---	1.010
1.60	46,711	60.10	1.05 ic	1.05 ic	---	---	0.00	0.00	---	---	---	---	1.050
1.70	50,058	60.20	1.13 ic	1.09 ic	---	---	0.00	0.00	---	---	---	---	1.088
1.80	53,404	60.30	1.13 ic	1.13 ic	---	---	0.00	0.00	---	---	---	---	1.128
1.90	56,750	60.40	1.22 ic	1.16 ic	---	---	0.00	0.00	---	---	---	---	1.161
2.00	60,097	60.50	1.22 ic	1.20 ic	---	---	0.00	0.00	---	---	---	---	1.199
2.10	63,443	60.60	2.49 ic	1.17 ic	---	---	1.32	0.00	---	---	---	---	2.488
2.20	66,790	60.70	4.99 ic	1.11 ic	---	---	3.74	0.00	---	---	---	---	4.851
2.30	70,136	60.80	8.04 ic	1.05 ic	---	---	6.87	0.00	---	---	---	---	7.925
2.40	73,483	60.90	11.57 ic	0.99 ic	---	---	10.58	0.00	---	---	---	---	11.57
2.50	76,829	61.00	15.86 ic	0.92 ic	---	---	14.79	0.00	---	---	---	---	15.71
2.60	80,534	61.10	20.28 ic	0.85 ic	---	---	19.44	0.00	---	---	---	---	20.28
2.70	84,239	61.20	25.10 ic	0.76 ic	---	---	24.33 s	0.00	---	---	---	---	25.10
2.80	87,944	61.30	28.81 ic	0.72 ic	---	---	28.09 s	0.00	---	---	---	---	28.81
2.90	91,649	61.40	31.95 ic	0.67 ic	---	---	31.28 s	0.00	---	---	---	---	31.95

Continues on next page...

POND 1

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.00	95,354	61.50	34.91 ic	0.64 ic	---	---	34.28 s	0.00	---	---	---	---	34.91
3.10	99,059	61.60	37.46 ic	0.60 ic	---	---	36.85 s	0.00	---	---	---	---	37.45
3.20	102,765	61.70	39.77 ic	0.57 ic	---	---	39.20 s	0.00	---	---	---	---	39.77
3.30	106,470	61.80	41.55 ic	0.53 ic	---	---	41.01 s	0.00	---	---	---	---	41.54
3.40	110,175	61.90	43.29 ic	0.50 ic	---	---	42.79 s	0.00	---	---	---	---	43.29
3.50	113,880	62.00	44.98 ic	0.48 ic	---	---	44.50 s	0.00	---	---	---	---	44.98
3.60	117,955	62.10	46.56 ic	0.45 ic	---	---	46.10 s	0.00	---	---	---	---	46.55
3.70	122,030	62.20	48.04 ic	0.43 ic	---	---	47.60 s	0.00	---	---	---	---	48.03
3.80	126,106	62.30	49.45 ic	0.41 ic	---	---	49.04 s	0.00	---	---	---	---	49.45
3.90	130,181	62.40	50.79 ic	0.39 ic	---	---	50.39 s	0.00	---	---	---	---	50.78
4.00	134,257	62.50	52.07 ic	0.38 ic	---	---	51.69 s	0.00	---	---	---	---	52.07
4.10	138,332	62.60	53.31 ic	0.36 ic	---	---	52.94 s	0.00	---	---	---	---	53.31
4.20	142,407	62.70	54.50 ic	0.35 ic	---	---	54.15 s	0.00	---	---	---	---	54.50
4.30	146,483	62.80	55.66 ic	0.33 ic	---	---	55.31 s	0.00	---	---	---	---	55.65
4.40	150,558	62.90	56.78 ic	0.32 ic	---	---	56.45 s	0.00	---	---	---	---	56.77
4.50	154,634	63.00	57.87 ic	0.31 ic	---	---	57.53 s	0.00	---	---	---	---	57.85
4.60	159,091	63.10	58.93 ic	0.30 ic	---	---	58.61 s	0.00	---	---	---	---	58.91
4.70	163,548	63.20	59.96 ic	0.29 ic	---	---	59.66 s	0.00	---	---	---	---	59.95
4.80	168,006	63.30	60.98 ic	0.28 ic	---	---	60.67 s	0.00	---	---	---	---	60.95
4.90	172,463	63.40	61.97 ic	0.27 ic	---	---	61.67 s	0.00	---	---	---	---	61.94
5.00	176,921	63.50	62.94 ic	0.27 ic	---	---	62.66 s	0.00	---	---	---	---	62.93
5.10	181,378	63.60	63.89 ic	0.26 ic	---	---	63.60 s	0.00	---	---	---	---	63.86
5.20	185,835	63.70	64.83 ic	0.25 ic	---	---	64.57 s	0.00	---	---	---	---	64.82
5.30	190,293	63.80	65.75 ic	0.25 ic	---	---	65.48 s	0.00	---	---	---	---	65.72
5.40	194,750	63.90	66.65 ic	0.24 ic	---	---	66.37 s	0.00	---	---	---	---	66.61
5.50	199,208	64.00	67.54 ic	0.23 ic	---	---	67.27 s	0.00	---	---	---	---	67.51
5.60	204,059	64.10	68.42 ic	0.23 ic	---	---	68.14 s	6.58	---	---	---	---	74.95
5.70	208,910	64.20	69.28 ic	0.22 ic	---	---	69.04 s	18.60	---	---	---	---	87.87
5.80	213,761	64.30	70.13 ic	0.22 ic	---	---	69.89 s	34.18	---	---	---	---	104.28
5.90	218,612	64.40	70.97 ic	0.21 ic	---	---	70.73 s	52.62	---	---	---	---	123.56
6.00	223,463	64.50	71.80 ic	0.21 ic	---	---	71.53 s	73.54	---	---	---	---	145.28
6.10	228,314	64.60	72.62 ic	0.20 ic	---	---	72.36 s	96.67	---	---	---	---	169.23
6.20	233,166	64.70	73.42 ic	0.20 ic	---	---	73.22 s	121.81	---	---	---	---	195.23
6.30	238,017	64.80	74.22 ic	0.20 ic	---	---	73.99 s	148.83	---	---	---	---	223.02
6.40	242,868	64.90	75.01 ic	0.19 ic	---	---	74.75 s	177.59	---	---	---	---	252.53
6.50	247,719	65.00	75.79 ic	0.19 ic	---	---	75.58 s	208.00	---	---	---	---	283.77

...End

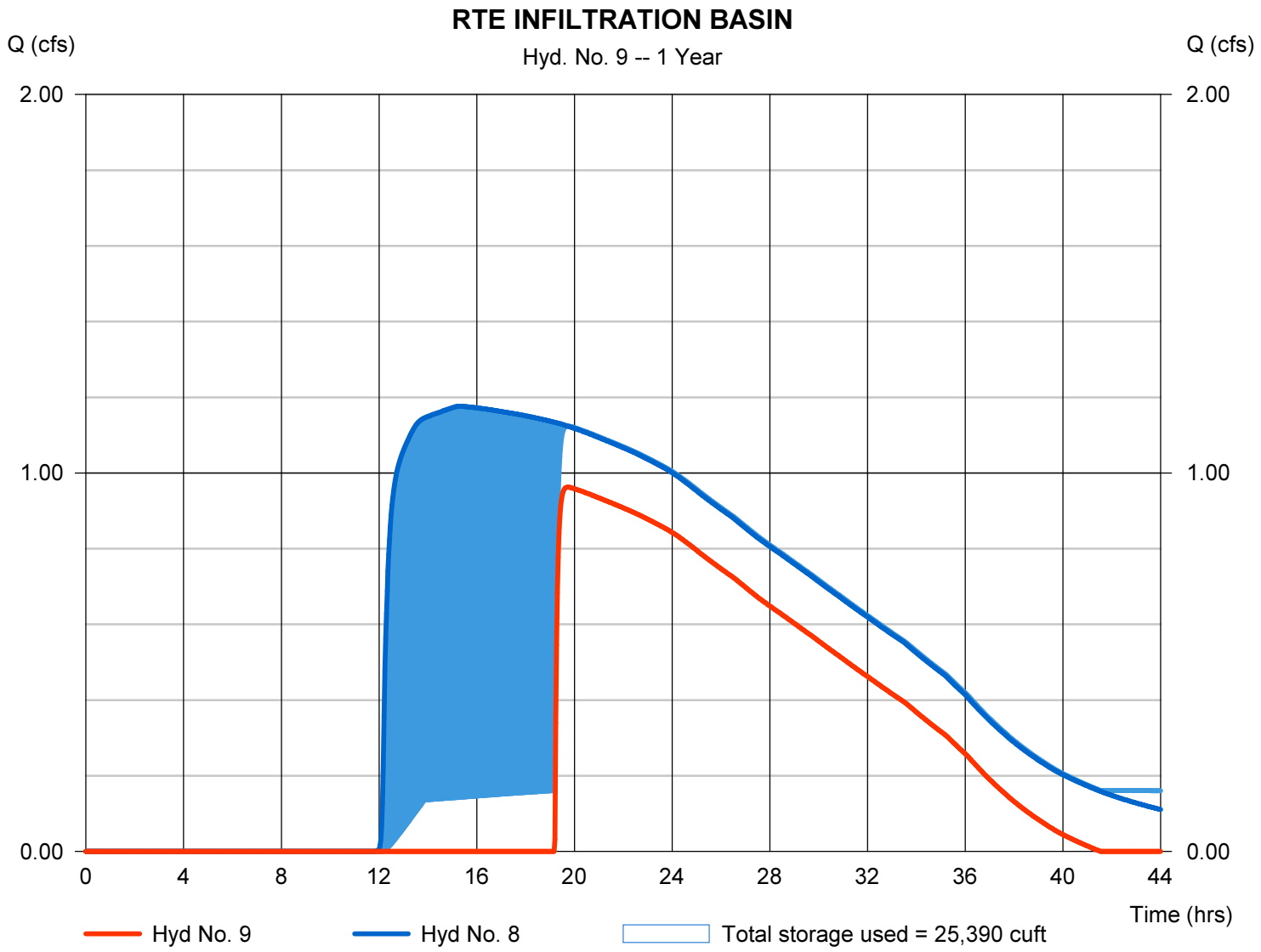
Hydrograph Report

Hyd. No. 9

RTE INFILTRATION BASIN

Hydrograph type	=	Reservoir	Peak discharge	=	0.963 cfs
Storm frequency	=	1 yrs	Time to peak	=	19.73 hrs
Time interval	=	2 min	Hyd. volume	=	41,676 cuft
Inflow hyd. No.	=	8 - RTE POND 1	Max. Elevation	=	56.52 ft
Reservoir name	=	POND 2	Max. Storage	=	25,390 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 2 - POND 2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 54.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	54.50	10,988	0	0
0.50	55.00	11,756	5,684	5,684
1.50	56.00	13,178	12,459	18,143
2.50	57.00	14,640	13,901	32,045
3.00	57.50	15,631	7,566	39,610

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 54.50	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 55.00	0.00	0.00	0.00
Crest El. (ft)	= 56.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	Broad	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.500 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	54.50	---	---	---	---	0.00	---	---	---	0.000	---	0.000
0.05	568	54.55	---	---	---	---	0.00	---	---	---	0.014	---	0.014
0.10	1,137	54.60	---	---	---	---	0.00	---	---	---	0.027	---	0.027
0.15	1,705	54.65	---	---	---	---	0.00	---	---	---	0.041	---	0.041
0.20	2,274	54.70	---	---	---	---	0.00	---	---	---	0.054	---	0.054
0.25	2,842	54.75	---	---	---	---	0.00	---	---	---	0.068	---	0.068
0.30	3,411	54.80	---	---	---	---	0.00	---	---	---	0.082	---	0.082
0.35	3,979	54.85	---	---	---	---	0.00	---	---	---	0.095	---	0.095
0.40	4,547	54.90	---	---	---	---	0.00	---	---	---	0.109	---	0.109
0.45	5,116	54.95	---	---	---	---	0.00	---	---	---	0.122	---	0.122
0.50	5,684	55.00	---	---	---	---	0.00	---	---	---	0.136	---	0.136
0.60	6,930	55.10	---	---	---	---	0.00	---	---	---	0.138	---	0.138
0.70	8,176	55.20	---	---	---	---	0.00	---	---	---	0.139	---	0.139
0.80	9,422	55.30	---	---	---	---	0.00	---	---	---	0.141	---	0.141
0.90	10,668	55.40	---	---	---	---	0.00	---	---	---	0.143	---	0.143
1.00	11,914	55.50	---	---	---	---	0.00	---	---	---	0.144	---	0.144
1.10	13,160	55.60	---	---	---	---	0.00	---	---	---	0.146	---	0.146
1.20	14,406	55.70	---	---	---	---	0.00	---	---	---	0.148	---	0.148
1.30	15,652	55.80	---	---	---	---	0.00	---	---	---	0.149	---	0.149
1.40	16,897	55.90	---	---	---	---	0.00	---	---	---	0.151	---	0.151
1.50	18,143	56.00	---	---	---	---	0.00	---	---	---	0.153	---	0.153
1.60	19,533	56.10	---	---	---	---	0.00	---	---	---	0.154	---	0.154
1.70	20,924	56.20	---	---	---	---	0.00	---	---	---	0.156	---	0.156
1.80	22,314	56.30	---	---	---	---	0.00	---	---	---	0.158	---	0.158
1.90	23,704	56.40	---	---	---	---	0.00	---	---	---	0.159	---	0.159
2.00	25,094	56.50	---	---	---	---	0.00	---	---	---	0.161	---	0.161
2.10	26,484	56.60	---	---	---	---	4.52	---	---	---	0.163	---	4.684
2.20	27,874	56.70	---	---	---	---	12.79	---	---	---	0.164	---	12.95
2.30	29,264	56.80	---	---	---	---	23.50	---	---	---	0.166	---	23.66
2.40	30,654	56.90	---	---	---	---	36.18	---	---	---	0.168	---	36.34
2.50	32,045	57.00	---	---	---	---	50.56	---	---	---	0.169	---	50.73
2.55	32,801	57.05	---	---	---	---	58.33	---	---	---	0.171	---	58.50
2.60	33,558	57.10	---	---	---	---	66.46	---	---	---	0.172	---	66.63
2.65	34,314	57.15	---	---	---	---	74.94	---	---	---	0.173	---	75.11
2.70	35,071	57.20	---	---	---	---	83.75	---	---	---	0.174	---	83.92
2.75	35,827	57.25	---	---	---	---	92.88	---	---	---	0.175	---	93.06
2.80	36,584	57.30	---	---	---	---	102.32	---	---	---	0.176	---	102.50
2.85	37,340	57.35	---	---	---	---	112.06	---	---	---	0.177	---	112.24

Continues on next page...

POND 2

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
2.90	38,097	57.40	---	---	---	---	122.09	---	---	---	0.179	---	122.27
2.95	38,854	57.45	---	---	---	---	132.41	---	---	---	0.180	---	132.59
3.00	39,610	57.50	---	---	---	---	143.00	---	---	---	0.181	---	143.18

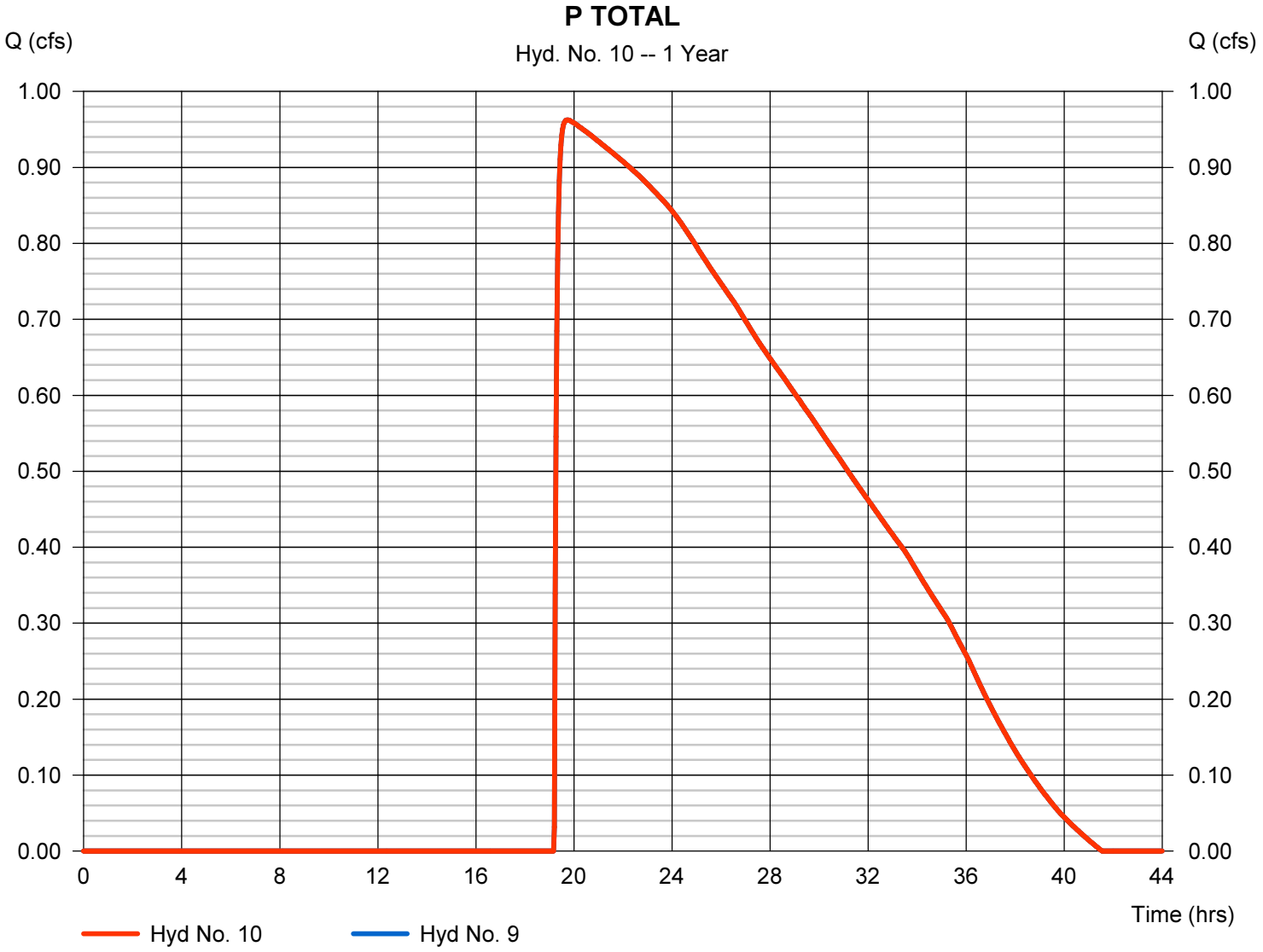
...End

Hydrograph Report

Hyd. No. 10

P TOTAL

Hydrograph type	= Combine	Peak discharge	= 0.963 cfs
Storm frequency	= 1 yrs	Time to peak	= 19.73 hrs
Time interval	= 2 min	Hyd. volume	= 41,676 cuft
Inflow hyds.	= 9	Contrib. drain. area	= 0.000 ac

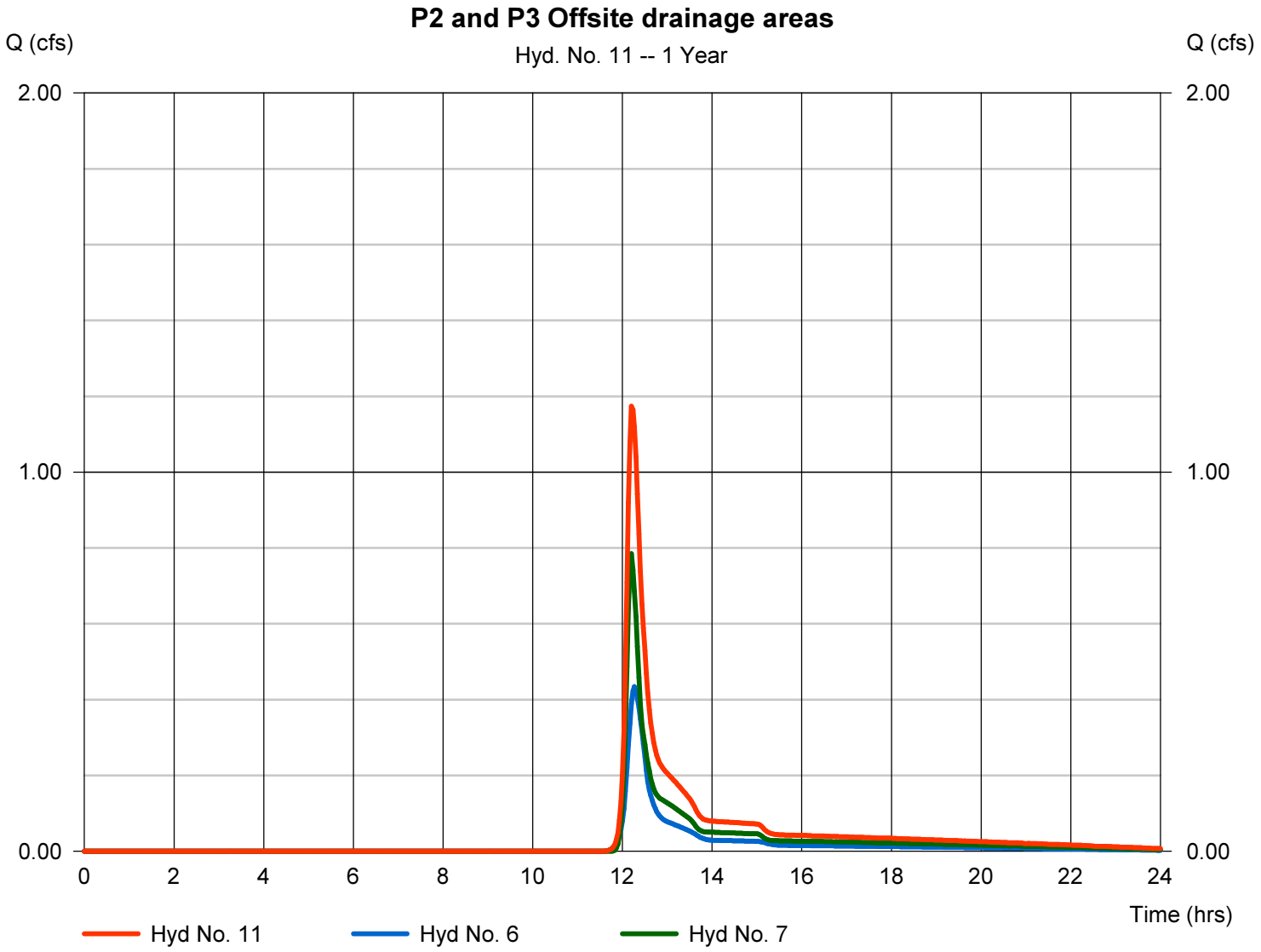


Hydrograph Report

Hyd. No. 11

P2 and P3 Offsite drainage areas

Hydrograph type	= Combine	Peak discharge	= 1.174 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 3,700 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.760 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

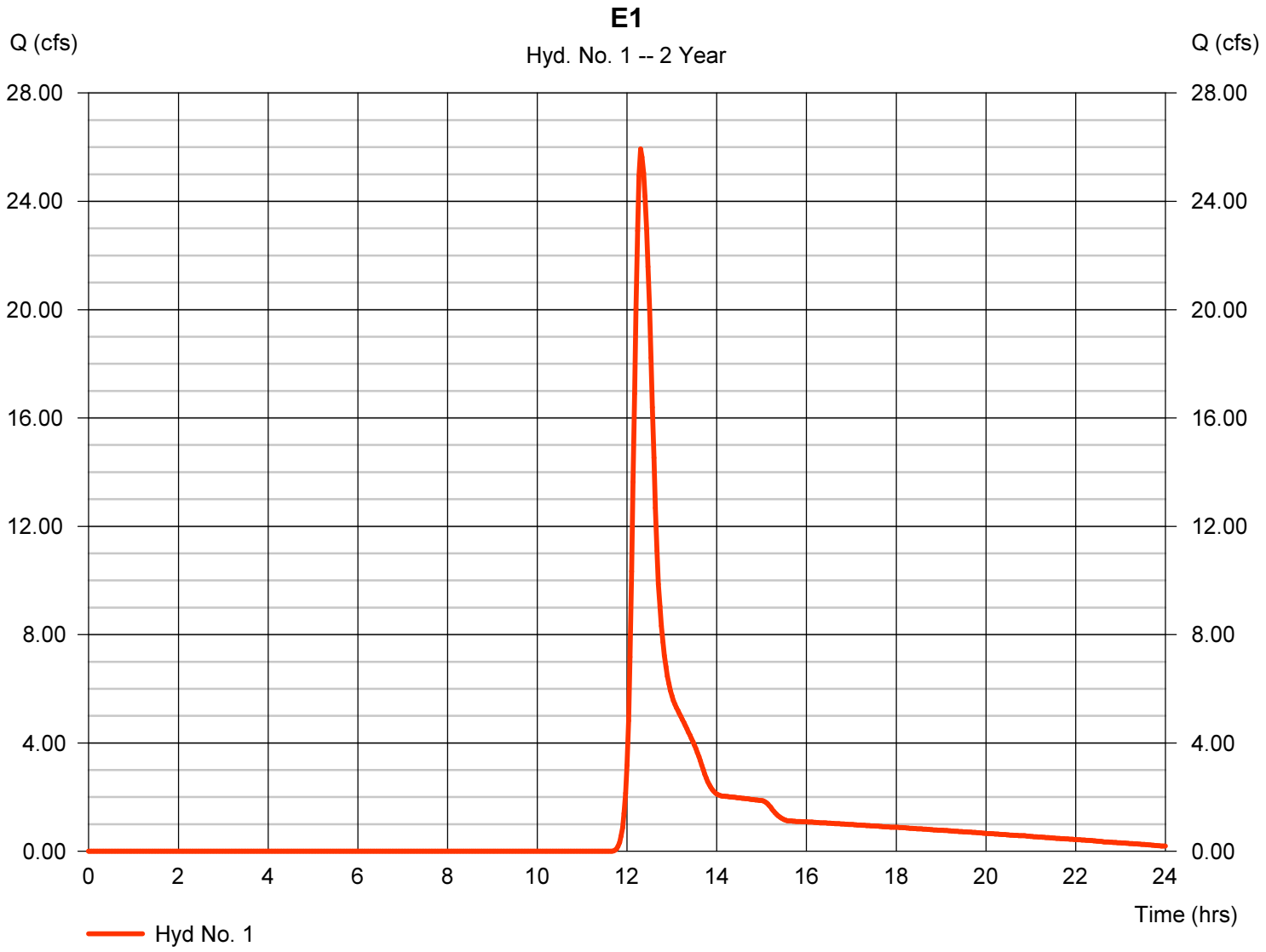
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	25.93	2	738	97,273	------	------	------	E1
2	SCS Runoff	0.570	2	736	1,829	------	------	------	E2
3	SCS Runoff	1.476	2	732	3,980	------	------	------	E3
4	Combine	27.58	2	738	103,081	1, 2, 3	------	------	E TOTAL
5	SCS Runoff	35.72	2	736	115,772	------	------	------	P1
6	SCS Runoff	0.570	2	736	1,829	------	------	------	P2
7	SCS Runoff	1.084	2	732	3,000	------	------	------	P3
8	Reservoir	4.330	2	808	114,542	5	60.68	66,052	RTE POND 1
9	Reservoir	2.031	2	914	66,527	8	56.54	25,718	RTE INFILTRATION BASIN
10	Combine	2.031	2	914	66,527	9	------	------	P TOTAL
11	Combine	1.603	2	732	4,828	6, 7,	------	------	P2 and P3 Offsite drainage areas

Hydrograph Report

Hyd. No. 1

E1

Hydrograph type	=	SCS Runoff	Peak discharge	=	25.93 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.30 hrs
Time interval	=	2 min	Hyd. volume	=	97,273 cuft
Drainage area	=	38.770 ac	Curve number	=	73
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.00 min
Total precip.	=	2.70 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS factor	=	484

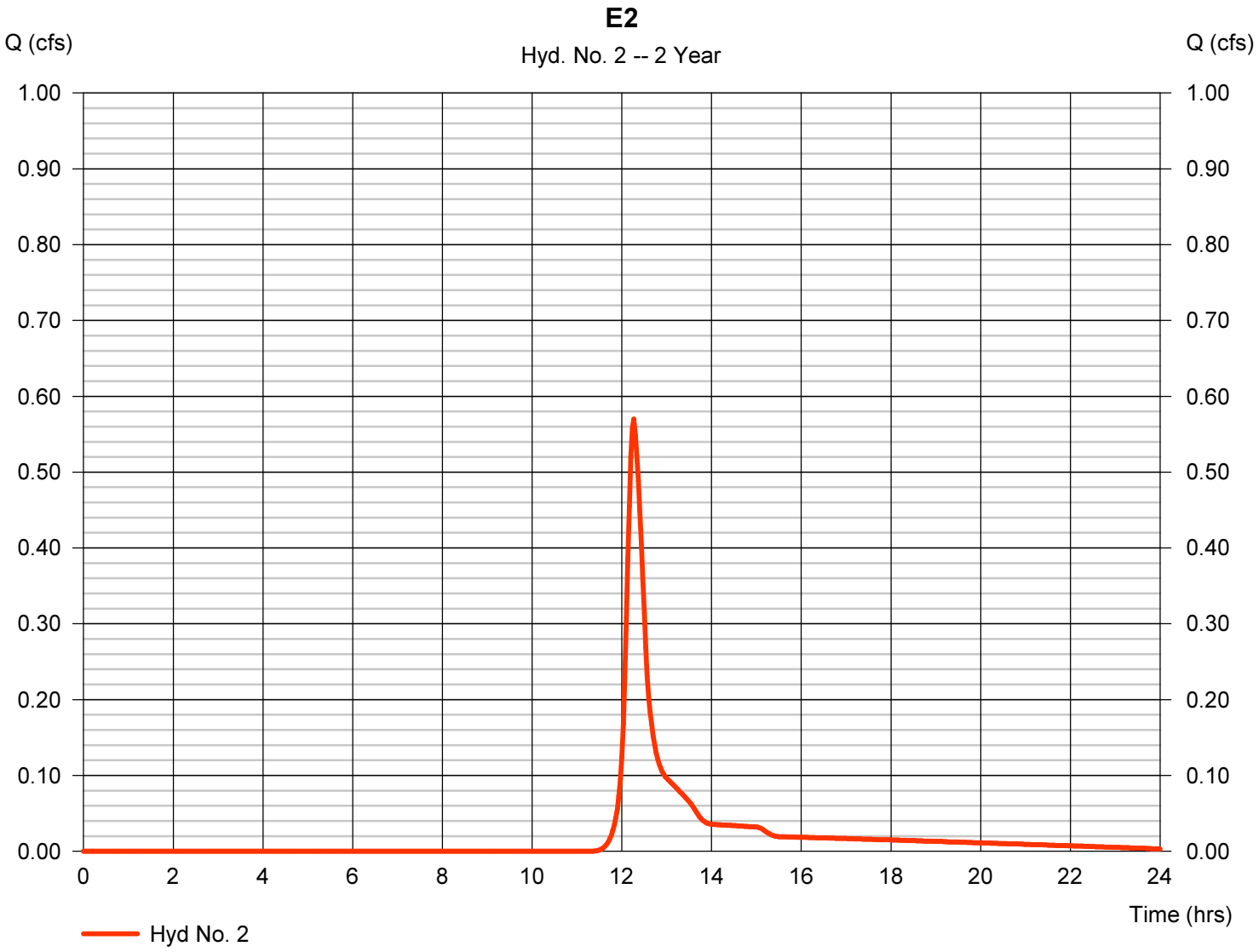


Hydrograph Report

Hyd. No. 2

E2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.570 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	1,829 cuft
Drainage area	=	0.580 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.00 min
Total precip.	=	2.70 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS Type	=	484

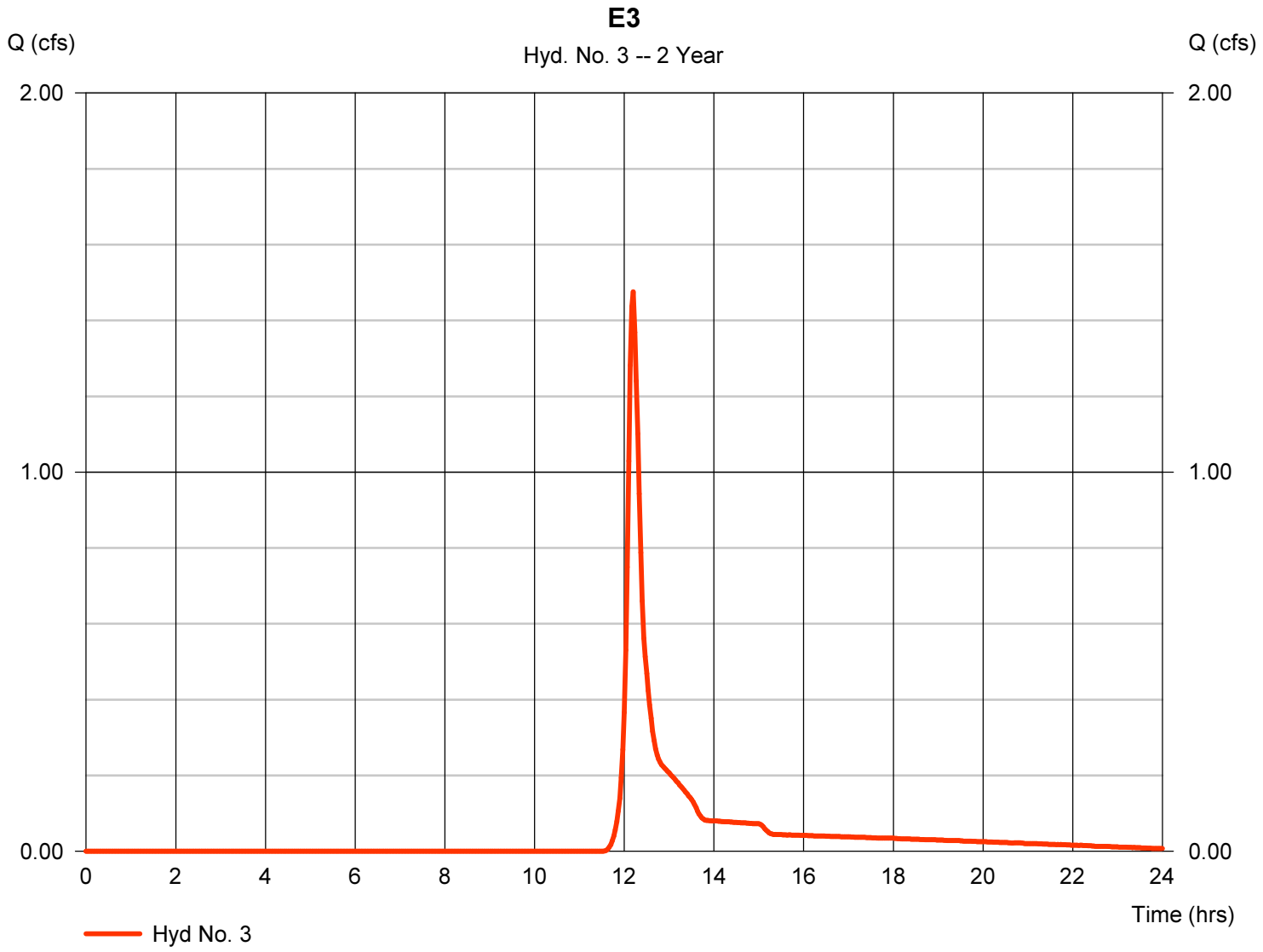


Hydrograph Report

Hyd. No. 3

E3

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.476 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	3,980 cuft
Drainage area	=	1.380 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.00 min
Total precip.	=	2.70 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS factor	=	484

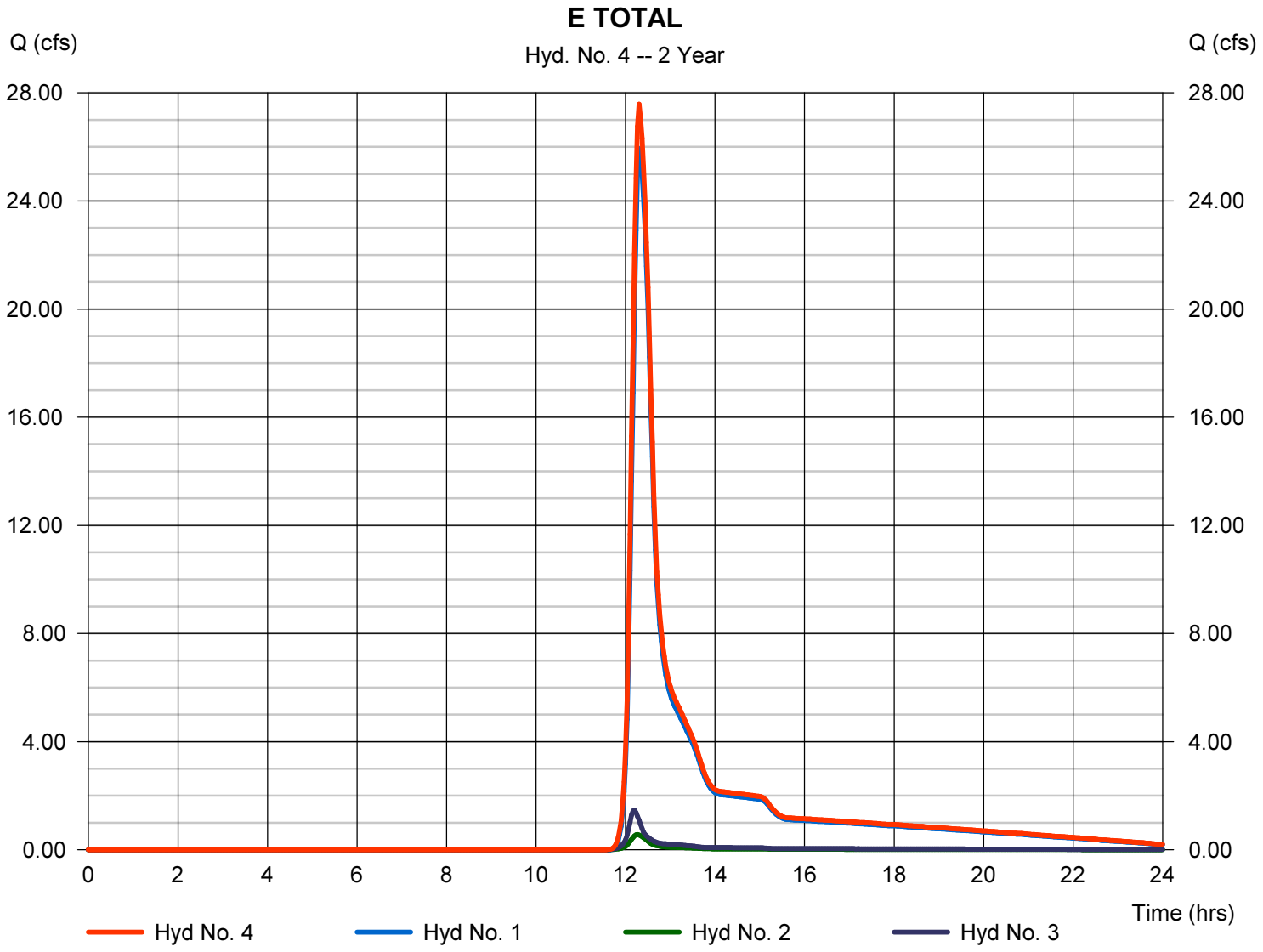


Hydrograph Report

Hyd. No. 4

E TOTAL

Hydrograph type	= Combine	Peak discharge	= 27.58 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 103,081 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 40.730 ac

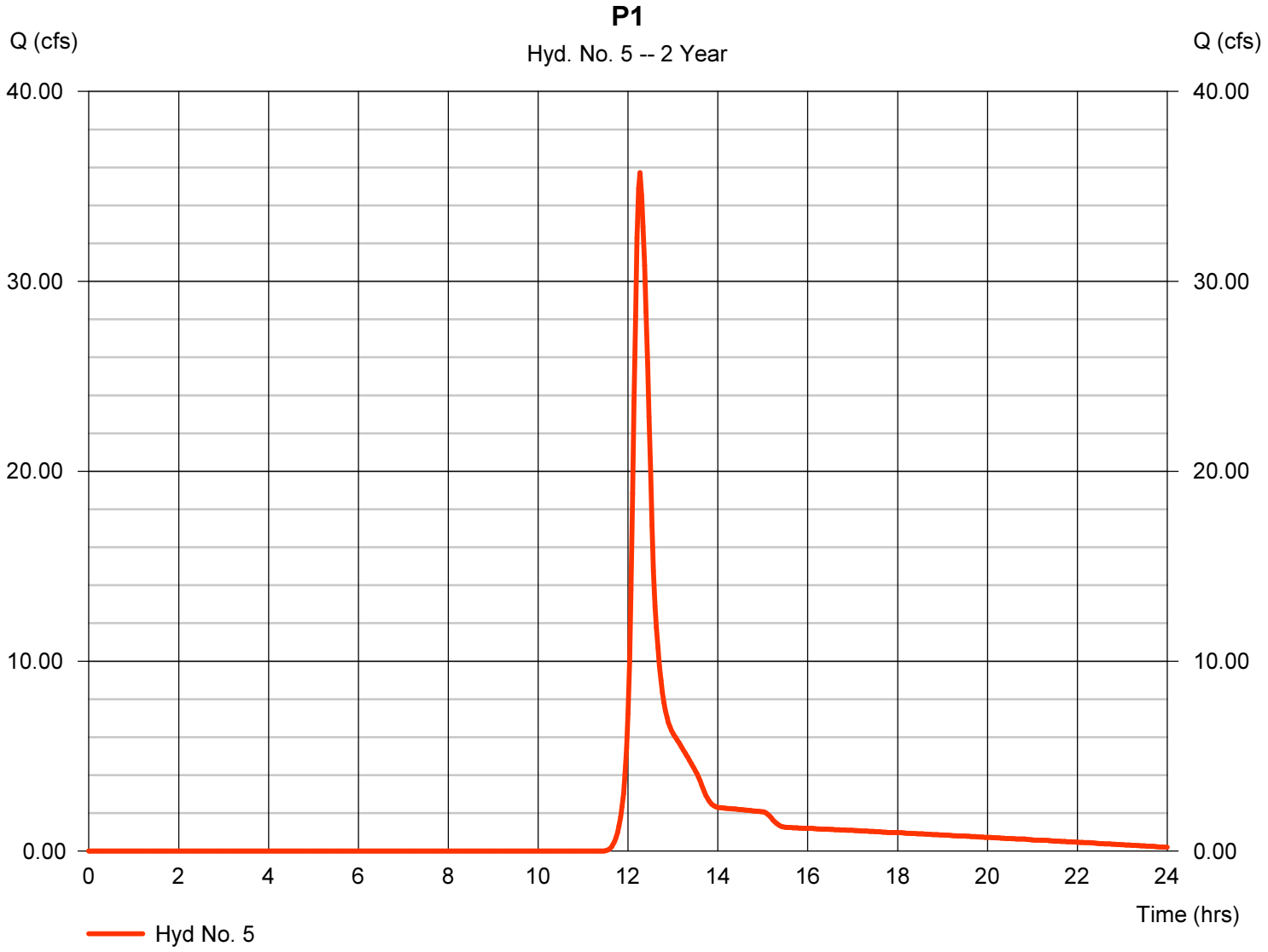


Hydrograph Report

Hyd. No. 5

P1

Hydrograph type	=	SCS Runoff	Peak discharge	=	35.72 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	115,772 cuft
Drainage area	=	38.960 ac	Curve number	=	76
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.00 min
Total precip.	=	2.70 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS factor	=	484

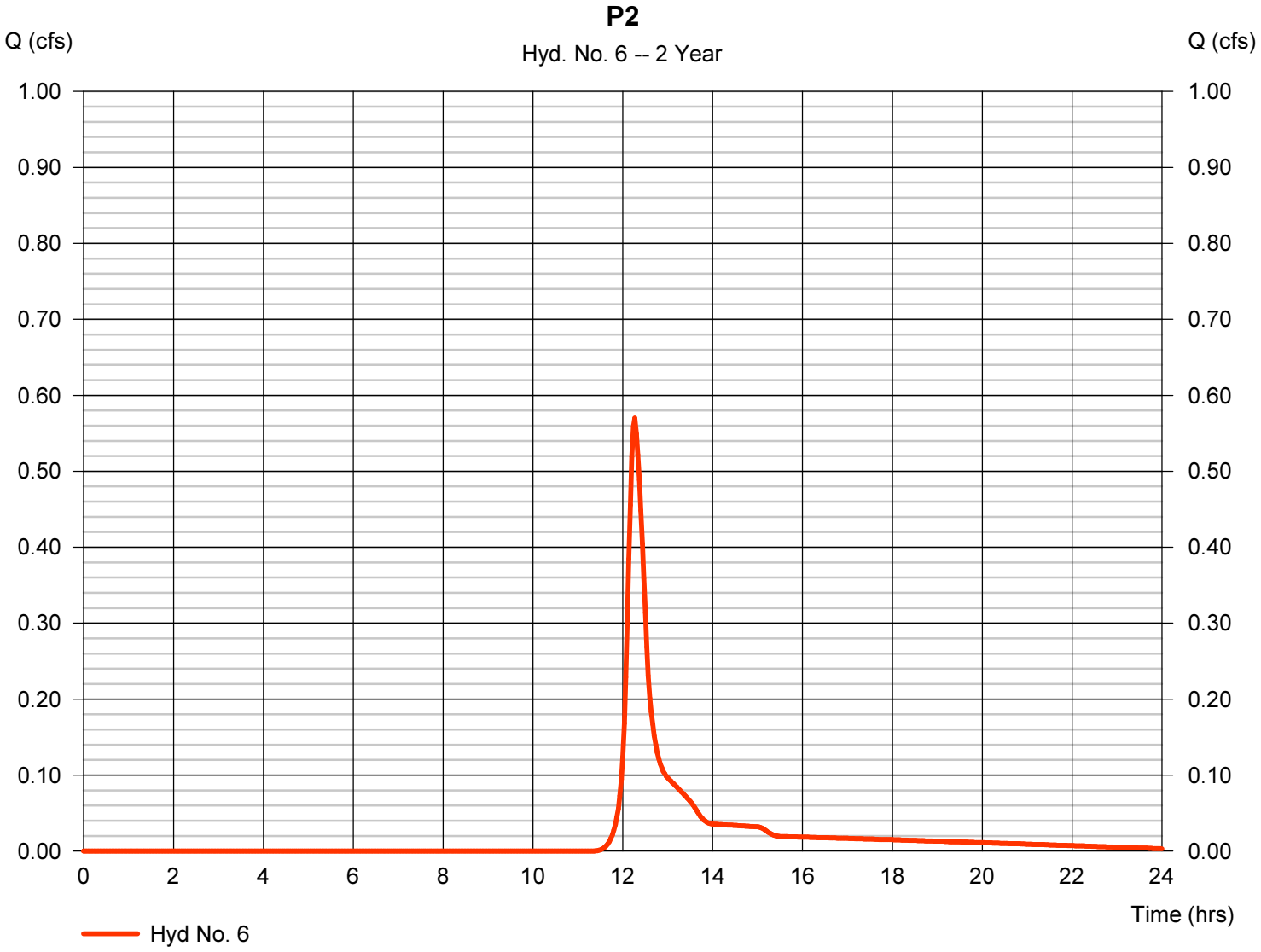


Hydrograph Report

Hyd. No. 6

P2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.570 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	1,829 cuft
Drainage area	=	0.580 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.00 min
Total precip.	=	2.70 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS factor	=	484

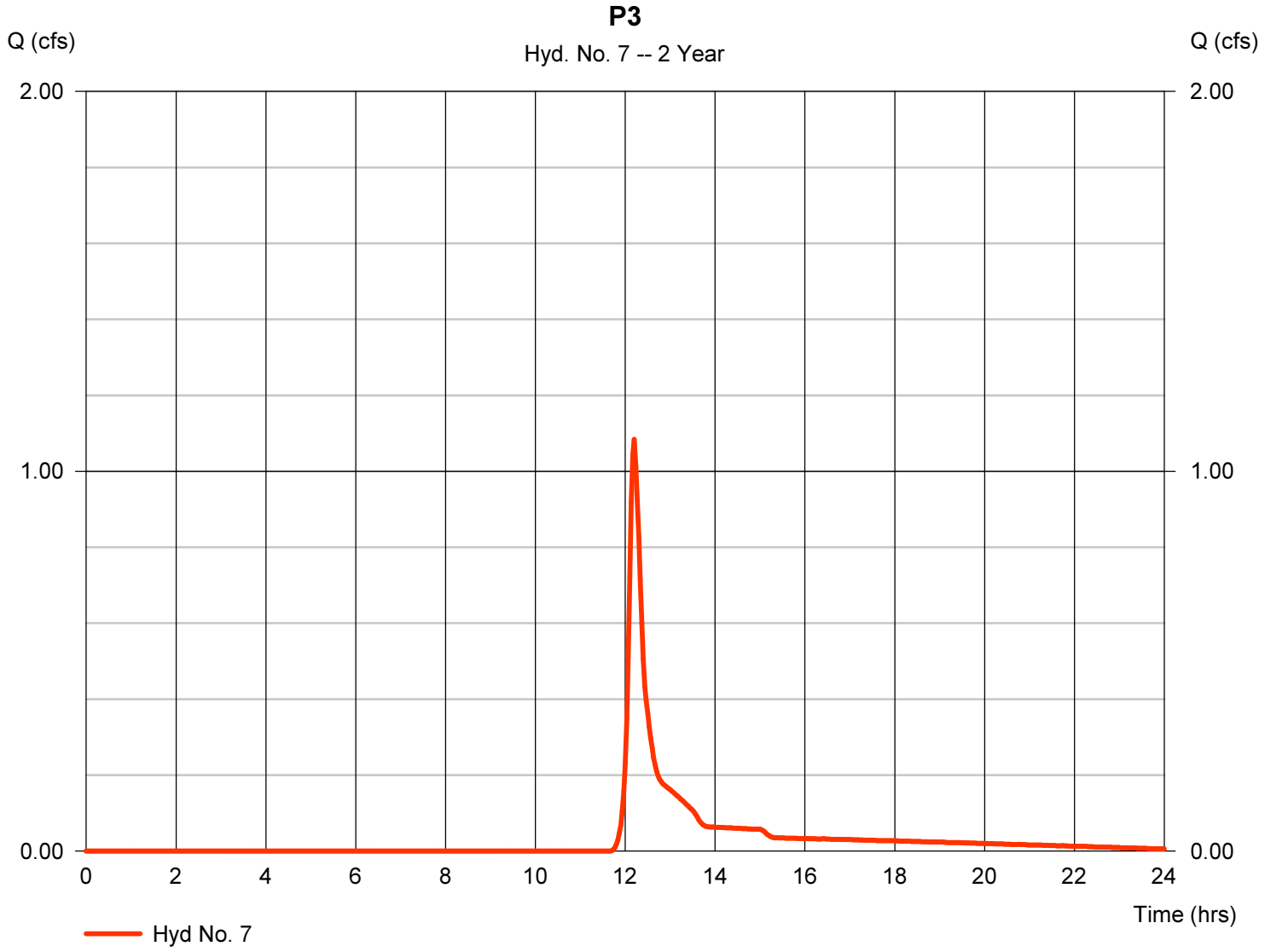


Hydrograph Report

Hyd. No. 7

P3

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.084 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	3,000 cuft
Drainage area	=	1.180 ac	Curve number	=	73
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.00 min
Total precip.	=	2.70 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS Temporal factor	=	484



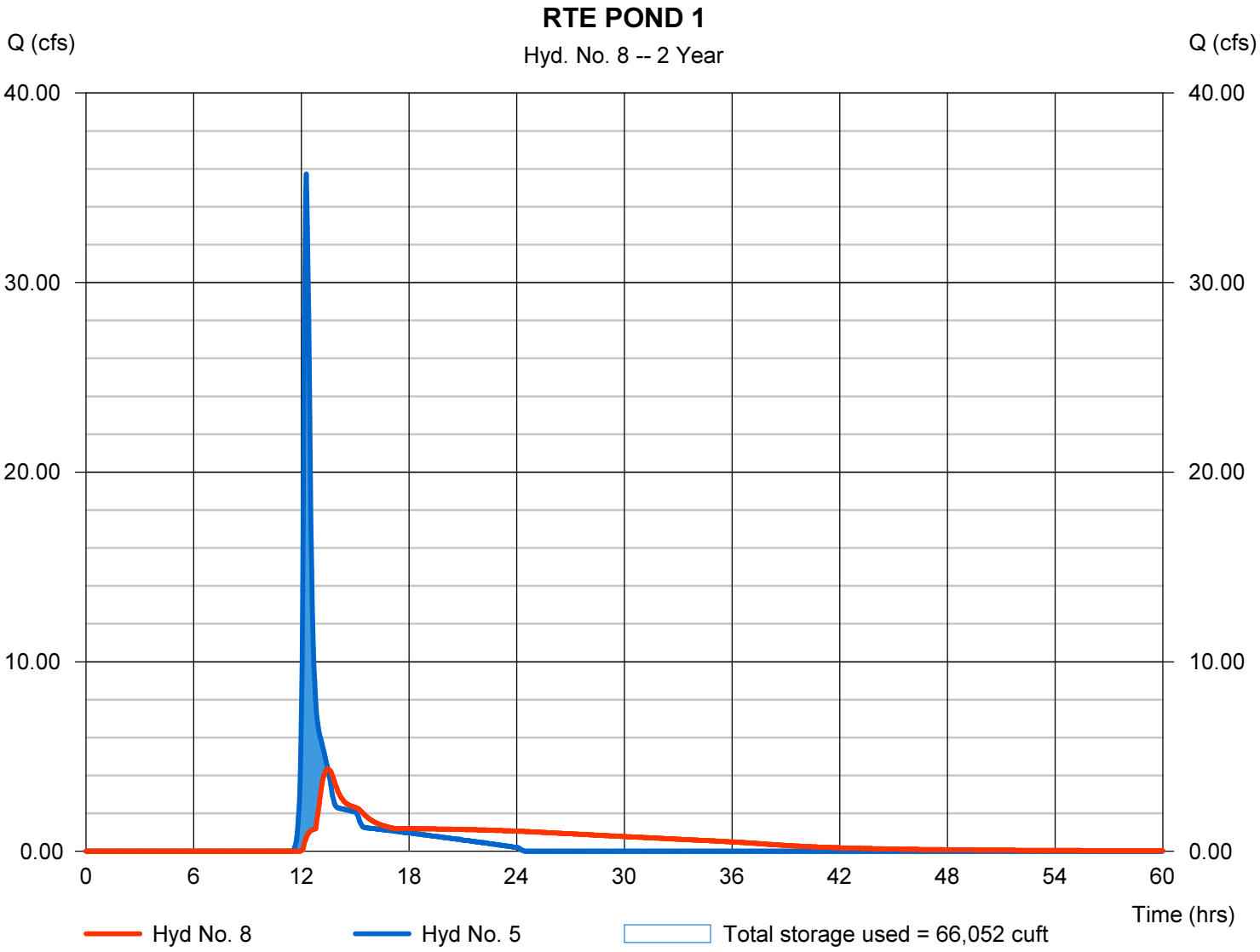
Hydrograph Report

Hyd. No. 8

RTE POND 1

Hydrograph type	=	Reservoir	Peak discharge	=	4.330 cfs
Storm frequency	=	2 yrs	Time to peak	=	13.47 hrs
Time interval	=	2 min	Hyd. volume	=	114,542 cuft
Inflow hyd. No.	=	5 - P1	Max. Elevation	=	60.68 ft
Reservoir name	=	POND 1	Max. Storage	=	66,052 cuft

Storage Indication method used.



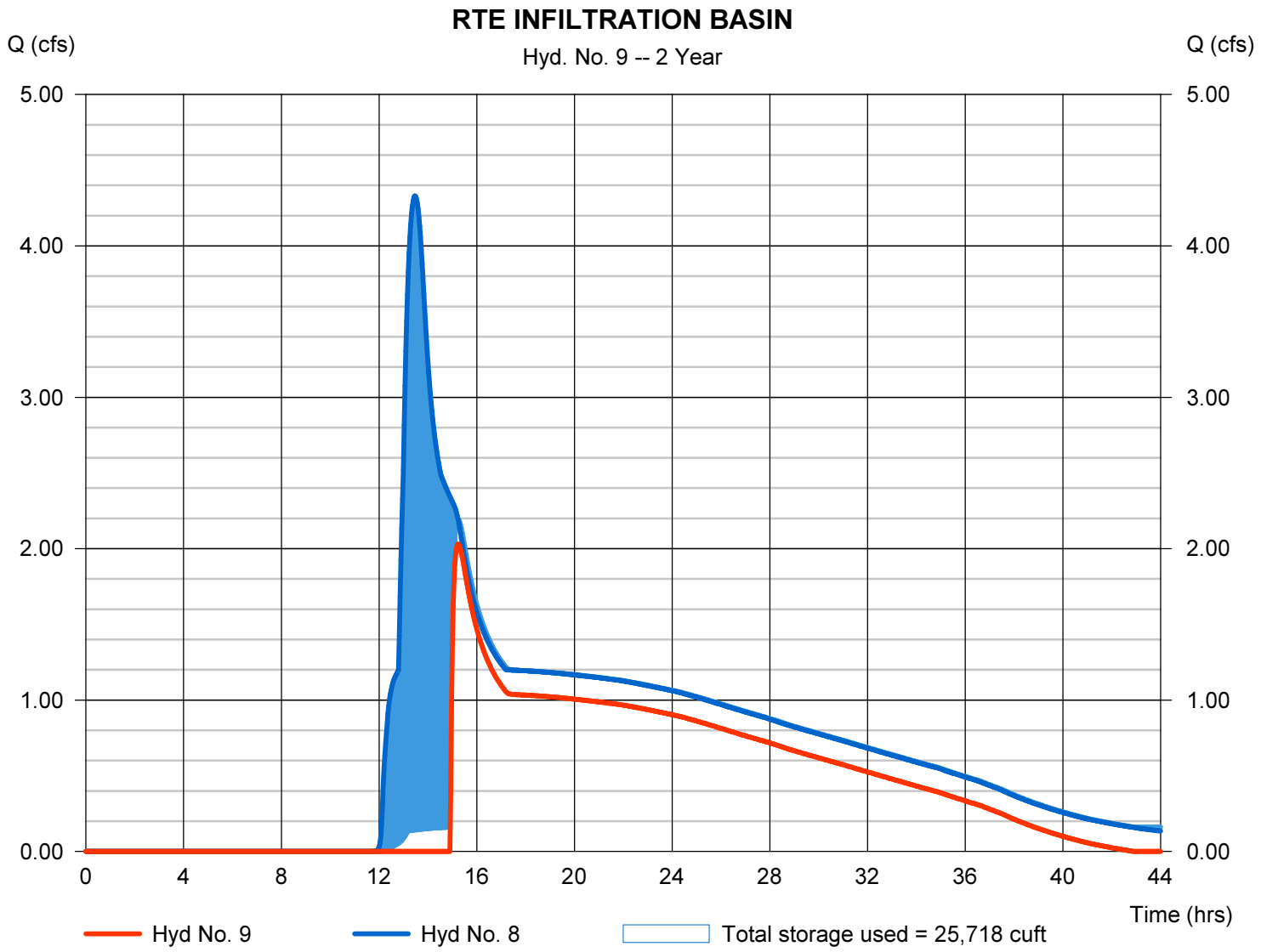
Hydrograph Report

Hyd. No. 9

RTE INFILTRATION BASIN

Hydrograph type	=	Reservoir	Peak discharge	=	2.031 cfs
Storm frequency	=	2 yrs	Time to peak	=	15.23 hrs
Time interval	=	2 min	Hyd. volume	=	66,527 cuft
Inflow hyd. No.	=	8 - RTE POND 1	Max. Elevation	=	56.54 ft
Reservoir name	=	POND 2	Max. Storage	=	25,718 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

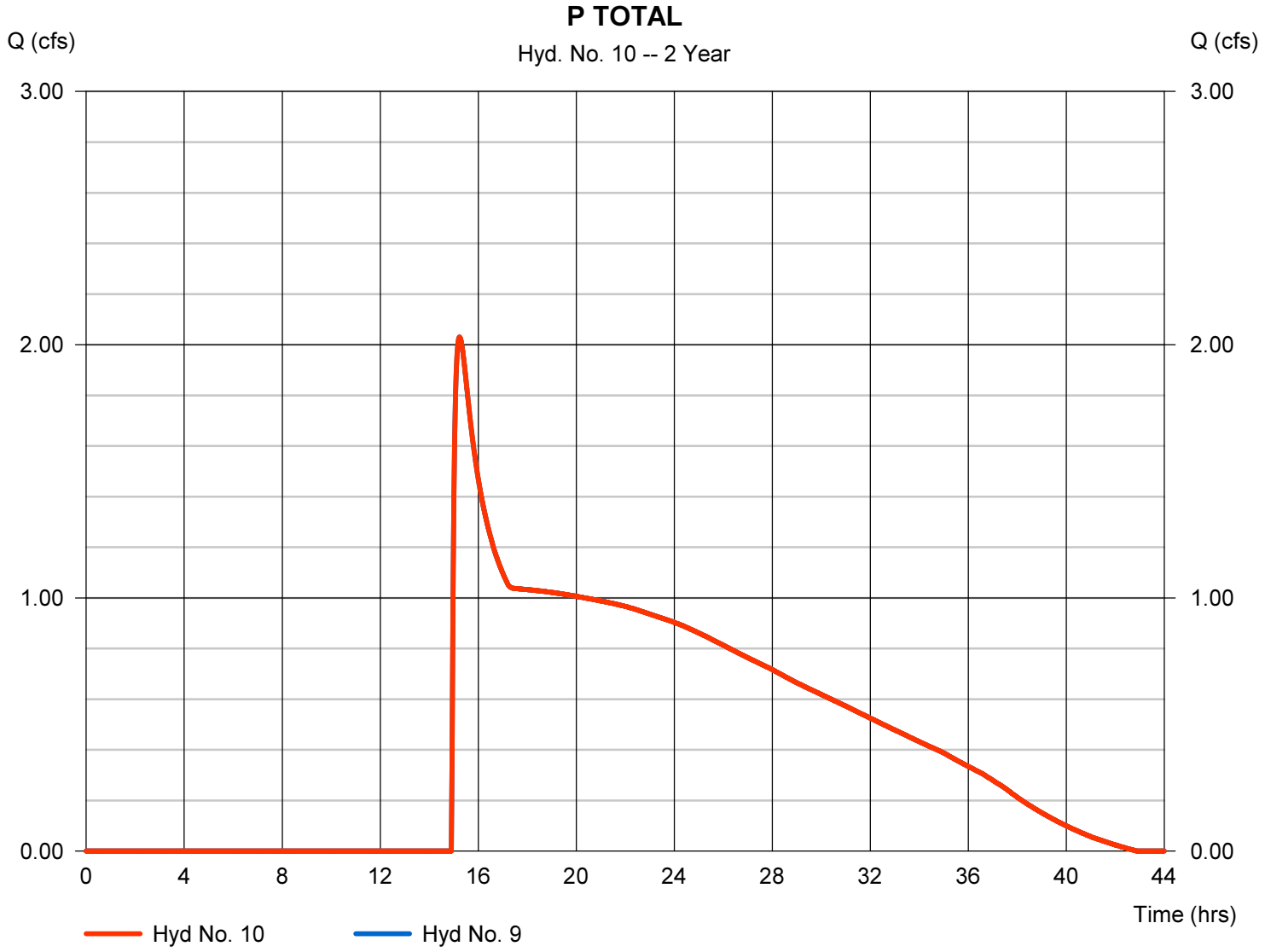


Hydrograph Report

Hyd. No. 10

P TOTAL

Hydrograph type	= Combine	Peak discharge	= 2.031 cfs
Storm frequency	= 2 yrs	Time to peak	= 15.23 hrs
Time interval	= 2 min	Hyd. volume	= 66,527 cuft
Inflow hyds.	= 9	Contrib. drain. area	= 0.000 ac

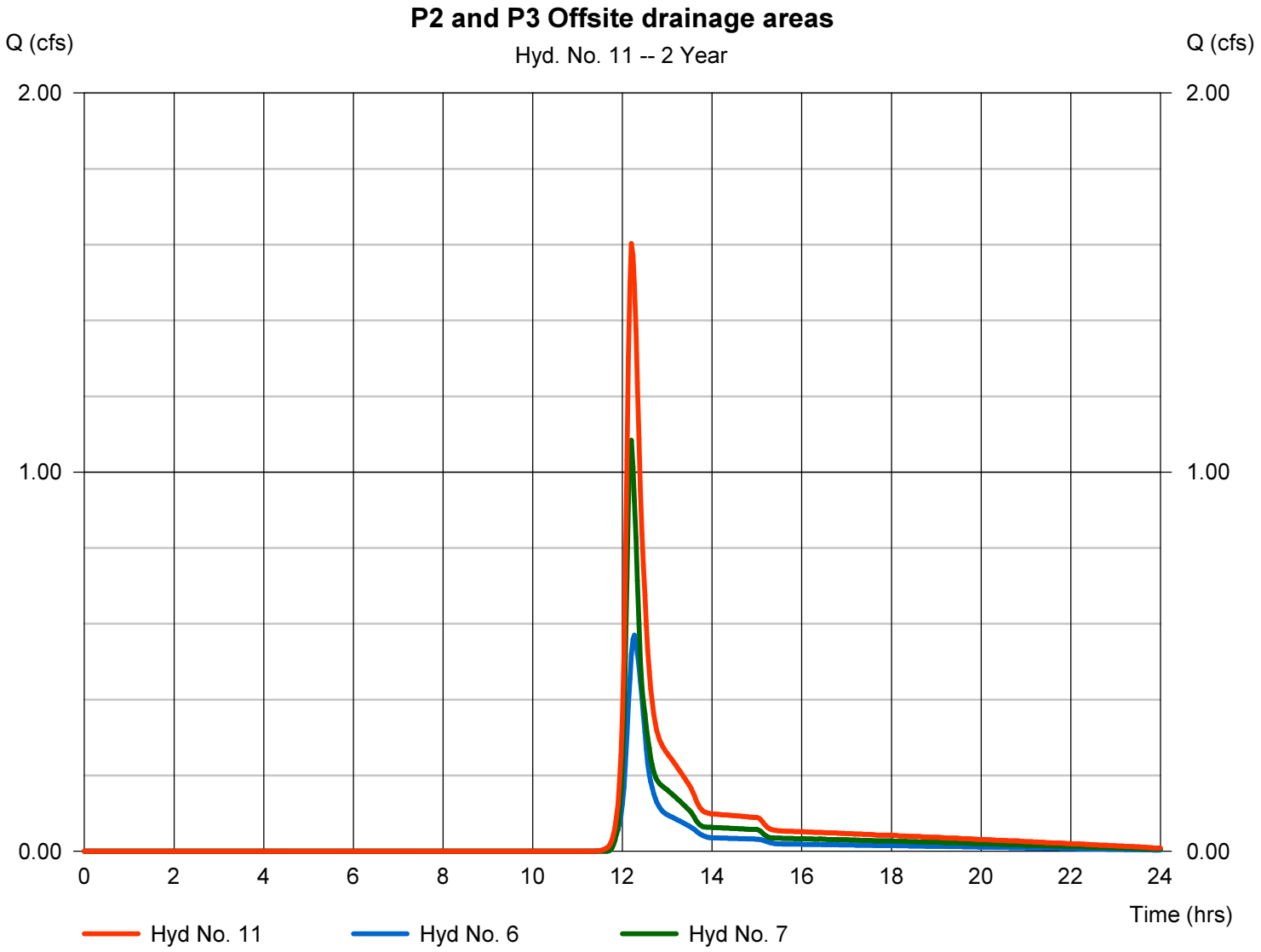


Hydrograph Report

Hyd. No. 11

P2 and P3 Offsite drainage areas

Hydrograph type	= Combine	Peak discharge	= 1.603 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 4,828 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.760 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

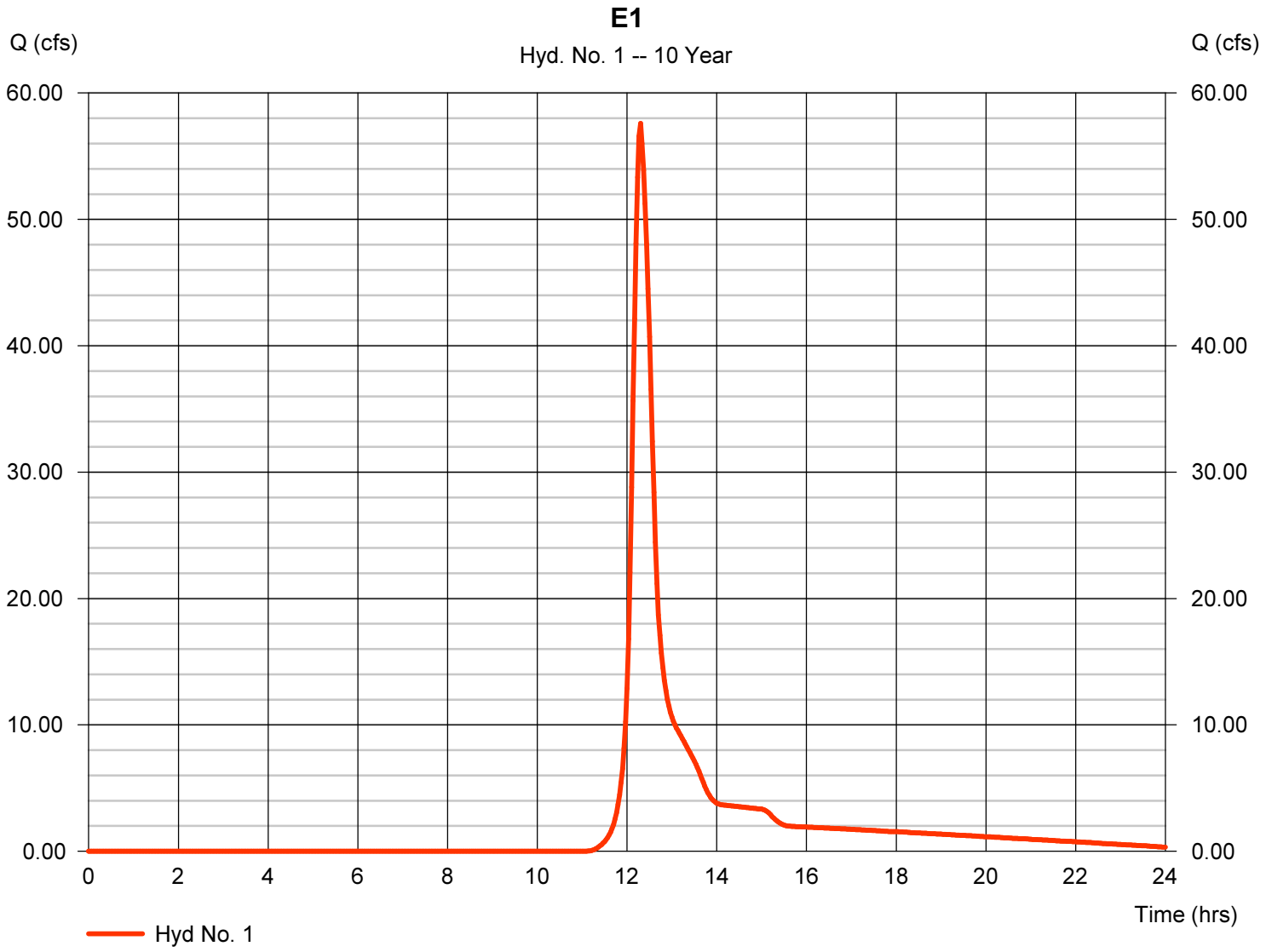
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	57.60	2	738	199,491	------	------	------	E1
2	SCS Runoff	1.128	2	736	3,505	------	------	------	E2
3	SCS Runoff	3.033	2	732	7,881	------	------	------	E3
4	Combine	60.83	2	738	210,877	1, 2, 3	------	------	E TOTAL
5	SCS Runoff	72.38	2	736	225,481	------	------	------	P1
6	SCS Runoff	1.128	2	736	3,505	------	------	------	P2
7	SCS Runoff	2.353	2	732	6,152	------	------	------	P3
8	Reservoir	31.95	2	752	224,221	5	61.40	91,653	RTE POND 1
9	Reservoir	28.52	2	760	174,808	8	56.84	29,815	RTE INFILTRATION BASIN
10	Combine	28.52	2	760	174,808	9	------	------	P TOTAL
11	Combine	3.415	2	732	9,657	6, 7,	------	------	P2 and P3 Offsite drainage areas

Hydrograph Report

Hyd. No. 1

E1

Hydrograph type	=	SCS Runoff	Peak discharge	=	57.60 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.30 hrs
Time interval	=	2 min	Hyd. volume	=	199,491 cuft
Drainage area	=	38.770 ac	Curve number	=	73
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.00 min
Total precip.	=	3.81 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hyd factor\MSE3_2min.SCS	Shape factor	=	484

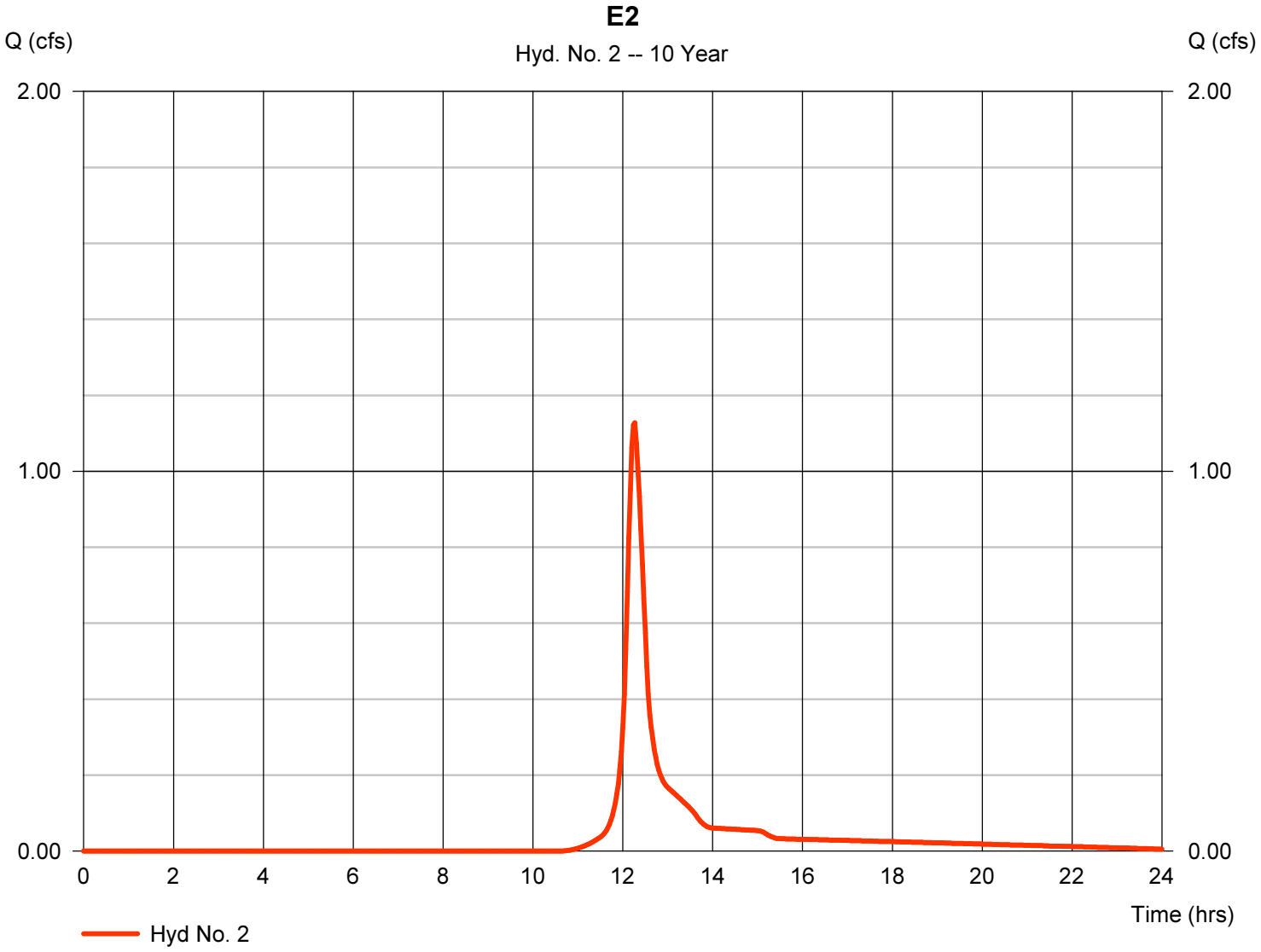


Hydrograph Report

Hyd. No. 2

E2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.128 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	3,505 cuft
Drainage area	=	0.580 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.00 min
Total precip.	=	3.81 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSV	SCS factor	=	484

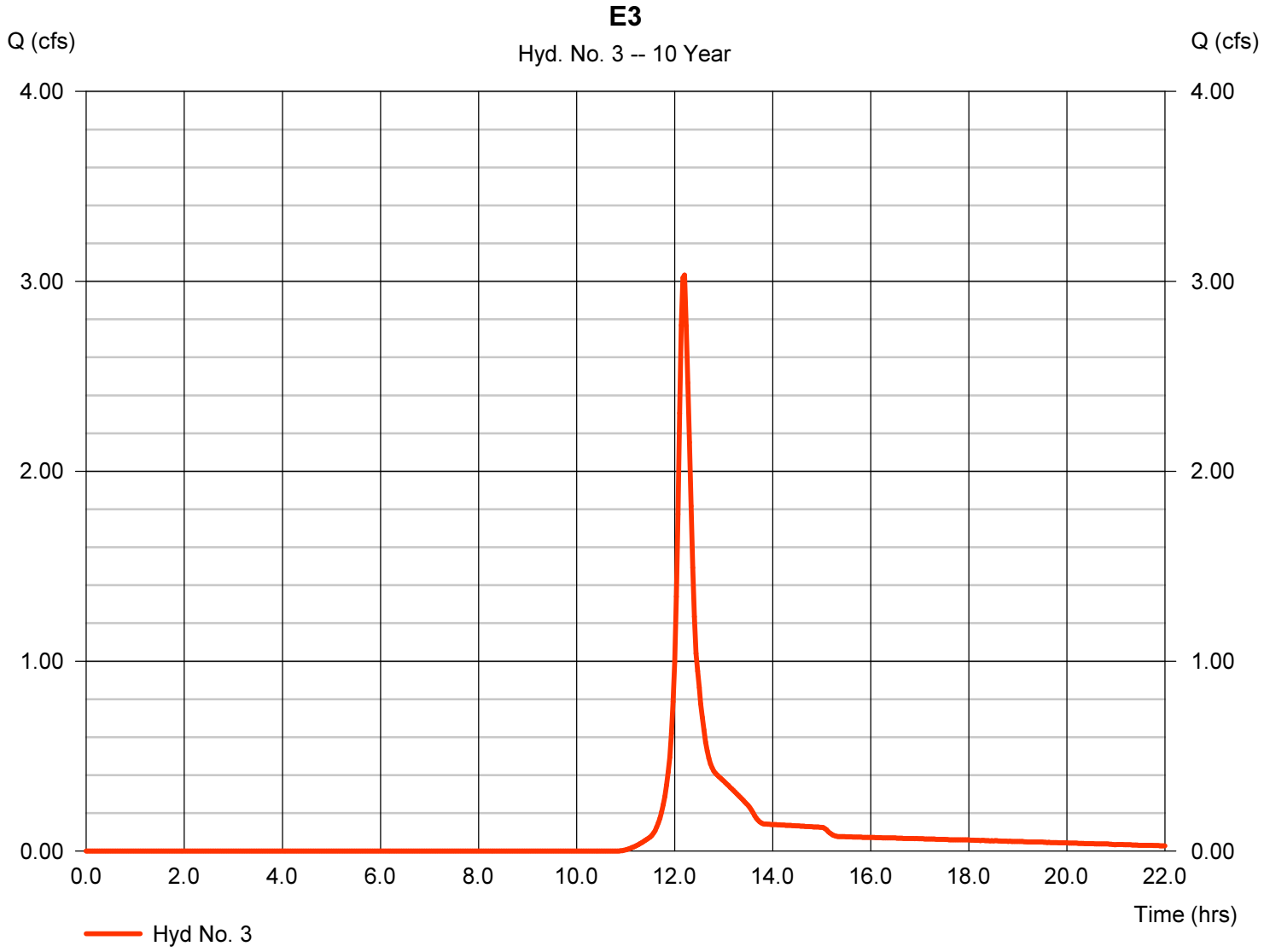


Hydrograph Report

Hyd. No. 3

E3

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.033 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	7,881 cuft
Drainage area	=	1.380 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.00 min
Total precip.	=	3.81 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.SDS	SCS factor	=	484

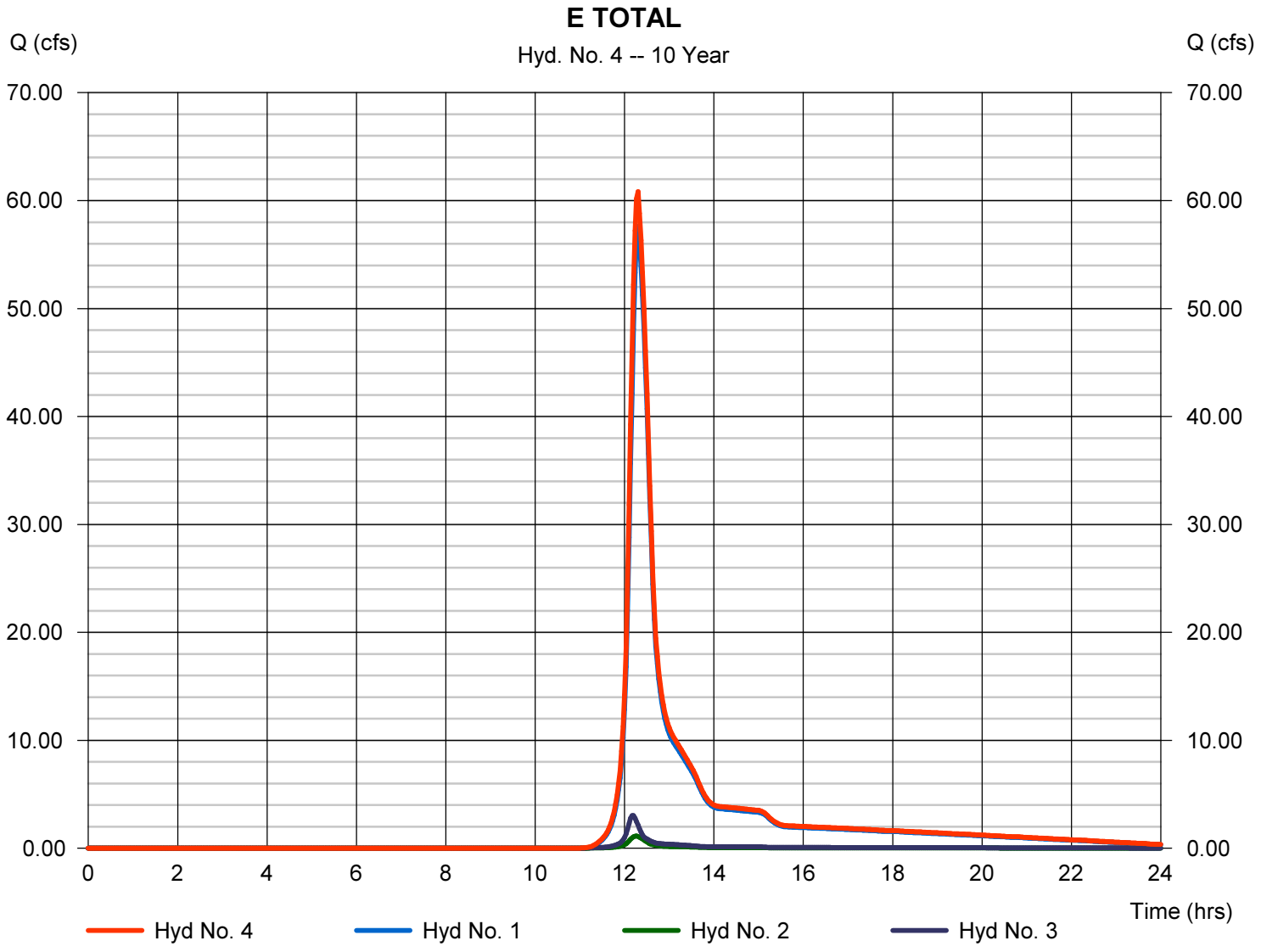


Hydrograph Report

Hyd. No. 4

E TOTAL

Hydrograph type	= Combine	Peak discharge	= 60.83 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 210,877 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 40.730 ac

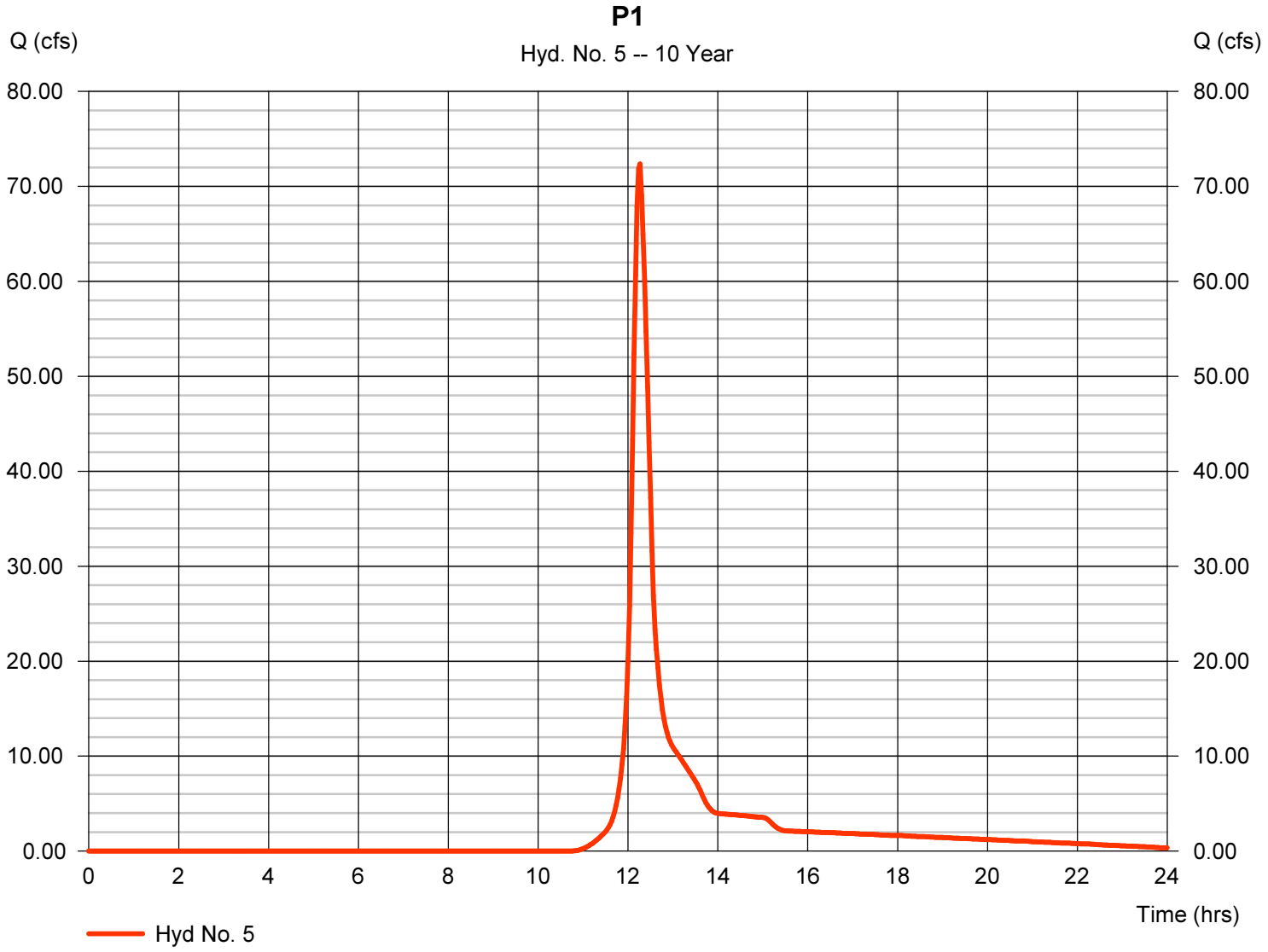


Hydrograph Report

Hyd. No. 5

P1

Hydrograph type	=	SCS Runoff	Peak discharge	=	72.38 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	225,481 cuft
Drainage area	=	38.960 ac	Curve number	=	76
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.00 min
Total precip.	=	3.81 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hyd factor\MSE3_2min.SCS	SCS Hyd factor	=	484

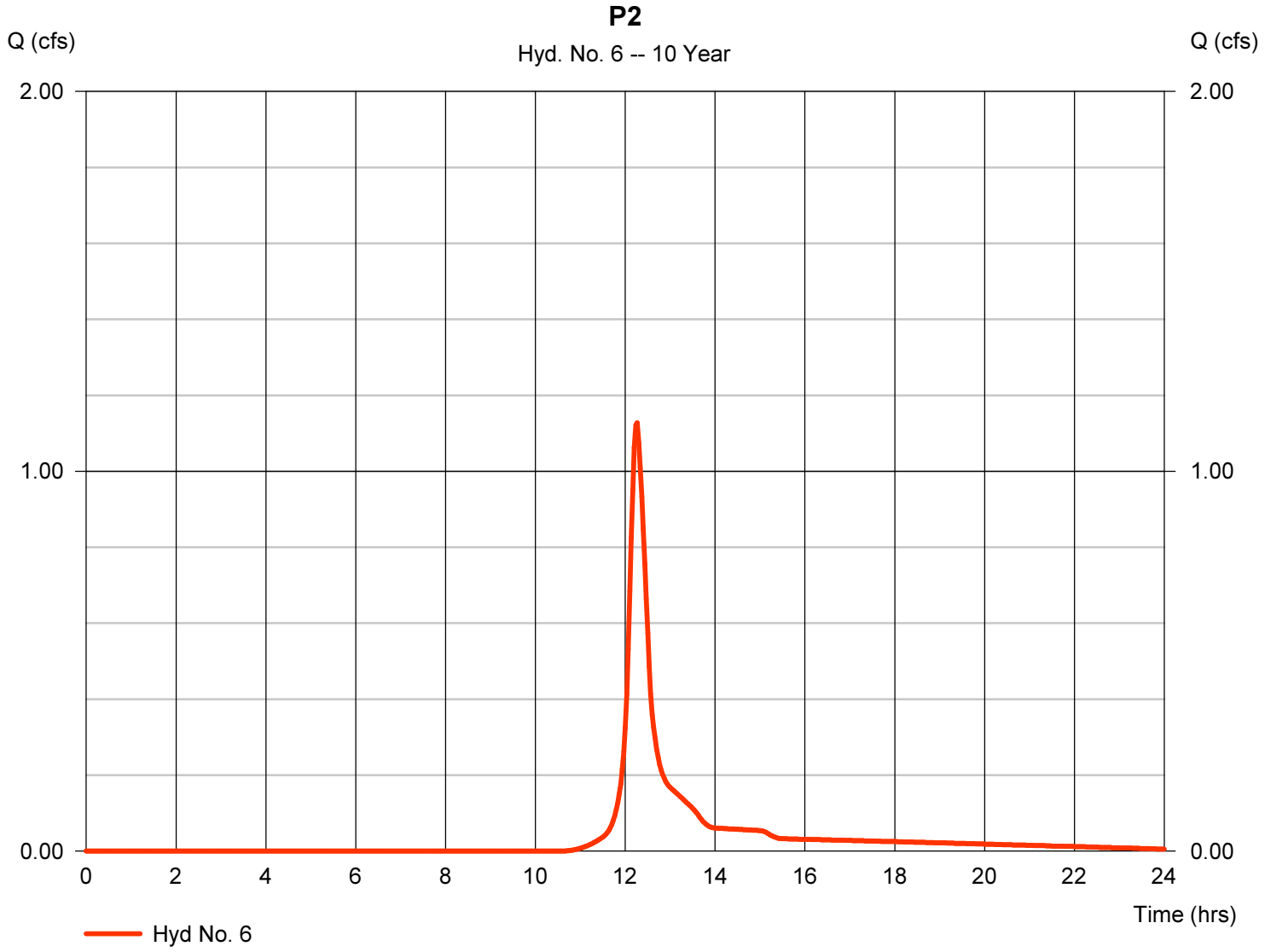


Hydrograph Report

Hyd. No. 6

P2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.128 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.27 hrs
Time interval	=	2 min	Hyd. volume	=	3,505 cuft
Drainage area	=	0.580 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.00 min
Total precip.	=	3.81 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSV	SCS Storm Factor	=	484

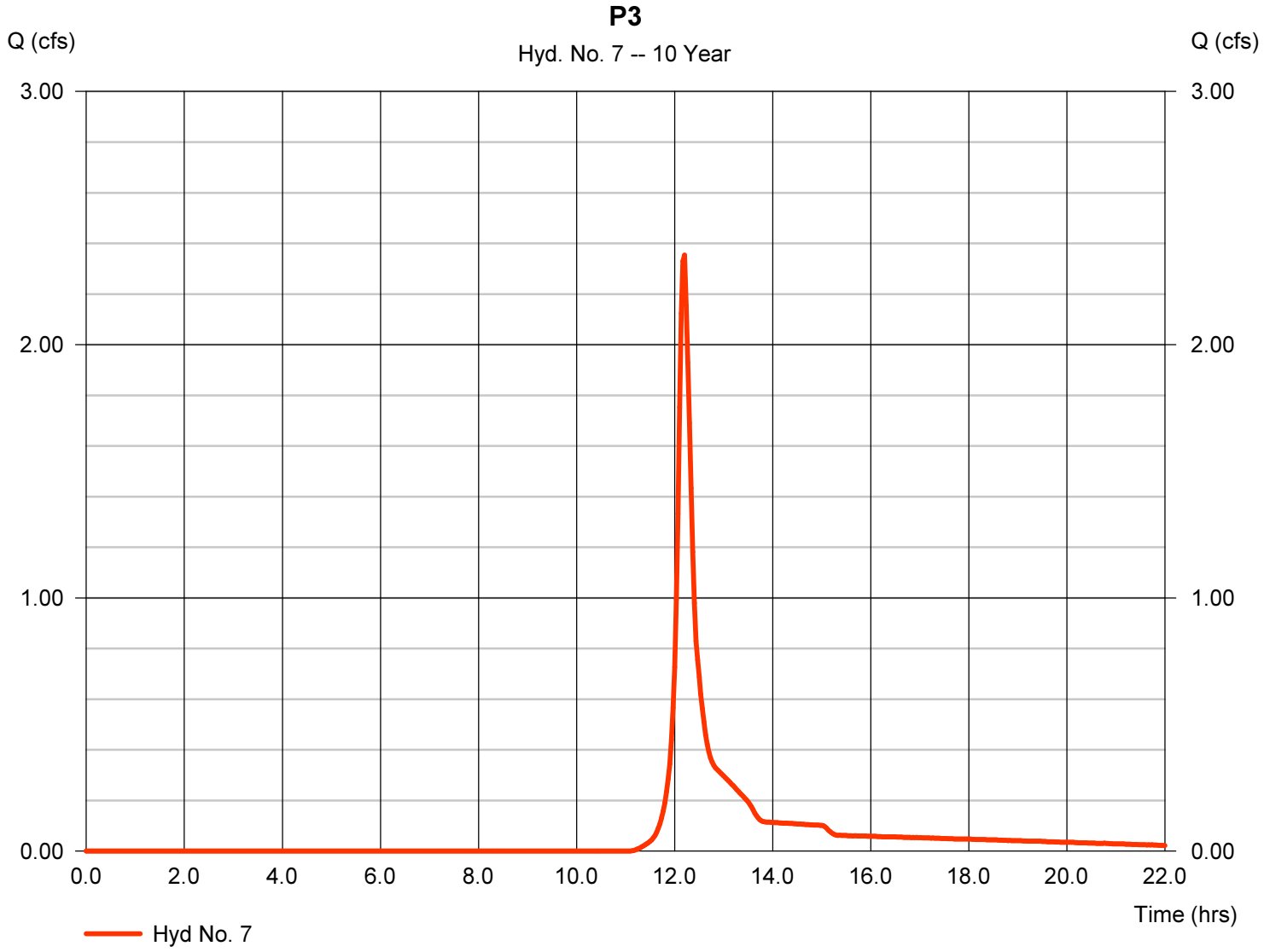


Hydrograph Report

Hyd. No. 7

P3

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.353 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	6,152 cuft
Drainage area	=	1.180 ac	Curve number	=	73
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.00 min
Total precip.	=	3.81 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS factor	=	484



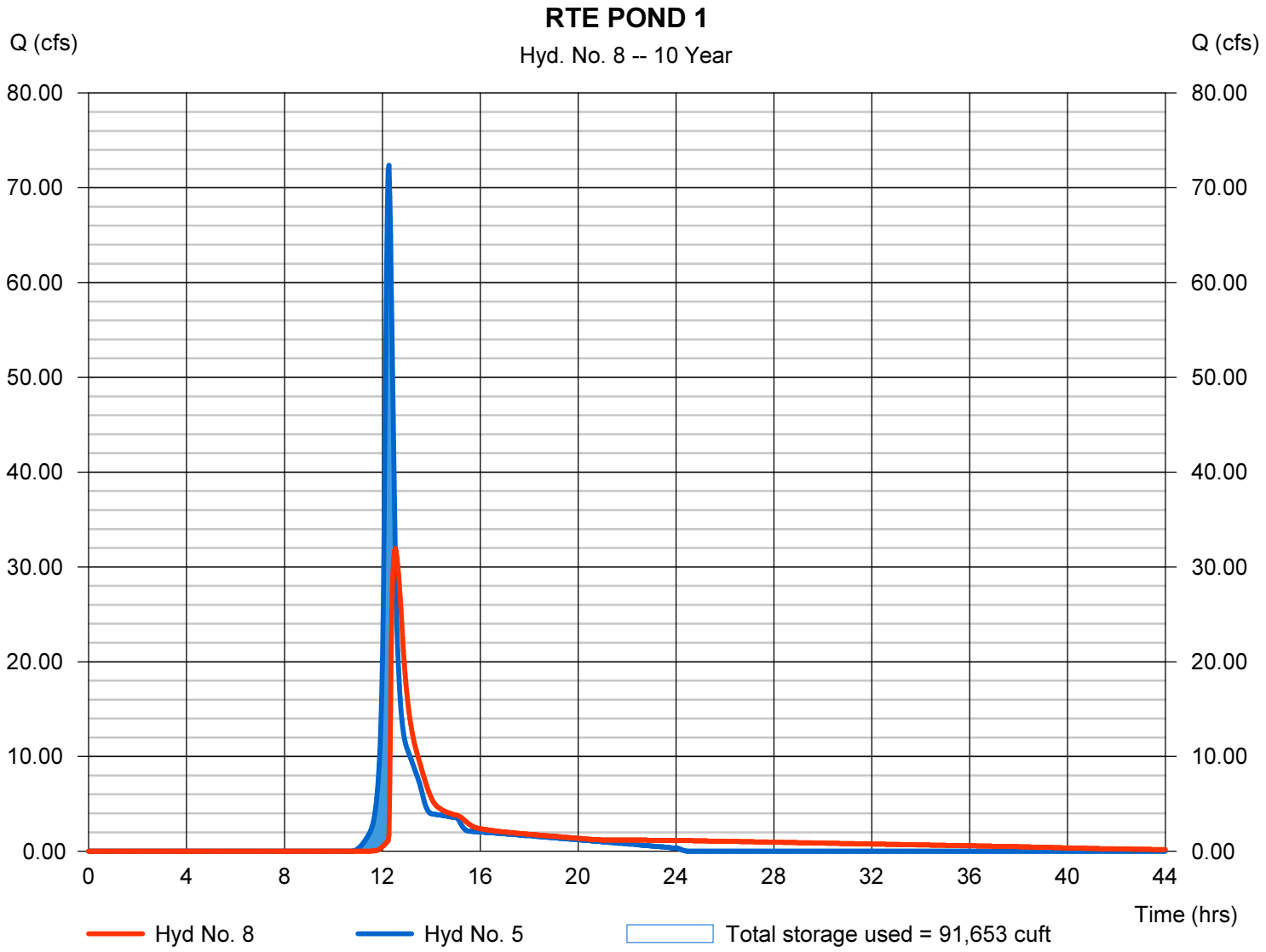
Hydrograph Report

Hyd. No. 8

RTE POND 1

Hydrograph type	= Reservoir	Peak discharge	= 31.95 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.53 hrs
Time interval	= 2 min	Hyd. volume	= 224,221 cuft
Inflow hyd. No.	= 5 - P1	Max. Elevation	= 61.40 ft
Reservoir name	= POND 1	Max. Storage	= 91,653 cuft

Storage Indication method used.



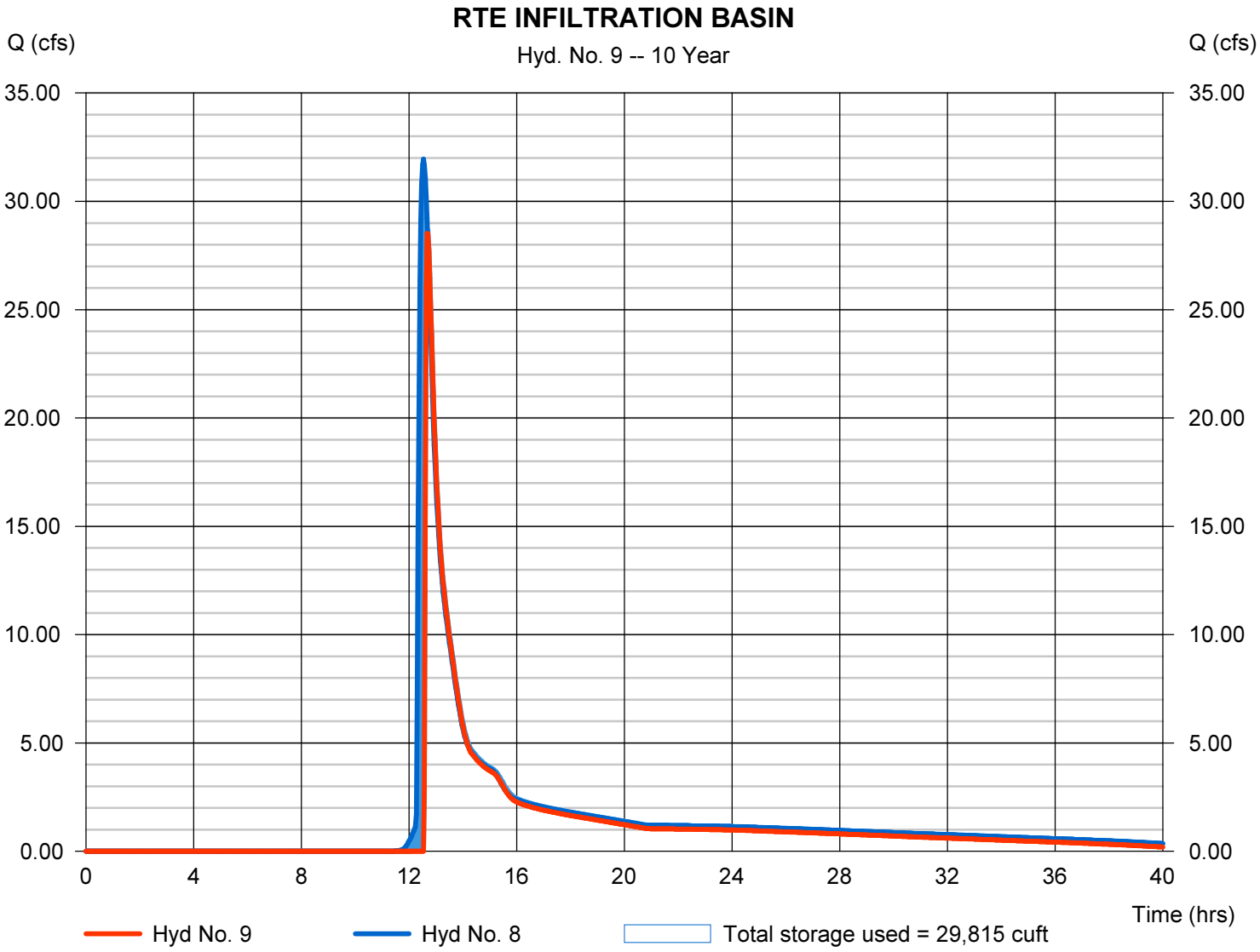
Hydrograph Report

Hyd. No. 9

RTE INFILTRATION BASIN

Hydrograph type	=	Reservoir	Peak discharge	=	28.52 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.67 hrs
Time interval	=	2 min	Hyd. volume	=	174,808 cuft
Inflow hyd. No.	=	8 - RTE POND 1	Max. Elevation	=	56.84 ft
Reservoir name	=	POND 2	Max. Storage	=	29,815 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

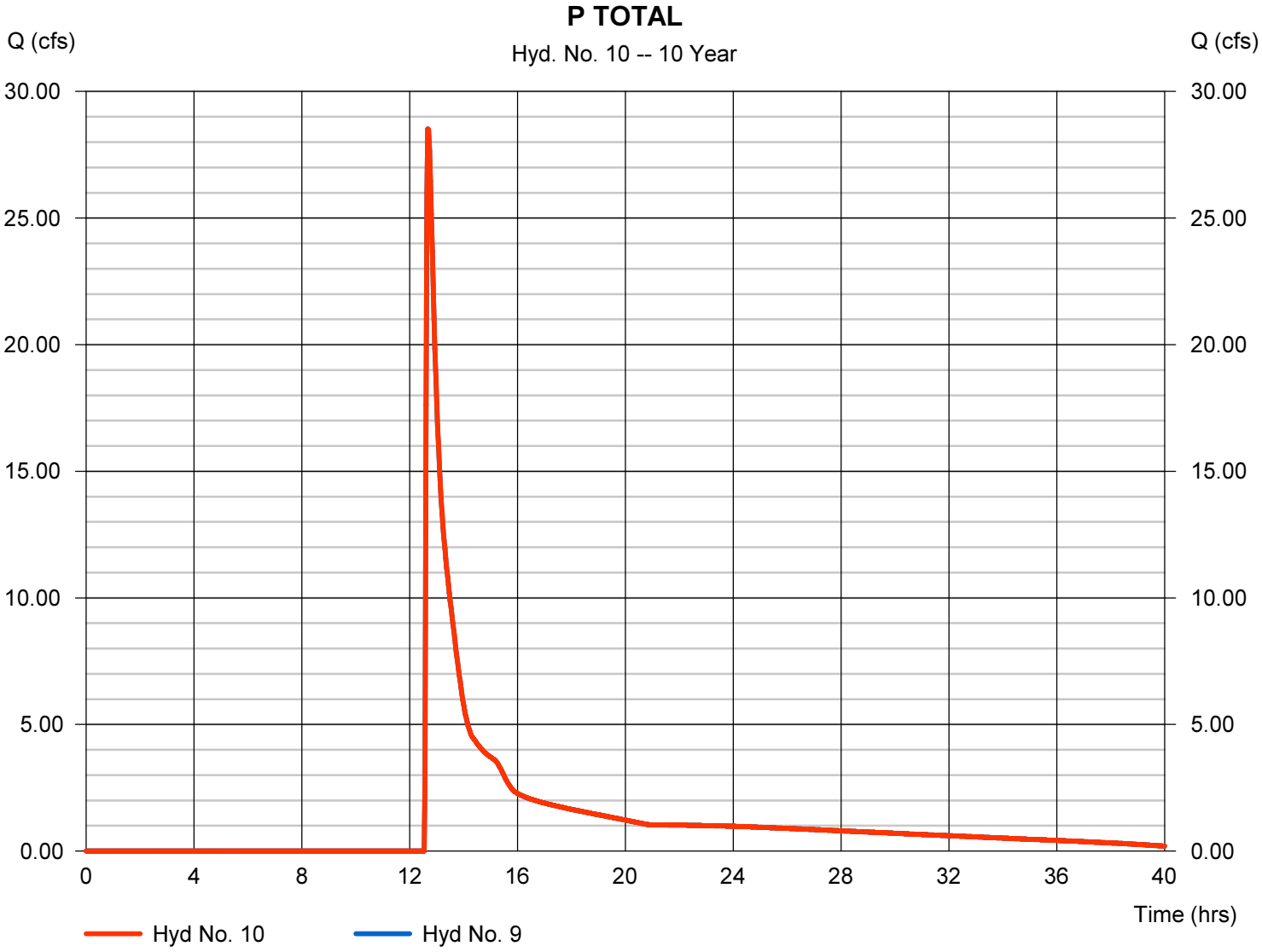


Hydrograph Report

Hyd. No. 10

P TOTAL

Hydrograph type	= Combine	Peak discharge	= 28.52 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.67 hrs
Time interval	= 2 min	Hyd. volume	= 174,808 cuft
Inflow hyds.	= 9	Contrib. drain. area	= 0.000 ac

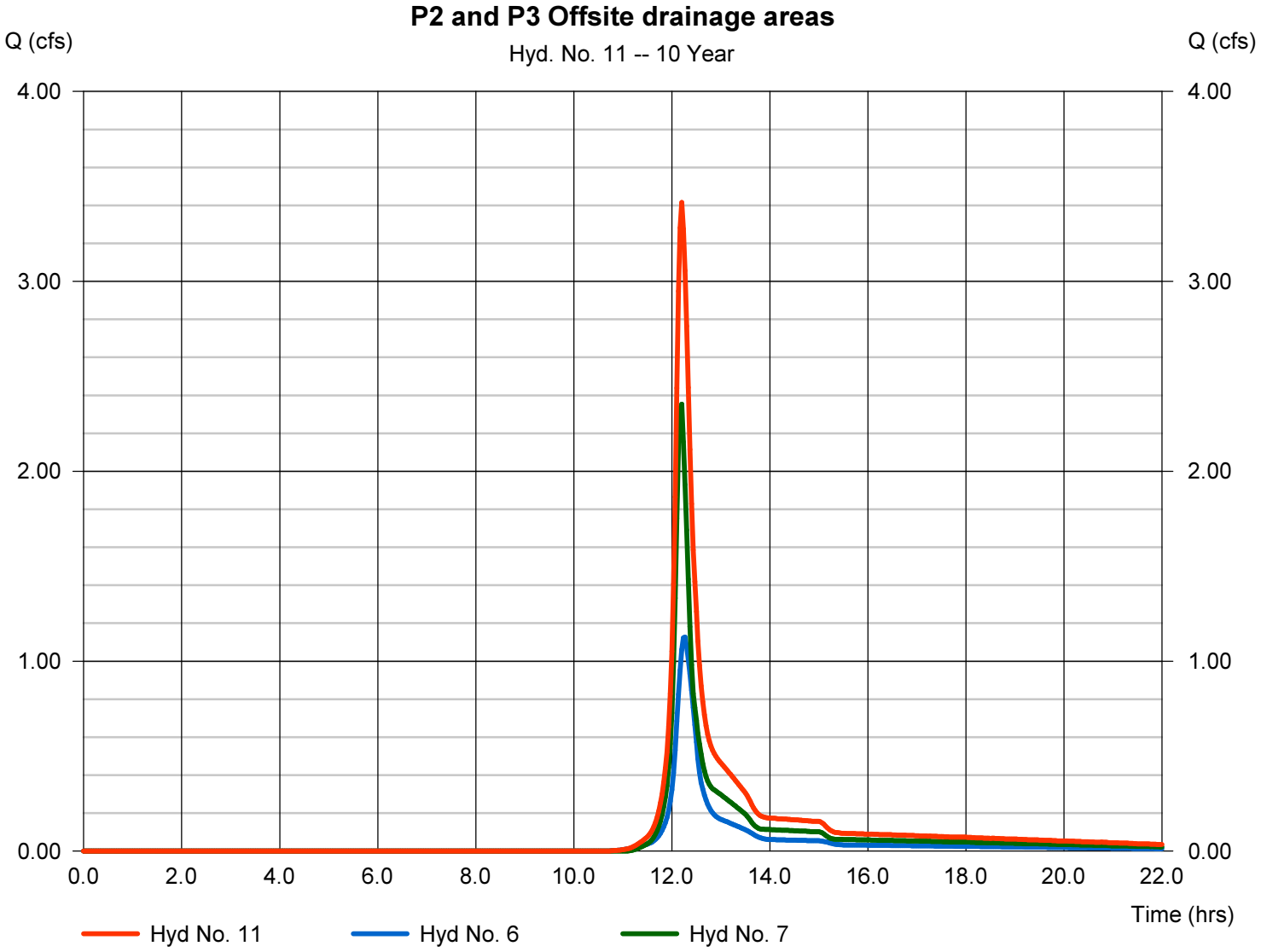


Hydrograph Report

Hyd. No. 11

P2 and P3 Offsite drainage areas

Hydrograph type	= Combine	Peak discharge	= 3.415 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 9,657 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.760 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

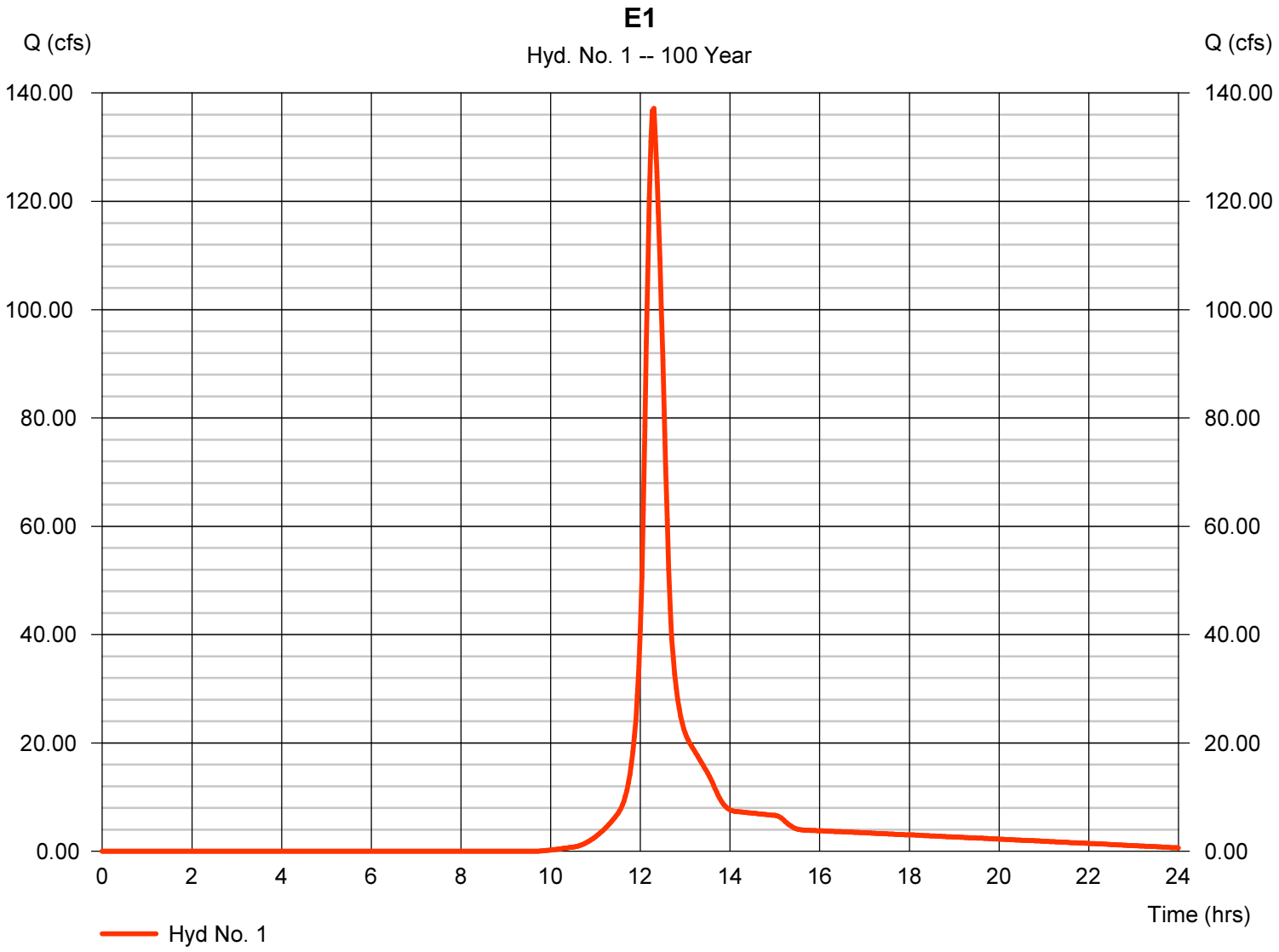
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	137.16	2	738	463,913	------	------	------	E1
2	SCS Runoff	2.477	2	734	7,657	------	------	------	E2
3	SCS Runoff	6.900	2	730	17,750	------	------	------	E3
4	Combine	144.57	2	736	489,320	1, 2, 3	------	------	E TOTAL
5	SCS Runoff	161.90	2	734	500,069	------	------	------	P1
6	SCS Runoff	2.477	2	734	7,657	------	------	------	P2
7	SCS Runoff	5.563	2	730	14,305	------	------	------	P3
8	Reservoir	66.35	2	752	498,788	5	63.87	193,433	RTE POND 1
9	Reservoir	66.08	2	754	448,438	8	57.10	33,522	RTE INFILTRATION BASIN
10	Combine	66.08	2	754	448,438	9	------	------	P TOTAL
11	Combine	7.889	2	732	21,962	6, 7,	------	------	P2 and P3 Offsite drainage areas

Hydrograph Report

Hyd. No. 1

E1

Hydrograph type	=	SCS Runoff	Peak discharge	=	137.16 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.30 hrs
Time interval	=	2 min	Hyd. volume	=	463,913 cuft
Drainage area	=	38.770 ac	Curve number	=	73
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	22.00 min
Total precip.	=	6.18 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS factor	=	484

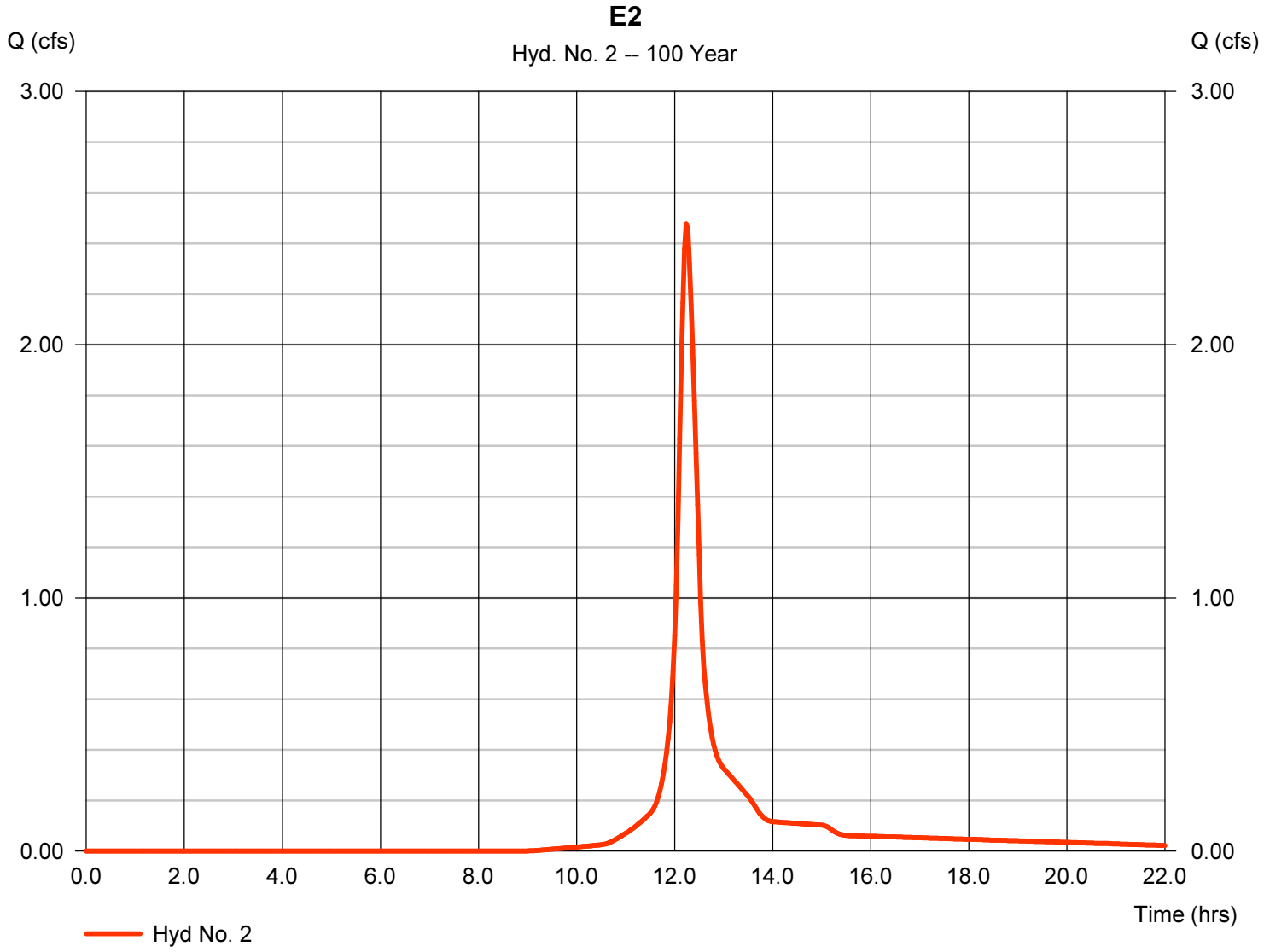


Hydrograph Report

Hyd. No. 2

E2

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.477 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.23 hrs
Time interval	=	2 min	Hyd. volume	=	7,657 cuft
Drainage area	=	0.580 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.00 min
Total precip.	=	6.18 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS Storm factor	=	484

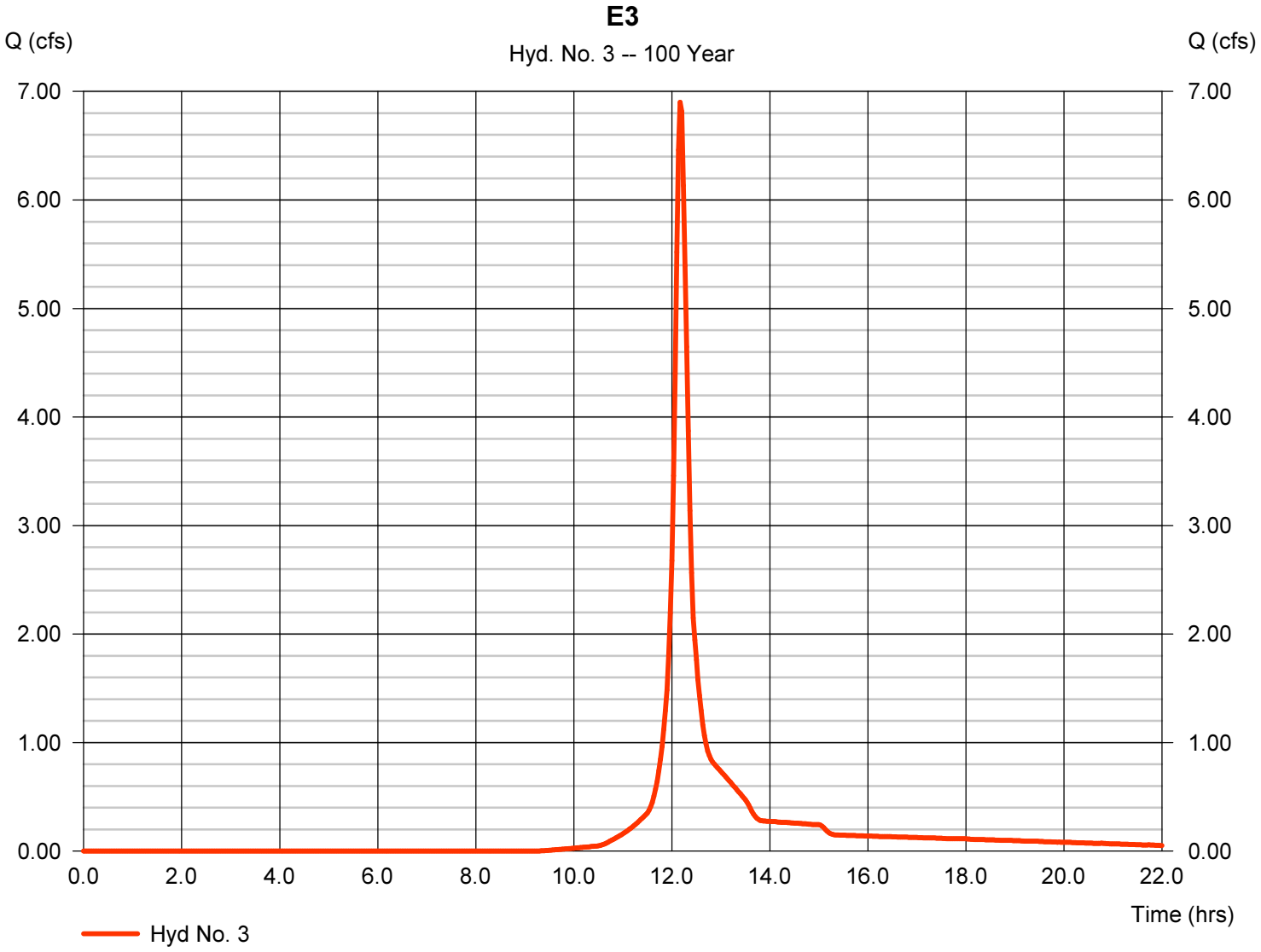


Hydrograph Report

Hyd. No. 3

E3

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.900 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	17,750 cuft
Drainage area	=	1.380 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.00 min
Total precip.	=	6.18 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydrafl ow\MSE3_2min.SS	Shape factor	=	484

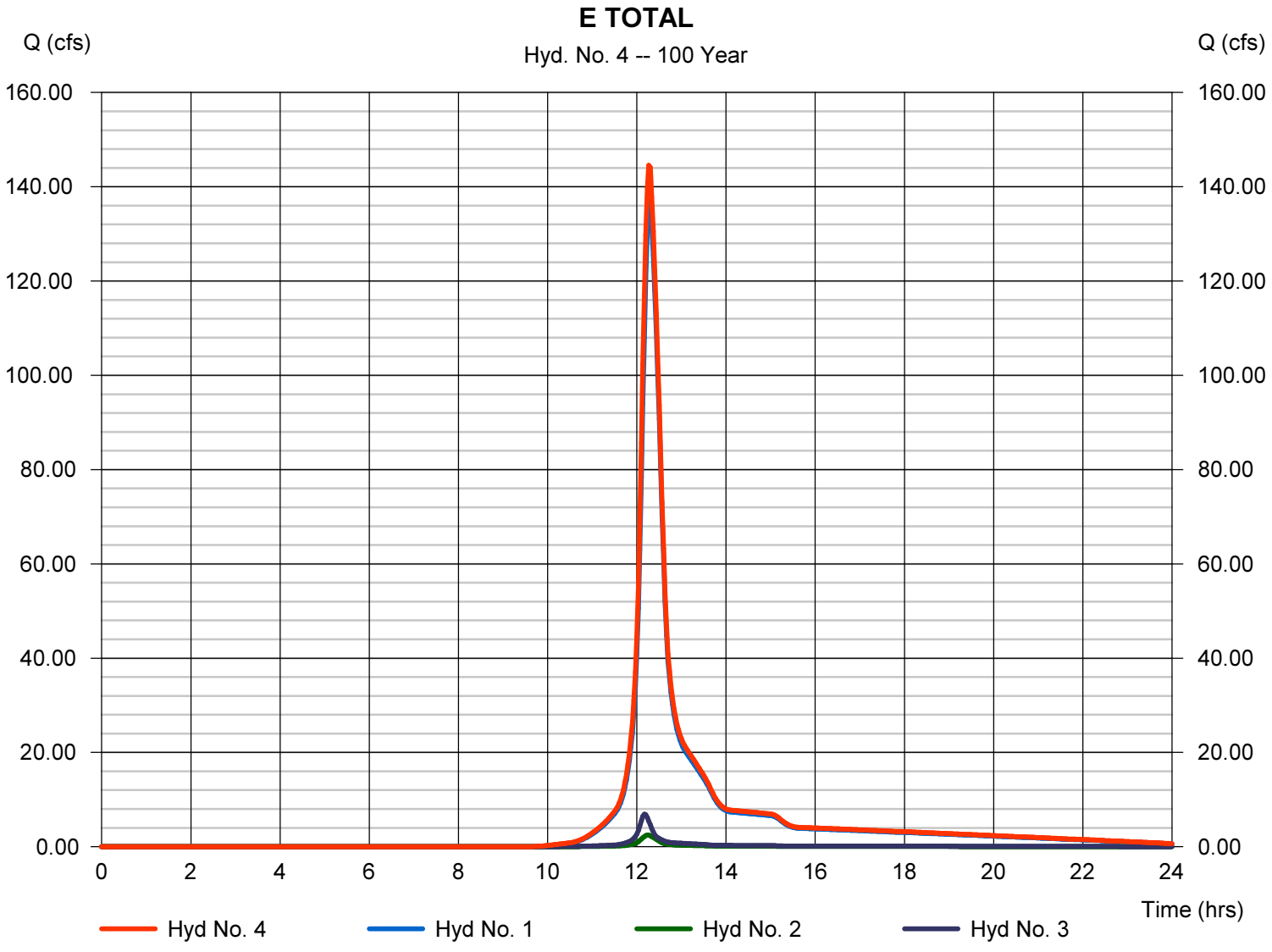


Hydrograph Report

Hyd. No. 4

E TOTAL

Hydrograph type	= Combine	Peak discharge	= 144.57 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 489,320 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 40.730 ac

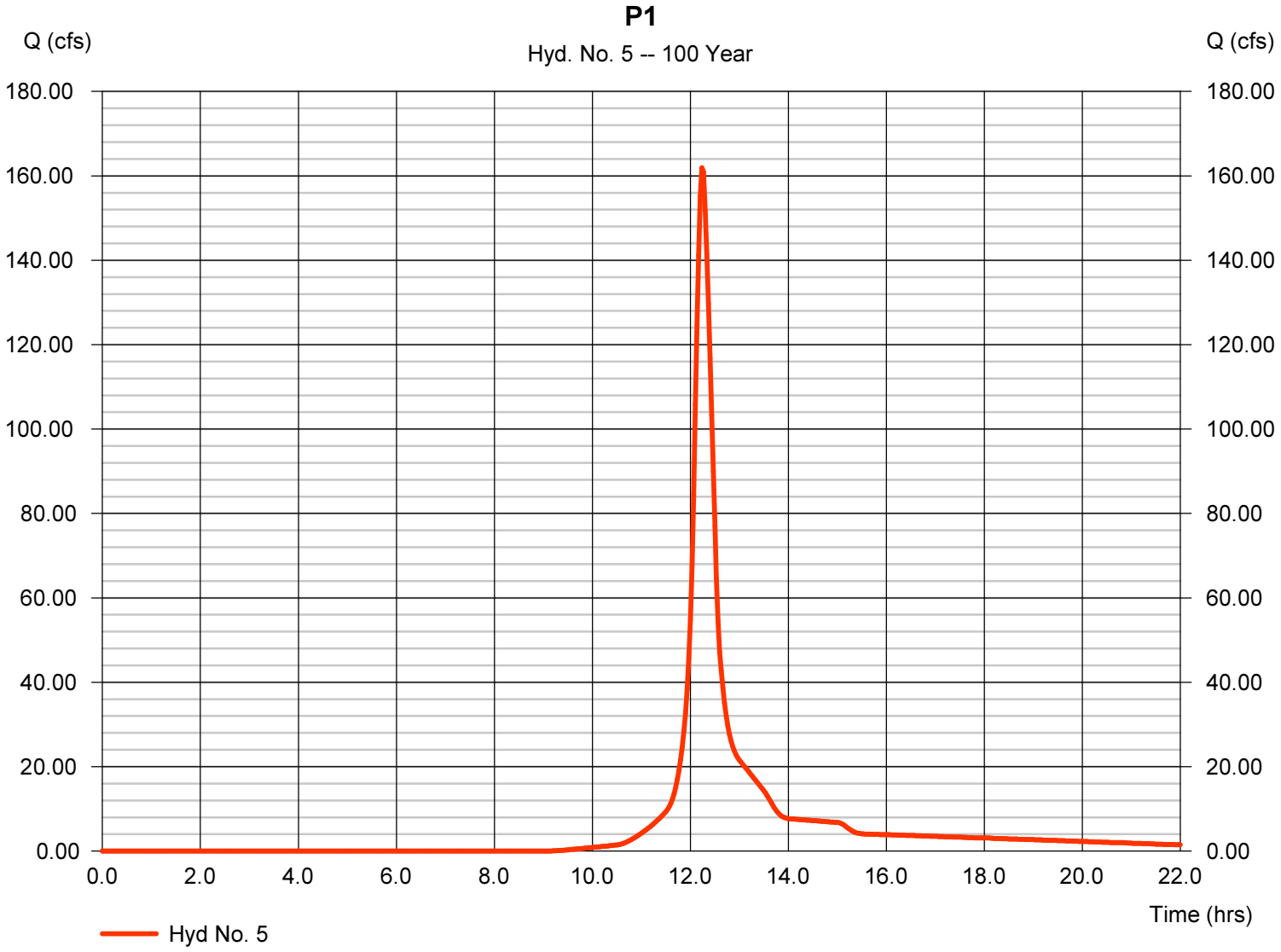


Hydrograph Report

Hyd. No. 5

P1

Hydrograph type	=	SCS Runoff	Peak discharge	=	161.90 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.23 hrs
Time interval	=	2 min	Hyd. volume	=	500,069 cuft
Drainage area	=	38.960 ac	Curve number	=	76
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.00 min
Total precip.	=	6.18 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS Temporal factor	=	484

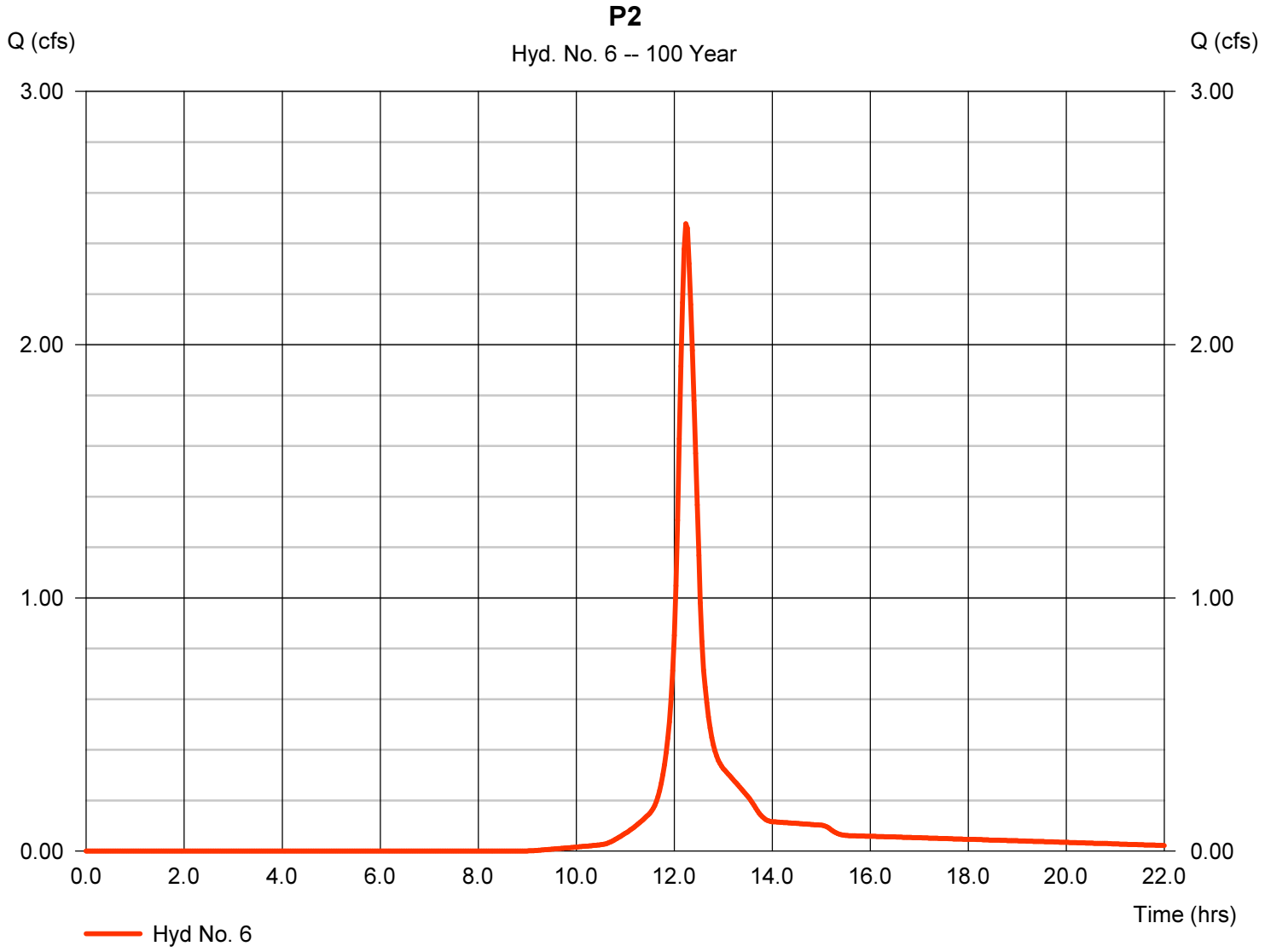


Hydrograph Report

Hyd. No. 6

P2

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.477 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.23 hrs
Time interval	=	2 min	Hyd. volume	=	7,657 cuft
Drainage area	=	0.580 ac	Curve number	=	77
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.00 min
Total precip.	=	6.18 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.CSS	SCS Storm factor	=	484

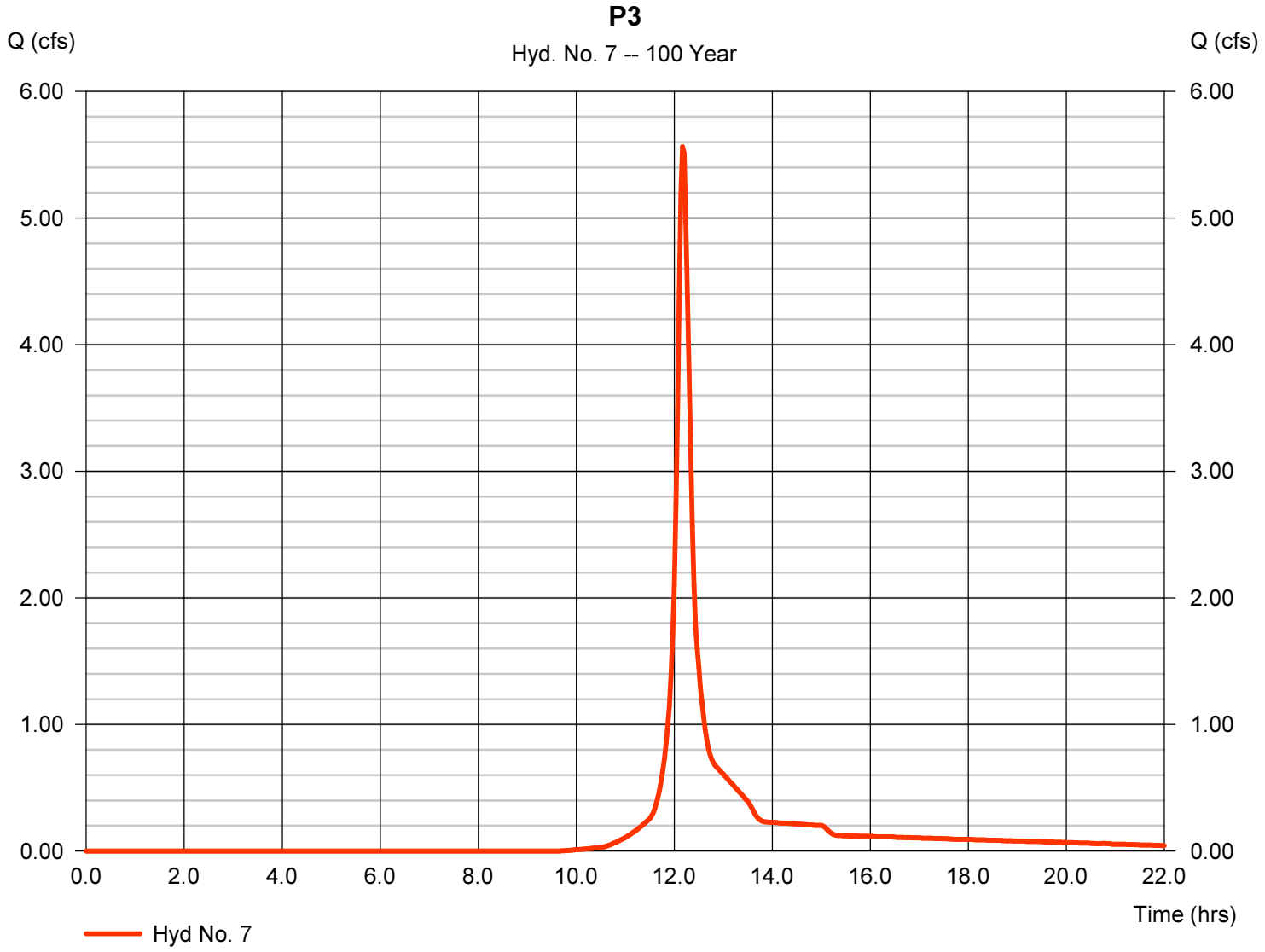


Hydrograph Report

Hyd. No. 7

P3

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.563 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	14,305 cuft
Drainage area	=	1.180 ac	Curve number	=	73
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.00 min
Total precip.	=	6.18 in	Distribution	=	Custom
Storm duration	=	P:\3150342\Eng Data\Hydrology\Hydraflow\MSE3_2min.SDS	SCS Storm factor	=	484



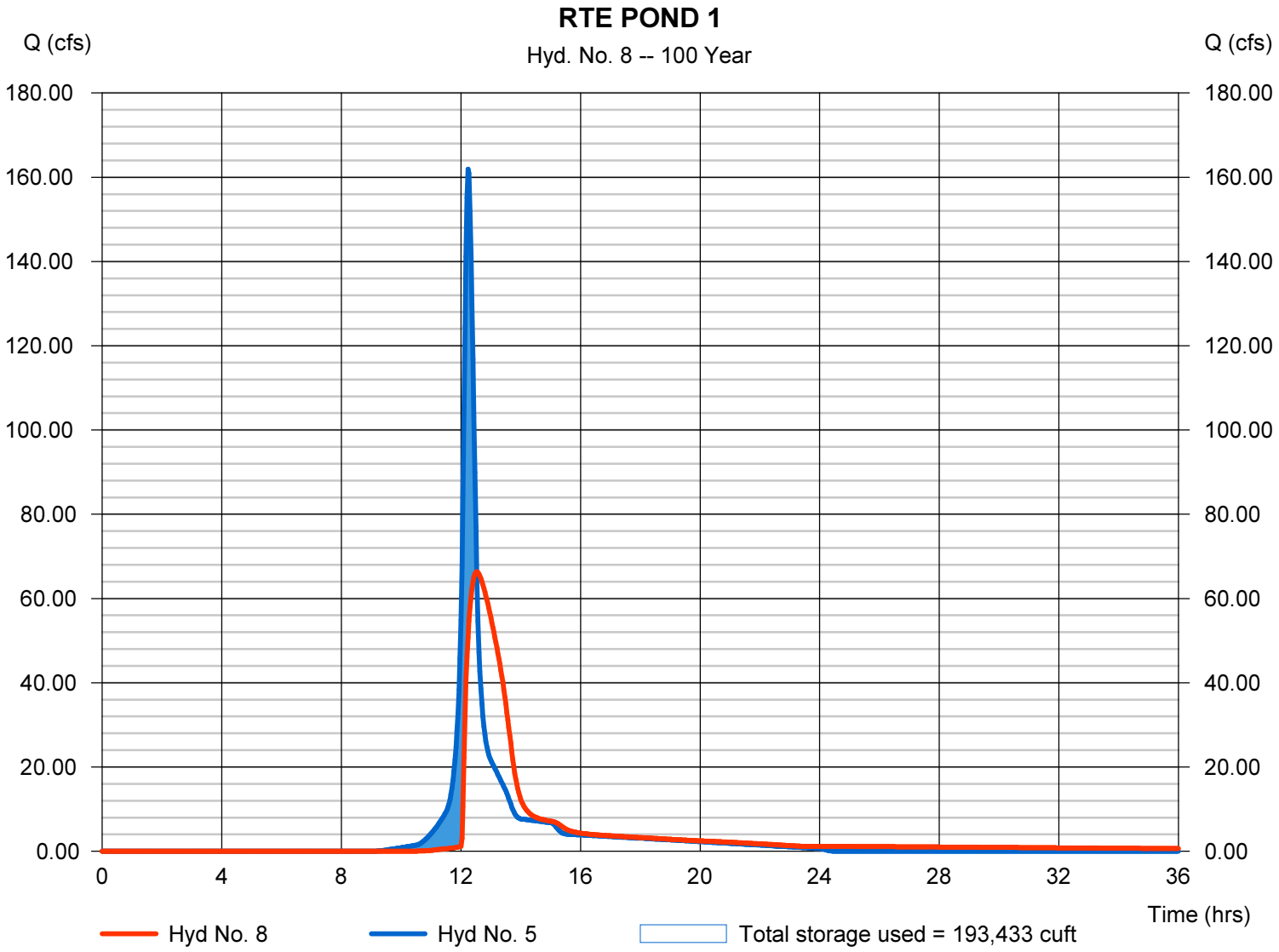
Hydrograph Report

Hyd. No. 8

RTE POND 1

Hydrograph type	= Reservoir	Peak discharge	= 66.35 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.53 hrs
Time interval	= 2 min	Hyd. volume	= 498,788 cuft
Inflow hyd. No.	= 5 - P1	Max. Elevation	= 63.87 ft
Reservoir name	= POND 1	Max. Storage	= 193,433 cuft

Storage Indication method used.



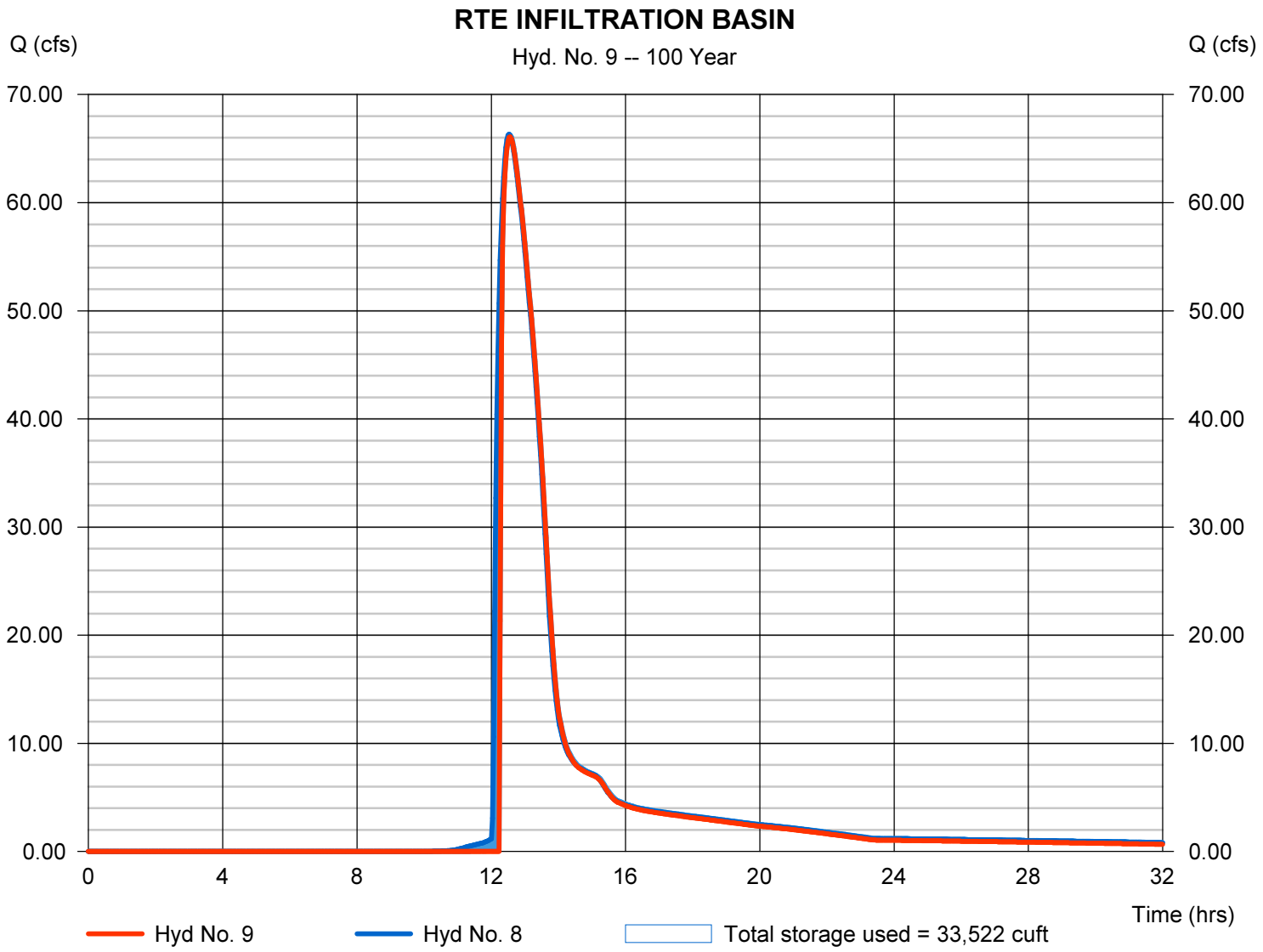
Hydrograph Report

Hyd. No. 9

RTE INFILTRATION BASIN

Hydrograph type	=	Reservoir	Peak discharge	=	66.08 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.57 hrs
Time interval	=	2 min	Hyd. volume	=	448,438 cuft
Inflow hyd. No.	=	8 - RTE POND 1	Max. Elevation	=	57.10 ft
Reservoir name	=	POND 2	Max. Storage	=	33,522 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

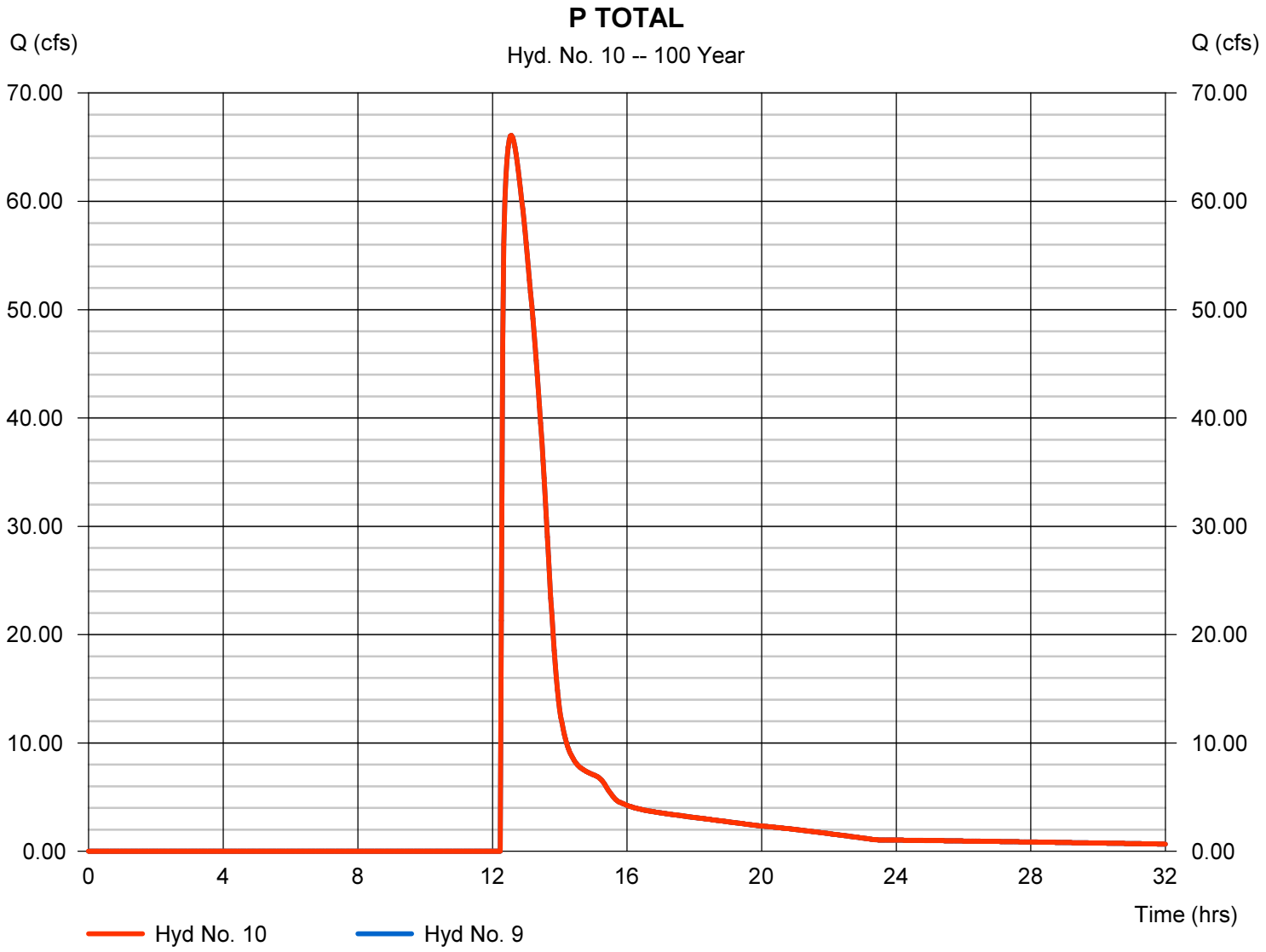


Hydrograph Report

Hyd. No. 10

P TOTAL

Hydrograph type	=	Combine	Peak discharge	=	66.08 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.57 hrs
Time interval	=	2 min	Hyd. volume	=	448,438 cuft
Inflow hyds.	=	9	Contrib. drain. area	=	0.000 ac

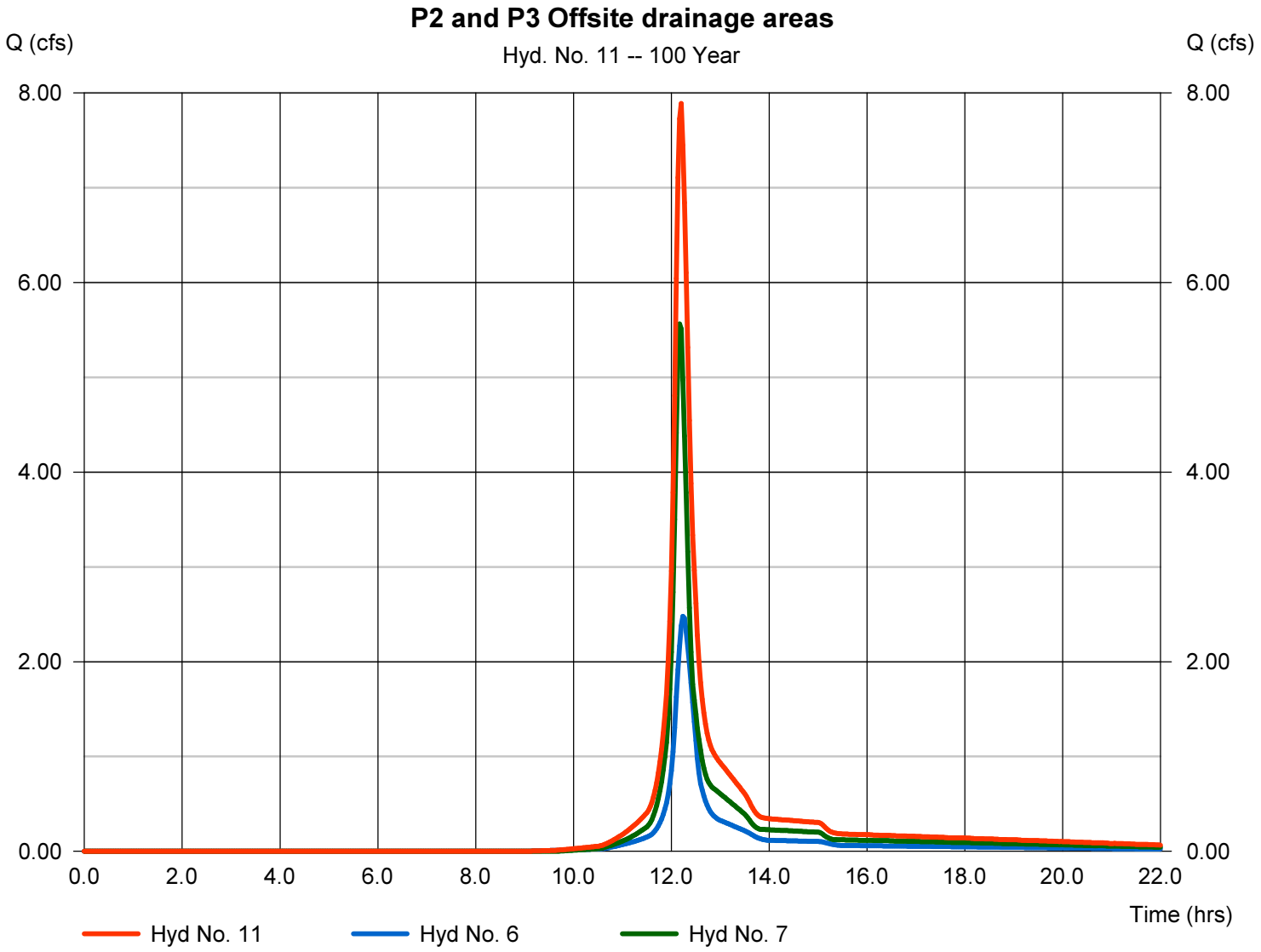


Hydrograph Report

Hyd. No. 11

P2 and P3 Offsite drainage areas

Hydrograph type	= Combine	Peak discharge	= 7.889 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 21,962 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.760 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: P:\3150342\Eng Data\Hydrology\Hydraflow\Atlas 14_Waukesha.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	2.40	2.70	0.00	3.26	3.81	4.65	5.37	6.18

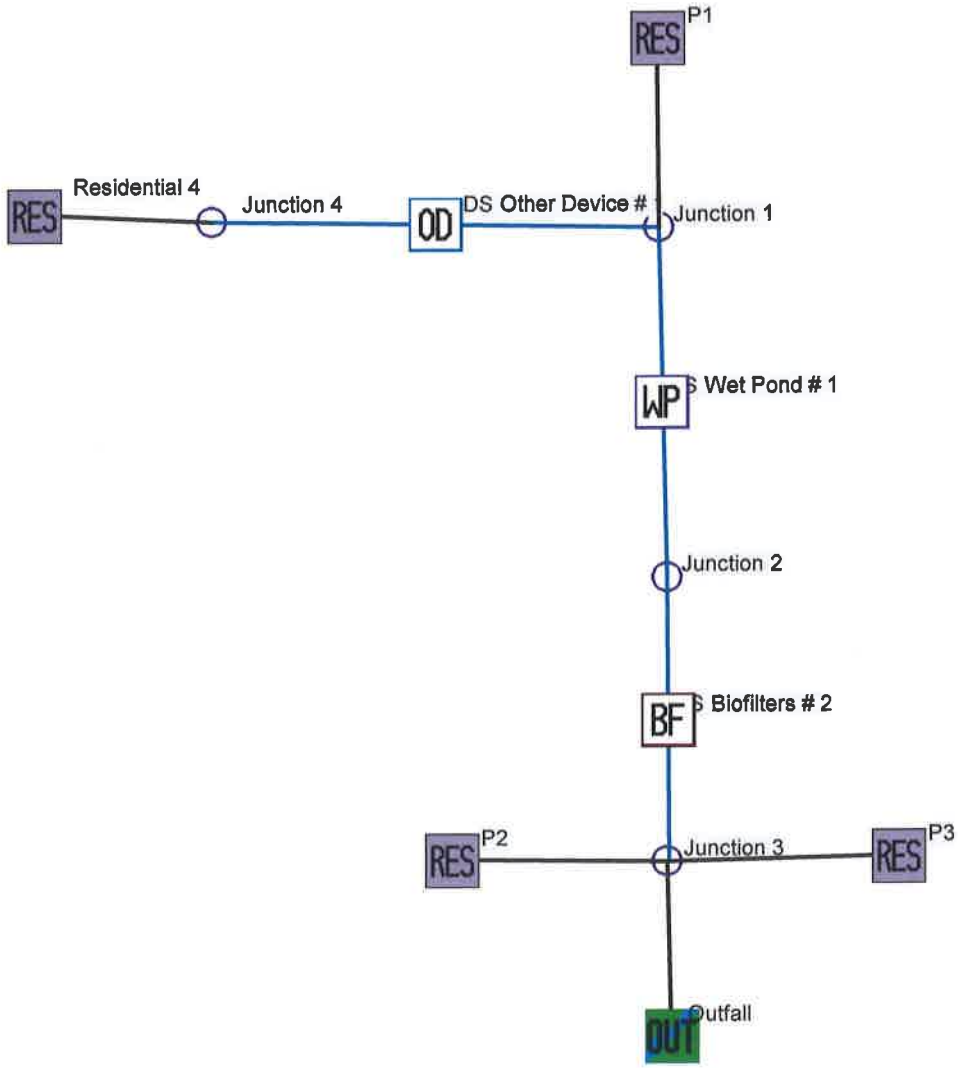
Hydraflow Table of Contents

3150342_KJB.gpw

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 Thursday, 08 / 3 / 2017

Exhibit H

WinSLAMM Analysis


RES
P1
Residential 4
RES
Junction 4
OD
DS Other Device # 1
Junction 1
WP
S Wet Pond # 1
Junction 2
BF
S Biofilters # 2
RES
P2
Junction 3
RES
P3
OUT
Outfall

Data file name: \\rasmith.com\brookfield\LDS\3150342\Eng Data\Hydrology\SLAMM\3150342_KJB offsite and onsite w controls Run C.mdb
WinSLAMM Version 10.3.1
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 08-07-2017 Time: 11:52:14
Site information:

LU# 1 - Residential: P1 Total area (ac): 30.260
  1 - Roofs 1: 2.070 ac. Pitched Disconnected Severely Compacted Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  25 - Driveways 1: 1.030 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  31 - Sidewalks 1: 0.700 ac. Disconnected Severely Compacted Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  37 - Streets 1: 3.620 ac. Smooth Street Length = 1.496 curb-mi Street Width (assuming two curb-mi per street mile) = 39.92647 ft
    Default St. Dirt Accum. Annual Winter Load = 2500 lbs Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  45 - Large Landscaped Areas 1: 6.000 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  46 - Large Landscaped Areas 2: 7.913 ac. Moderately Compacted Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  47 - Large Landscaped Areas 3: 7.955 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  70 - Water Body Areas: 0.972 ac. Source Area PSD File:

LU# 2 - Residential: P2 Total area (ac): 0.580
  45 - Large Landscaped Areas 1: 0.580 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 3 - Residential: P3 Total area (ac): 1.180
  45 - Large Landscaped Areas 1: 1.180 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 4 - Residential: Residential 4   Total area (ac): 8.700
     1 - Roofs 1: 0.400 ac.   Pitched   Disconnected   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
     25 - Driveways 1: 0.300 ac.   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
     45 - Large Landscaped Areas 1: 8.000 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Wet Detention Pond CP# 1 (DS) - DS Wet Pond # 1
   Particle Size Distribution file name: Not needed - calculated by program
   Initial stage elevation (ft):   5
   Peak to Average Flow Ratio: 0
   Maximum flow allowed into pond (cfs): No maximum value entered
   Outlet Characteristics:
        Outlet type: Orifice 1
              1. Orifice diameter (ft):   0.5
              2. Number of orifices: 1
              3. Invert elevation above datum (ft):   5
        Outlet type: Broad Crested Weir
              1. Weir crest length (ft):   80
              2. Weir crest width (ft):   10
              3. Height from datum to bottom of weir opening: 10
        Outlet type: Vertical Stand Pipe
              1. Stand pipe diameter (ft):   4
              2. Stand pipe height above datum (ft):   6.5
   Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.01	0.1610	0.00	0.00
2	1.00	0.1770	0.00	0.00
3	2.00	0.1940	0.00	0.00
4	3.00	0.2120	0.00	0.00
5	4.00	0.2300	0.00	0.00
6	4.50	0.2800	0.00	0.00
7	5.00	0.3310	0.00	0.00
8	6.00	0.3640	0.00	0.00
9	7.00	0.3980	0.00	0.00
10	8.00	0.4340	0.00	0.00
11	9.00	0.4710	0.00	0.00
12	10.00	0.5100	0.00	0.00
13	11.00	0.5490	0.00	0.00

Control Practice 2: Biofilter CP# 1 (DS) - DS Biofilters # 2
   1. Top area (square feet) = 15631
   2. Bottom aea (square feet) = 10988
   3. Depth (ft):   3
   4. Biofilter width (ft) - for Cost Purposes Only: 70

```
    5.  Infiltration rate (in/hr) =  0.5
    6.  Random infiltration rate generation?  No
    7.  Infiltration rate fraction (side):   1
    8.  Infiltration rate fraction (bottom):   1
    9.  Depth of biofilter that is rock filled (ft) 0
    10.  Porosity of rock filled volume =  0
    11.  Engineered soil infiltration rate:   0
    12.  Engineered soil depth (ft) =  0
    13.  Engineered soil porosity =  0
    14. Percent solids reduction due to flow through engineered soil =  0
    15. Biofilter peak to average flow ratio =  3.8
    16. Number of biofiltration control devices =  1
    17. Particle size distribution file:  Not needed - calculated by program
    18. Initial water surface elevation (ft):   0
    Soil Data                        Soil Type Fraction in Eng. Soil
    Biofilter Outlet/Discharge Characteristics:
        Outlet type:  Broad Crested Weir
                1.  Weir crest length (ft):   55
                2.  Weir crest width (ft):   10
                3.  Height of datum to bottom of weir opening:   2


Control Practice 3:  Other Device CP# 1 (DS) - DS Other Device # 1
   Fraction of drainage area served by device (ac) = 1.00
   Particulate Concentration reduction fraction = 1.00
   Filterable Concentration reduction fraction = 0.00
   Runoff volume reduction fraction = 0
```

SLAMM for Windows Version 10.3.1

Data file name: \\rasmith.com\brookfield\LDS\3150342\Eng Data\Hydrology\SLAMM\3150342_KJB offsite and onsite w controls Run C.mdb
Data file description:
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Start of Winter Season: 12/06 End of Winter Season: 03/28
Model Run Start Date: 01/05/69 Model Run End Date: 12/31/69
Date of run: 08-07-2017 Time of run: 11:51:56
Total Area Modeled (acres): 40.720
Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	1.488E+06	-	158.8	14755	-
Outfall Total with Controls:	616123	58.59%	66.08	2541	82.78%
Annualized Total After Outfall Controls:	624681			2577	