Agenda
Town Board Meeting
August 23, 2023
6:30 PM

1. Virtual Meeting Instructions

   Documents:

   8-23-23 TOWN BOARD MEETING INSTRUCTIONS.PDF

2. Pledge Of Allegiance

3. Open Podium

4. Appoint Jason Cassalia To Provisional Chief Of Police

5. Town Of Manlius Police CIT Presentation

6. Garden Park Senior Apartments - Planned Unit Development (PUD) Request - Highbridge Street

   Documents:

   2023_08_02 - GRAPHIC PUD DISTRICT PLAN - GARDEN PARK (H5216936X7A869).PDF
   2023_04_12 - GRAPHIC CONCEPT PLAN - GARDEN PARK (H5216935X7A869).PDF
   PUD DISTRICT DRAFT 1 CJD 080323 (H5216933X7A869).PDF

7. Zone Change Application 7078 East Genesee St., Fayetteville NY (Tax Map 092.-01-05.0)

   Documents:

   2023-08-16 ZONE CHANGE APPLICATION - 7078 E. GENESEE STREET.PDF

8. Set A Date For A Public Hearing - Twin Ponds - Planned Unit Development (PUD) Request - 5440 Burdick Street

   Documents:

   TWIN PONDS PUD DOCUMENTS .PDF

9. Grant Of Easement - 5701 Bowman Road

   Documents:

   OH ELECTRIC TELEPHONE DIST EASEMENT - TOWN OF MANLIUS.PDF

10. Establishing A Special Election To Consider The Creation Of A Ward System For The Town Of Manlius

    Documents:

    IN THE MATTER OF ESTABLISHING A SPECIAL ELECTION TO CONSIDER THE

CREATION OF A WARD SYSTEM FOR THE TOWN OF MANLIUS.PDF

10.I. Amended Adopted Resolution - Special Election

Documents:

RESOLUTION ESTABLISHING A SPECIAL ELECTION.PDF

11. Amended And Restated Manlius Police Intermunicipal Agreement

Documents:

AMENDED AND RESTATED MANLIUS POLICE INTERMUNICIPAL AGREEMENT.PDF

12. Special Patrol Officer Agreement Between The Town Of Manlius And East Syracuse Minoa Central School District

Documents:

SPO AGREEMENT BETWEEN TOWN OF MANLIUS AND ESM CENTRAL SCHOOL DISTRICT.PDF

13. SIRO Program Agreement Between Manlius Police Department And Fayetteville-Manlius School District 2023-24

Documents:

SIRO AGREEMENT F-M OFFICER A. PALMER.PDF
SIRO AGREEMENT F-M OFFICER D. GOLDEN.PDF
SIRO AGREEMENT F-M OFFICER M. GROGAN.PDF

14. Special Patrol Officer Agreement Between The Town Of Manlius And Fayetteville-Manlius School District 2023-24

Documents:

SPO FM OFFICER B. DAMON.PDF
SPO FM OFFICER G. HACK.PDF
SPO FM OFFICER S. MEHLEK.PDF
SPO FM OFFICER T. LEROY.PDF

15. Muirfield Drainage Assessment - Select & Authorize Recommended Improvement Option

Documents:

MJ1456.07 DRAFT MUIRFIELD DRAINAGE ASSESSMENT.PDF

16. OCWA - One Hydrant And Extension Of Water Main - Hoag Rd., Kirkville

Documents:

OCWA HOAG ROAD, KIRKVILLE - HYDRANT AND WATER MAIN.PDF

17. Toshiba Copier Lease - Police Department

Documents:

TOSHIBA COPIER LEASE - POLICE DEPARTMENT.PDF

18. Reminder - Budget Workshop - September 6th At 4:00 PM

19. Approval Of Minutes - July 26, 2023 And (August 9, 2023 - Tabled)

    Documents:

    7-26-23 DRAFT.PDF
    8-9-23 DRAFT.PDF

20. Approval Of Abstract # 16

    Documents:

    ABSTRACT 16.PDF

21. Adjournment

This meeting is being recorded and live streamed. The recording will be broadcast live and will be posted to the town website at www.townofmanlius.org

Town of
MANLIUS
New York

August 23, 2023

6:30 PM

Town Board Meeting Instructions

The easiest way to participate in the meeting is to use the link provided below. The meeting will be conducted on the ZOOM platform as a webinar. Please make sure that when you complete your attendee registration you enter your full name.

Click on the link or enter the meeting URL web address as listed below.

https://us02web.zoom.us/j/81800084897?pwd=aEpJdk84V1U5d2VnQ1VBNTNIYU9Bdz09

Password to join when prompted:

Password: **398852**

Enter your email address and name and join the meeting.

Join by telephone by dialing the number below:

(929) 436-2866

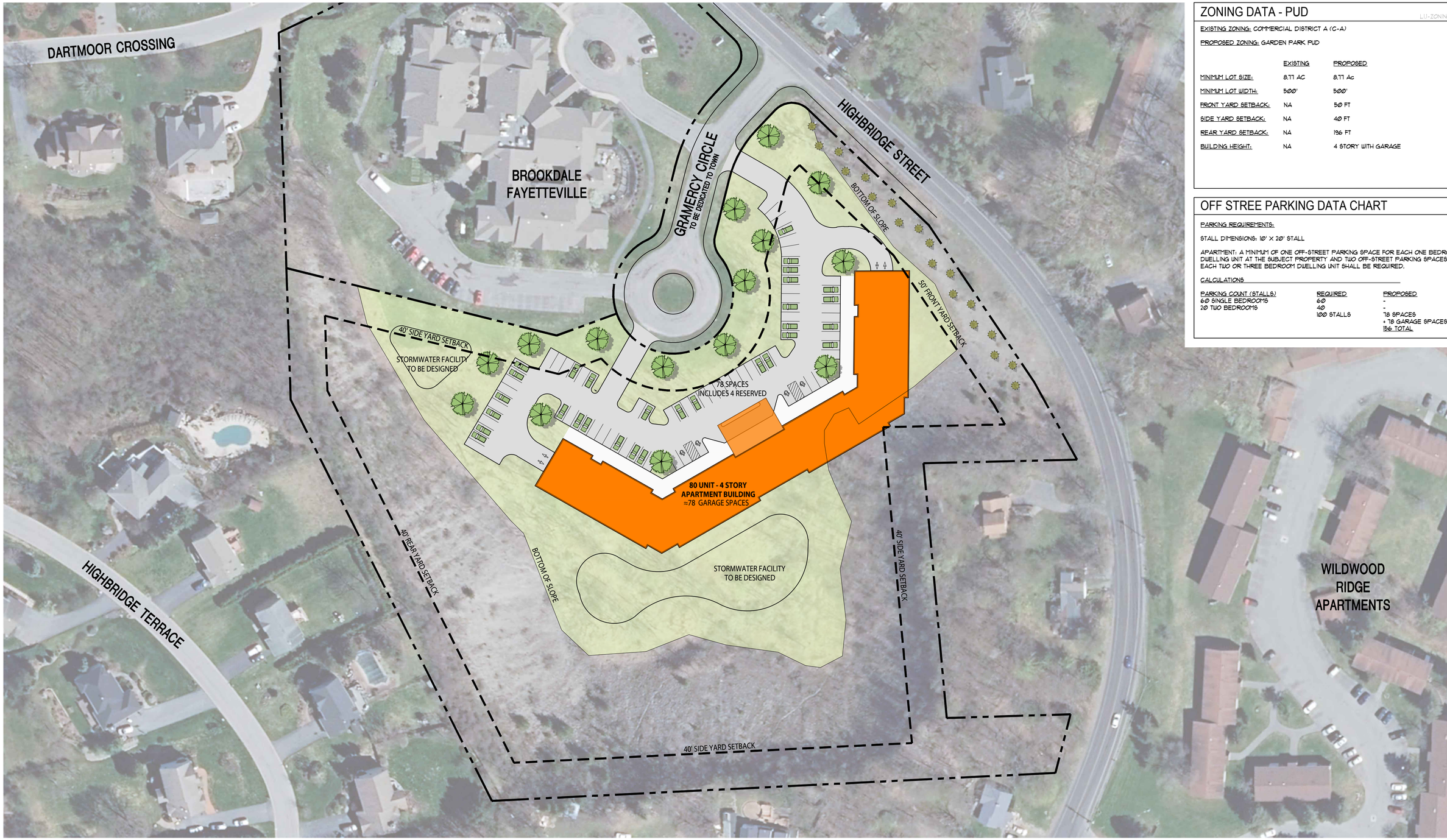
When prompted to enter the Webinar ID, use the number below followed by #

Webinar ID: 818 0008 4897

Press # again to skip the personal id and enter the password below followed by #

Password: **398852**

If this is your first time joining a ZOOM meeting, you may practice using ZOOM meeting platform at https://zoom.us/test.



ZONING DATA - PUD

LJJ-ZONING-PUD

EXISTING ZONING: COMMERCIAL DISTRICT A (C-A)

PROPOSED ZONING: GARDEN PARK PUD

	EXISTING	PROPOSED
MINIMUM LOT SIZE:	8.77 AC	8.77 Ac
MINIMUM LOT WIDTH:	500'	500'
FRONT YARD SETBACK:	NA	50 FT
SIDE YARD SETBACK:	NA	40 FT
REAR YARD SETBACK:	NA	196 FT
BUILDING HEIGHT:	NA	4 STORY WITH GARAGE

OFF STREE PARKING DATA CHART

PARKING REQUIREMENTS:

STALL DIMENSIONS: 10' X 20' STALL

APARTMENT: A MINIMUM OF ONE OFF-STREET PARKING SPACE FOR EACH ONE BEDROOM DWELLING UNIT AT THE SUBJECT PROPERTY AND TWO OFF-STREET PARKING SPACES FOR EACH TWO OR THREE BEDROOM DWELLING UNIT SHALL BE REQUIRED.

CALCULATIONS

PARKING COUNT (STALLS)	REQUIRED	PROPOSED
60 SINGLE BEDROOMS	60	-
20 TWO BEDROOMS	40	-
	100 STALLS	78 SPACES
		+ 78 GARAGE SPACES
		156 TOTAL

GARDEN PARK SENIOR APARTMENTS

HIGHBRIDGE ST. MANLIUS , NY - PUD DISTRICT PLAN

0 50 100 150

SCALE IN FEET

AUGUST 02, 2023

KEPLINGER FREEMAN ASSOCIATES

LANDSCAPE ARCHITECTURE & LAND PLANNING

ZONING DATA

LU-ZONING

EXISTING ZONING: COMMERCIAL (C-A)

PROPOSED ZONING: RESIDENTIAL MULTITIPLE-USE (RM)

	EXISTING ZONE	NEW ZONE	PROPOSED
MINIMUM LOT SIZE:	N/A	40,000 SF	10.15 Ac
MINIMUM LOT FRONTAGE:	N/A	150 FT	> 150 FT
MAX LOT COVERAGE:	N/A	50%	18%
FRONT YARD SETBACK:	30 FT	40 FT	40 FT
SIDE YARD SETBACK:	15 FT	20 FT	20 FT
REAR YARD SETBACK:	25 FT	40 FT	40 FT

PARKING DATA CHART

PARKING REQUIREMENTS:

STALL DIMENSIONS: 10' X 20' STALL

APARTMENT: 2 PARKING SPACES PER APARTMENT

CALCULATIONS

PARKING COUNT (STALLS)	REQUIRED	PROPOSED
	156 STALLS	78 SPACES 78 GARAGE SPACES 156 TOTAL

GARDEN PARK SENIOR APARTMENTS

HIGHBRIDGE ST. MANLIUS , NY

0 50 100 150

SCALE IN FEET

APRIL 12, 2023

KEPLINGER FREEMAN ASSOCIATES

LANDSCAPE ARCHITECTURE & LAND PLANNING

Draft #1

Garden Park Senior Apartments District Plan

A. Intent. This district is intended to be used primarily for multiple-family dwelling units in order to provide unique housing opportunity that may not be available in the other residential zoning districts within the Town. The design of the PUD District Plan provides for relatively high-density residential housing options.

B. PUD District Plan Description.

1. Types of land uses. The following structures and uses shall be permitted within the PUD District, pursuant to site plan approval:

   a. Multi-family dwellings containing seventy-eight (78) one bedroom and two bedroom apartments for senior citizens; and

   b. Accessory structures and uses incidental to multiple-family dwellings.

2. Bulk requirements

   a. Lot Area: 8.77 acres for residential

   b. Maximum Building height: 4 stories

3. Off-Street Parking Requirements. The site shall contain a total of one hundred fifty-six (156) parking spaces. One-half of the parking spaces (78 parking spaces) will be located under the proposed improvements and the remaining one-half of the parking spaces (78 parking spaces) will be above ground surface parking spaces.

4. Vehicle Circulation. Provisions for smooth internal vehicle circulation shall be made with storage space for snow which will not block parking spaces and with provision for access of emergency vehicles. The design for vehicular ingress and egress to the site from a public highway and for interior streets shall be approved by the Town Highway Superintendent and the Chief of the Fire Protection District in which the project is to be located.

C. PUD District Plan Map. Attached as **Appendix A** is a map identifying the location of permissible land uses, roads, sidewalks, drainage, landscaped areas, parking, utilities and the total acreage of the proposed PUD District Plan.

D. Phasing Plan. The project developer/owner does not anticipate that the project will be constructed in phases.

E. Application Timeline.

1. The project developer/owner shall be required to apply for site plan approval no later than 180 days after approval of the PUD District Plan by the Town of Manlius.

2. The project developer/owner shall be required to apply for a building permit to begin construction of the project no later than 18 months after securing site plan approval.

F. Public Roadways. Appendix A depicts the location of lands that shall be dedicated to the Town for public use as roadways.

G. Recreational Areas. The PUD District Plan Map includes recreational areas in the form of an outdoor activity space, walking trails and clubhouse. The map attached as Appendix A depicts the location of these amenities.

H. Signage. All signage shall be in accordance with §155-25 of the Manlius Town Code.

I. Utilities. All buildings will be served by public water and sewer systems.

J. Workforce Housing. 5% of the dwelling units (hereinafter individually referred to the "Unit" and collectively referred to as the "Units") within the PUD District shall be designated for "Workforce Housing." Workforce Housing shall be available for a period of ten (10) years following the issuance of a certificate of occupancy.

1. Rent for a Unit that does not exceed 30 percent of the income of a family whose income equals 80% of the Area Median Income (AMI) for Syracuse Metropolitan Area, shall qualify as Workforce Housing. AMI is determined annually by the U.S. Department of Housing and Urban Development.

2. In order to occupy a Unit set aside as Workforce Housing, the occupant's income may not exceed 80% of the Area Median Income (AMI) for Onondaga County.

3. The Town Board may reduce the number of Units designated for Workforce Housing or the method for calculating the rent ceiling to be considered Workforce Housing if such an adjustment is necessary to support the continued financial viability of the project.

4. Temporary noncompliance with paragraph J is permitted if such noncompliance is caused by increases in the incomes of existing tenants of the Units. The project owner/developer shall reduce the rent for the next available equivalent vacant Unit designated for Workforce Housing in the event that a Unit previously designated as Workforce Housing no longer qualifies due to an increase in a tenant's income.

5. The project owner/developer shall provide information on an annual basis to the Codes Officer to confirm compliance with these Workforce Housing requirements.

K. Sustainability. The project will include approximately 10 charging plugs for electric vehicles and all Units will utilize electric rather than gas for heat and cooking appliances.

FOGEL & BROWN, P.C.

ATTORNEYS AND COUNSELORS AT LAW
WWW.FOGELBROWN.COM

Michael A. Fogel, Esq.
120 Madison Street, Suite 1620
Syracuse, New York 13202
mfogel@fogelbrown.com
Tel: 315-399-4343
Fax: 315-472-6215

August 16, 2023

Supervisor John Deer
Town Board
Town of Manlius
301 Brooklea Drive
Fayetteville, New York 13066

Re: Bottar LLC
Zone Change Application
7078 East Genesee Street, Fayetteville, New York

Dear Supervisor Deer and Town Board members:

This office represents Bottar LLC, the contract vendee of the property located at 7078 East Genesee Street, Fayetteville, New York (Tax Map No. 092.-01-05.0) (the "Property"). As set forth in the enclosed Zone Change Application, Bottar LLC is applying to change the zoning of the Property from R-1 to R-M to allow for professional office use, specifically to allow for the Bottar Law Firm to open a law office at the Property.

In connection with this Application, please find enclosed one (1) original and twelve (12) copies of the following:

1. Zone Change Application signed by Bottar LLC and the current owners of the Property.
2. Disclosure Affidavit signed by Bottar LLC.
3. SEQRA Short Environmental Assessment Form.
4. Planning Department, Initial Appearance Application.
5. Legal Description of the Property.
6. Survey of the Property.
7. Check payable to "Town of Manlius" for the application fee of $300.

We respectfully request that this Application be placed on the next available Town Board meeting agenda for discussion and referral to the Planning Board.

Thank you for your attention to this matter.

Respectfully submitted,

FOGEL & BROWN, P.C.

By: Michael Fogel
Michael A. Fogel, Esq.

TOWN OF MANLIUS
ZONE CHANGE APPLICATION

1. Name of Person applying for Zone Change Bottar LLC
   Address of person applying 120 Madison Street, Suite 1300, Syracuse, NY 13202
   Cell Number _____ Phone Number (315) 422-3466
2. Name: (owner of record) of land where Zone Change would occur Richard P. Dodd and Daynia A. Dodd
   Address (owner of record) 7078 East Genesee Street, Fayetteville, New York 13066
   Cell Number (owner of record) _____ Phone Number (315) 370-3642
3. Tax Map Number of property where Zone Change would occur 092.-01-05.0
4. Is this property located in a flood hazard area? No
   If so, what flood area is the property in it in?
   N/A
5. Present zoning classification of property R-1
6. Desired zoning classification R-M
   Reason for Change of Zone (use additional sheets if necessary) _____
   For office use for Bottar Law, PLLC.
7. What is lot size? 4.53 acres
8. If the Zone Change is granted, will the use of the property conform to the District regulations as stated in Chapter 155 Article III of the Town of Manlius Municipal Code? Yes
9. Is the property within the protectively zoned area of a housing project authorized under the public housing law? No
10. Is the property within five hundred (500) feet of the boundaries of any city, village, town, county, state park or parkway? No
    If yes, please specify N/A
11. Is the property within five hundred (500) feet from the boundary of any existing or proposed County or State park or other recreation area, or from the right-of-way of any existing or proposed county or state parkway, thruway, expressway, road or highway, or from the existing or proposed right-of-way of any stream or drainage channel owned by the county or for which the county has established channel lines, or from the existing or proposed boundary of any county or state owned land on which a public building or institution is situated? Yes

If yes, please specify New York State Route 5

12. List the uses of all abutting property Residential and commercial.

13. The following must be included with your 12 application packets unless otherwise specified and/or specifically waived by the Town Board:

- An environmental assessment form which can be obtained from the Town Clerk, or an environmental impact statement.
- Copy of a survey of the premises certified by a New York State licensed surveyor.
- Legal description of the premises.
- This application must be signed by both the owner of record of the property and the applicant.

The failure to answer any question on this application, the failure to submit any item as specified or the failure to execute this application will result in a delay in the processing of the application.

Date August 14, 2023 — Member, Bottarelle
Applicant 1

Date _____ _____
Applicant 2

Date _____ _____
Applicant

Revised 5/8/17

If yes, please specify New York State Route 5

12. List the uses of all abutting property Residential and commercial.

13. The following must be included with your 12 application packets unless otherwise specified and/or specifically waived by the Town Board:

- An environmental assessment form which can be obtained from the Town Clerk, or an environmental impact statement.
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- This application must be signed by both the owner of record of the property and the applicant.

The failure to answer any question on this application, the failure to submit any item as specified or the failure to execute this application will result in a delay in the processing of the application.

Date _____ _____
Applicant 1

Date July 26, 2023 _____
Applicant 2

Date _____ _____
Applicant

Revised 5/8/17

TOWN OF MANLIUS

DISCLOSURE AFFIDAVIT

This affidavit is a part of and must be completed and attached to every application, petition, request submitted for a *site plan, variance, amendment, change of zoning, approval of a plat, exemption from a plat or official map, license* or *permit.*

STATE OF NEW YORK)
) SS:
COUNTY OF ONONDAGA)

I. Michael Bottar, being duly sworn, deposes and says that (s) he is:

a member of the Applicant Bottar LLC
(applicant, petitioner, corporation officer, property owner, *etc.)*

II. That deponent has read and is familiar with the provisions of the General Municipal Law, Section 809 which states:

A. Every application, petition or request submitted for a site plan, variance, amendment, change of zoning, approval of a plat, exemption from a plat or official map, license or permit, pursuant to the provisions or any ordinance, local law, rule or regulation constituting the zoning and planning regulations of a municipality shall state the name, residence and the nature and extent of the interest of any state officer or any officer or employee of such municipality is a part, in the person, partnership or association making such application, petition or request (hereinafter called the applicant) to the extent known to such applicant.

B. For the purpose of this action an officer or employee shall be deemed to have an interest in the applicant when (s)he, his/her spouse, or their brothers, sisters, parents, children, grandchildren, or the spouse of any of them:

1) is the applicant, or
2) is an officer, director, partner or employee of the applicant, or
3) legally or beneficially owns or controls stock of a corporate applicant or is a member of a partnership or association applicant, or
4) is a party to an agreement with such an applicant, express or implied, whereby (s) he may receive any payment or other benefit, whether or not for services rendered, or contingent upon the favorable approval of such application, petition or request.

C. Ownership of less than five percent (5%) of the stock of a corporation whose stock is listed on the New York or American Stock Exchanges shall not constitute an interest for the purposes of this section.

D. A person who knowingly and intentionally violates this section shall be guilty of a misdemeanor.

III. That no Town of Manlius officer, employee or a relative of either, as defined in Section 809 General Municipal Law has any interest in this application.

-OR-

If a Town of Manlius officer, employee or relative of either as defined in Section 809 General Municipal law has any interest in this application, the full particulars are provided on an attached sheet.

Date: August 14, 20 23.

Michael A. Botter, Member, Botter LLC
(Print Name)

(Signature)

Botter LLC
(Entity Name)

Michael A. Botter Member, Botter LLC
By (Officer) (Title)

120 Madison St, Suite 1300, Syracuse, NY 13202
(Mailing Address of Applicant)

315-422-3466
(Telephone Number)

Date: _____, 20_____.

(Print Name)

(Signature)

(Entity Name)

By (Officer) (Title)

(Mailing Address of Applicant)

(Telephone Number)

ACKNOWLEDGEMENTS

STATE OF NEW YORK)
) SS:
COUNTY OF ONONDAGA)

On this 14th day of August in the year 20 23, before me, the undersigned, a notary public in and for said state, personally appeared Michael Botter, _____, and _____ personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within Petition and acknowledged to me the he/she/they executed the same in his/her/their capacity, and that by his/her/their signature(s) on the Petition, the individual or the persons upon behalf of which the individual acted executed the instrument.

Sabre Maddock-Bracy
Notary Public

SABRE M. MADDOCK-BRACY
Notary Public, State of New York
No. 01MA6256760
Qualified in Cayuga County
Commission Expires March 5, 2024

CORPORATE ACKNOWLEDGEMENT

STATE OF NEW YORK)
) SS:
COUNTY OF ONONDAGA)

Michael Bottar, being duly sworn, deposes and says the s(he) is the Member of Bottar LLC corporation named in the within Application/Petition, that s(he) has read the foregoing affidavit and knows the contents thereof; that the same is true of s(he) own knowledge, except as to those matters therein stated to be alleged upon information and belief, and as to those matters s(he) believes it to be true.

Michael Bottar, Member, Bottar LLC
Applicant Signature

Subscribed to me before this 14th day
Of August, 2023

Sabre Maddock-Bracy
Notary Public

SABRE M. MADDOCK-BRACY
Notary Public, State of New York
No. 01MA6256760
Qualified in Cayuga County
Commission Expires March 5, 2024

06/29/16 LB

617.20
Appendix C
State Environmental Quality Review

SHORT ENVIRONMENTAL ASSESSMENT FORM
For UNLISTED ACTIONS Only

PART I – PROJECT INFORMATION (TO BE COMPLETED BY APPLICANT OR PROJECT SPONSOR)

1. APPLICANT/SPONSOR: Bottar LLC
2. PROJECT NAME: Zone Change - 7078 E. Genesee Street
3. PROJECT LOCATION: 7078 East Genesee Street
   MUNICIPALITY Manlius COUNTY Onondaga
4. PRECISE LOCATION: (Street address and road intersections, prominent landmarks, etc., or provide map)
   7078 E. Genesee Street, Fayetteville, New York (Tax Map No. 092.-01-05.0)
5. PROPOSED ACTION IS: ☐ NEW ☐ EXPANSION ☒ MODIFICATION/ALTERATION
6. DESCRIBE PROJECT BRIEFLY:
   Application for a zone change from R-1 Zoning District to R-M Zoning District to allow for professional office use (law office).
7. AMOUNT OF LAND AFFECTED: Initially 4.53 Acres Ultimately 4.53 Acres
8. WILL PROPOSED ACTION COMPLY WITH EXISTING ZONING OR OTHER EXISTING LAND USE RESTRICTIONS?
   ☒ Yes ☐ No
   If no, describe briefly:
9. WHAT IS THE PRESENT LAND USE IN THE VICINITY OF THE PROJECT?
   ☒ RESIDENTIAL ☐ INDUSTRIAL ☒ COMMERCIAL ☐ AGRICULTURAL ☐ PARK/FOREST/OPEN SPACE ☐ OTHER
   Describe:
10. DOES ACTION INVOLVE A PERMIT APPROVAL, OR FUNDING, NOW OR ULTIMATELY FROM ANY OTHER GOVERNMENTAL AGENCY (FEDERAL, STATE OR LOCAL)?
    ☐ Yes ☒ No If yes, list agency(s) name and permit/approvals: Planning Board - Site Plan and Accessory Use Permit
11. DOES ANY ASPECT OF THE ACTION HAVE A CURRENTLY VALID PERMIT OR APPROVAL?
    ☒ Yes ☐ No If yes, list agency(s) name and permit/approvals: Certificate of Occupancy
12. AS A RESULT OF PROPOSED ACTION, WILL EXISTING PERMIT/APPROVAL REQUIRE MODIFICATION? ☒ Yes ☐ No

I CERTIFY THAT THE INFORMATION PROVIDED ABOVE IS TRUE TO THE BEST OF MY KNOWLEDGE

APPLICANT/SPONSOR NAME: Bottar LLC, by Michael A Bottar, Member DATE: August 14, 2023

SIGNATURE: Michael A Bottar, Member

IF THE ACTION IS IN A COASTAL AREA, AND YOU ARE A STATE AGENCY, COMPLETE A COASTAL ASSESSMENT FORM BEFORE PROCEEDING WITH THIS ASSESSMENT.

PART II – ENVIRONMENTAL ASSESSMENT (TO BE COMPLETED BY AGENCY)

A. DOES ACTION EXCEED ANY TYPE 1 THRESHOLD IN 6 NYCRR, PART 617.4? IF YES, COORDINATE THE REVIEW PROCESS AND USE THE FULL EAF. ☐ YES ☐ NO

B. WILL ACTION RECEIVE COORDINATED REVIEW AS PROVIDED FOR UNLISTED ACTIONS IN 6 NYCRR, PART 617.6? IF NO, A NEGATIVE DECLARATION MAY BE SUPERSEDED BY ANOTHER INVOLVED AGENCY. ☐ YES ☐ NO

C. COULD ACTION RESULT IN ANY ADVERSE EFFECTS ASSOCIATED WITH THE FOLLOWING: (ANSWERS MAY BE HANDWRITTEN, IF LEGIBLE).

C1. EXISTING AIR QUALITY, SURFACE OR GROUNDWATER QUALITY OR QUANTITY, NOISE LEVELS, EXISTING TRAFFIC PATTERNS, SOLID WASTE PRODUCTION OR DISPOSAL, POTENTIAL FOR EROSION, DRAINAGE OR FLOODING PROBLEMS? EXPLAIN BRIEFLY:

C2. AESTHETIC, AGRICULTURAL, ARCHAEOLOGICAL, HISTORIC, OR OTHER NATURAL OR CULTURAL RESOURCES; OR COMMUNITY OR NEIGHBORHOOD CHARACTER: EXPLAIN BRIEFLY:

C3. VEGETATION OR FAUNA, FISH, SHELLFISH OR WILDLIFE SPECIES, SIGNIFICANT HABITATS, OR THREATENED OR ENDANGERED SPECIES? EXPLAIN BRIEFLY:

C4. A COMMUNITY'S EXISTING PLANS OR GOALS AS OFFICIALLY ADOPTED, OR A CHANGE IN USE OR INTENSITY OF USE OF LAND OR OTHER NATURAL RESOURCES? EXPLAIN BRIEFLY:

C5. GROWTH, SUBSEQUENT DEVELOPMENT, OR RELATED ACTIVITIES LIKELY TO BE INDUCED BY THE PROPOSED ACTION: EXPLAIN BRIEFLY:

C6. LONG TERM, SHORT TERM, CUMULATIVE, OR OTHER EFFECTS NOT IDENTIFIED IN C1-C5? EXPLAIN BRIEFLY:

C7. OTHER IMPACTS (INCLUDING CHANGES IN USE OF EITHER QUANTITY OR TYPE OF ENERGY)? EXPLAIN BRIEFLY:

D. WILL THE PROJECT HAVE AN IMPACT ON THE ENVIRONMENTAL CHARACTERISTICS THAT CAUSED THE ESTABLISHMENT OF A CRITICAL ENVIRONMENTAL AREA (CEA)? ☐ YES ☐ NO. IF YES, EXPLAIN BRIEFLY:

E. IS THERE, OR IS THERE LIKELY TO BE, CONTROVERSY RELATED TO POTENTIAL ADVERSE ENVIRONMENTAL IMPACTS? ☐ YES ☐ NO. IF YES, EXPLAIN BRIEFLY:

PART III – DETERMINATION OF SIGNIFICANCE (TO BE COMPLETED BY AGENCY)

Instructions: For each adverse effect identified above, determine whether it is substantial, large, important or otherwise significant. Each effect should be assessed in connection with its (a) setting (i.e., urban or rural); (b) probability of occurring; (c) duration; (d) irreversibility; (e) geographic scope; and (f) magnitude. If necessary, add attachments or reference supporting materials. Ensure that explanations contain sufficient detail to show that all relevant adverse impacts have been identified and adequately addressed. If question D or Part II was checked yes, the determination of significance must evaluate the potential impact of the proposed action on the environmental characteristics of the CEA.

☐ CHECK THIS BOX IF YOU HAVE IDENTIFIED ONE OR MORE POTENTIALLY LARGE OR SIGNIFICANT ADVERSE IMPACTS WHICH **MAY** OCCUR. THEN PROCEED DIRECTLY TO THE FULL EAF AND/OR PREPARE A POSITIVE DECLARATION.

☐ CHECK THIS BOX IF YOU HAVE DETERMINED, BASED ON THE INFORMATION AND ANALYSIS ABOVE AND ANY SUPPORTING DOCUMENTATION, THAT THE PROPOSED ACTION **WILL NOT** RESULT IN ANY SIGNIFICANT ADVERSE ENVIRONMENTAL IMPACTS **AND** PROVIDE ON ATTACHMENTS AS NECESSARY. THE REASONS SUPPORTING THIS DETERMINATION:

Name of Lead Agency	Date
Print or Type Name of Responsible Officer in Lead Agency	Title of Responsible Officer
Signature of Responsible Officer in Lead Agency	Signature of Preparer (if different from responsible officer)

Expected Fee: _____

TOWN OF MANLIUS
PLANNING DEPARTMENT
INITIAL APPEARANCE APPLICATION

DATE: August 16, 2023

Name of Project: Zone Change Application - 7078 E. Genesee Street

Applicant must submit 12 copies of all site plans, surveys, and supporting data with the final application before a planning board meeting can be scheduled.

Location of Project: 7078 E. Genesee Street, Fayetteville, New York (Tax Map No. 092.-01-05.0)

Type of Project:

○ Division of Land ○ Subdivision ○ Accessory Use ⊗ Zone Change ○ Site Review ○ Other _____

Developer: Bottar, LLC Phone: (315) 422-3466

Address: 120 Madison Street, Suite 1300, Syracuse, NY 13202 Zip: 13202

Tax Map Number(#)/s: 092.-01-05.0

Present Zoning: R-1 Desired Zoning: R-M

Total Acreage: 4.53 Total Number of Lots: 1

Property Owner/s: Richard P. Dodd and Daynia A. Dodd Phone: _____

Address: 7078 East Genesee Street, Fayetteville, New York 13066 Zip: _____

Tax Map#(s): 092.-01-05.0 Owner's Signature: [signature]

Printed Name: Richard P. Dodd + Daynia Dodd

Property Owner/s: _____ Phone: _____

Address: _____ Zip: _____

Tax Map#(s): _____ Owner's Signature: _____

Printed Name: _____

Use next page for additional known property owners' information

---

Planning Board Meeting Date Assignment: _____

Fee: _____ Paid: _____ Per: ○ Credit/Debit Card ○ Check ○ Cash

Planning Board - Initial

SCHEDULE "A"

All that tract and or parcel of land situate in the Town of Manlius, County of Onondaga and State of New York, being a Part of Subdivision# 7 of Military Lot# 74 in said Town and being more particularly described as follows:

Beginning at a point situate in the present southerly line of East Genesee Street (New York State Route# 5), said point being 660.0 feet easterly, as measured along said southerly line, from the westerly line of Military Lot# 74;

thence, S.83°-50'-30"E., along said southerly line, a distance of 510.00 feet to a point situate in the present westerly line of Draycott Road, said point also being 150.0 feet westerly, as measured along said southerly line of East Genesee Street, from the northwesterly corner of lands conveyed to F. Pratt, now or formerly;

thence, S.06°-47'-10"W., along said westerly line, a distance of 90.00 feet to an angle point therein;

thence, S.39°-41'-27"W., along said westerly line, a distance of 72.0 feet to an angle point therein;

thence, S.06°-47'-10"W., along said westerly line, a distance of 250.00 feet to a point, said point being 190.0 feet westerly from the southeasterly corner of lands conveyed to E. Bull, now or formerly;

thence, N.83°-50'-30"W., a distance of 470.00 feet to a point situate in the westerly line of lands conveyed to A.S. White, now or formerly;

thence, N.06°-39'-30"E., a distance of 400.00 feet to the point and place of beginning.

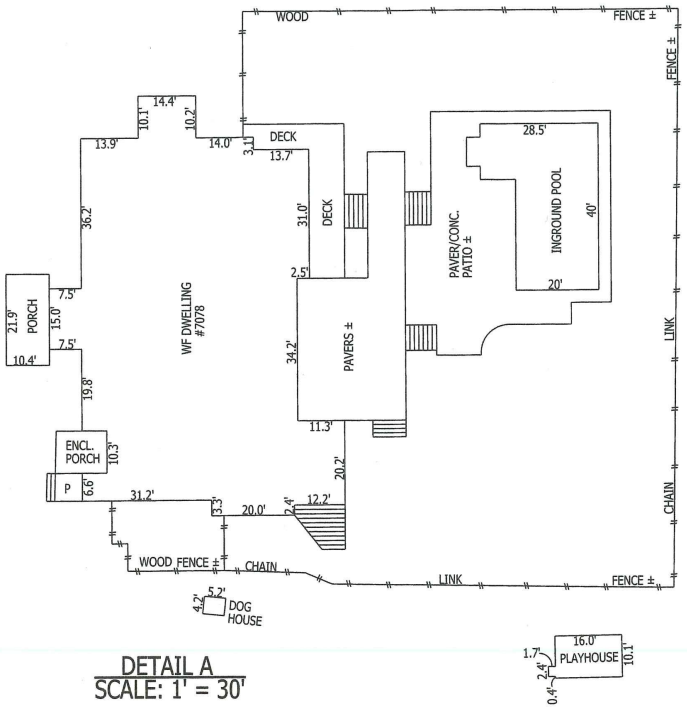
The hereinbefore described parcel of land is subject to and together with any and all easements, restrictions and/or rights of way of record.

Property address: **7078 E. Genesee St., Fayetteville, NY 13066**
Tax Map: **092.-01-05.0**

NO ABSTRACT PROVIDED AT TIME OF SURVEY.

SUBJECT TO EASEMENTS, ROWS, RESTRICTIONS & EXCEPTIONS OF RECORD WHICH AN UPDATED ABSTRACT WOULD SHOW.

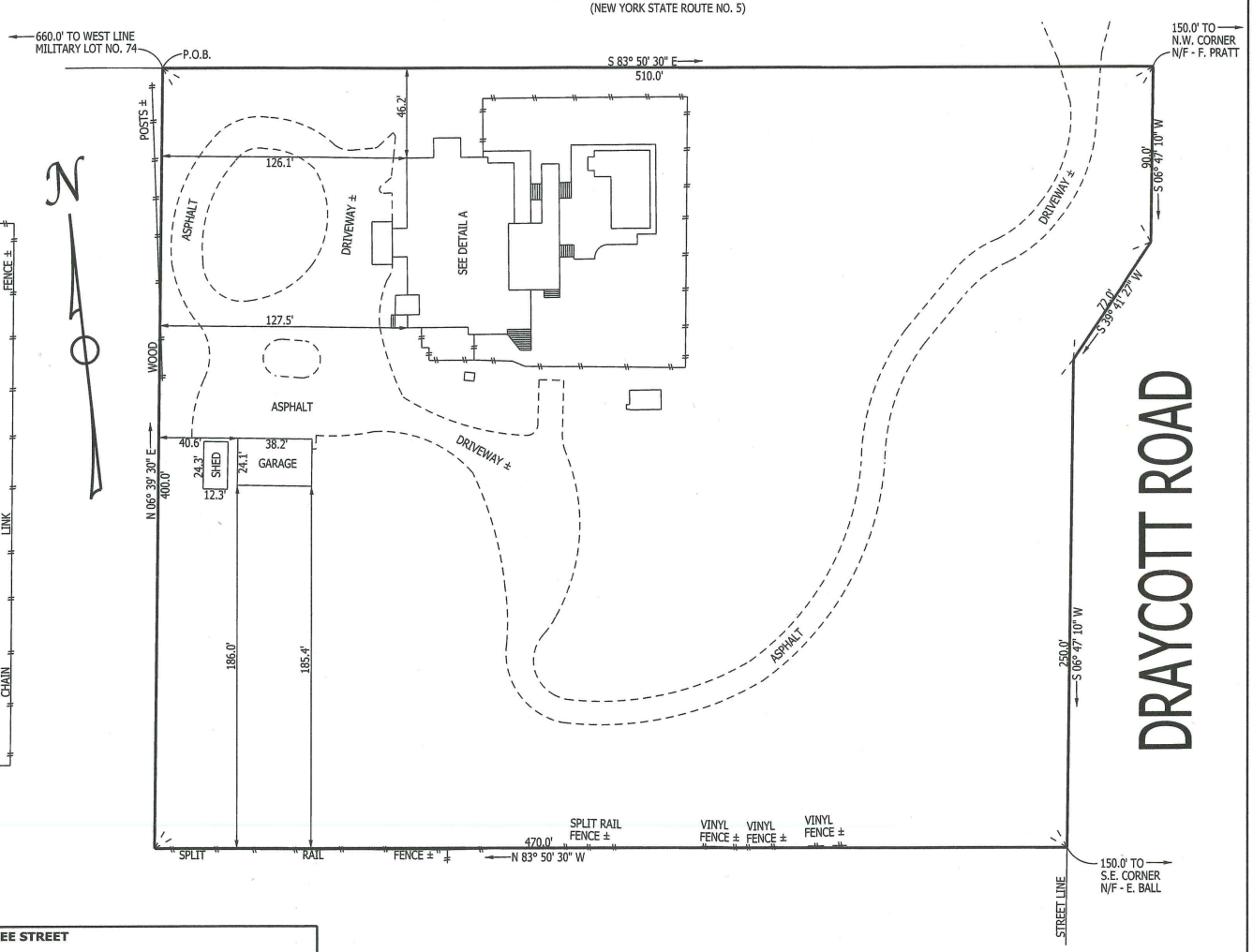
STATE OF NEW YORK · JAMES MICHAEL DUSSING · 050692 · LICENSED LAND SURVEYOR



DETAIL A
SCALE: 1' = 30'

EAST GENESEE STREET

(NEW YORK STATE ROUTE NO. 5)



CERTIFIED TO	**LOCATION SURVEY FOR:** 7078 EAST GENESEE STREET	
	LOT: — **TRACT:** PART OF SUBDIVISION NO. 7 OF MILITARY LOT NO. 74	
	TOWN OF MANLIUS **COUNTY OF ONONDAGA**	**STATE OF NEW YORK**
PROPERTY CORNERS NOT SET IN THIS SURVEY UNLESS SHOWN. THE UNDERSIGNED HEREBY CERTIFIES THAT THIS IS A CORRECT MAP MADE FROM AN ACTUAL SURVEY.	**DUSSING LAND SURVEYING, LLC**	**DATE:** 8/2/23
	JAMES M. DUSSING SR. LIC. NO. 050692	**SCALE:** 1" = 60'
N.Y.S. LICENSED LAND SURVEYOR NO. 050692	SYRACUSE, NEW YORK PHONE: 315-256-5372	**FILE NO.:** 23-668

August 1, 2023

Town Board
Town of Manlius
301 Brooklea Drive
Fayetteville, NY 13066

RE: PUD District Request
Twin Ponds District Plan - 5440 Burdick Street
CHA Project No. 080118

Dear Town Board Members:

CHA, on behalf of Twin Ponds Housing, LLC (the Applicant), is pleased to submit the enclosed request for the creation of a Planned Unit Development (PUD) District related to the above referenced project.

The following items have been included for the Town Board review and consideration:

- PUD District Plan
- District Plan Map
- SEQR Form (EAF)

Should you require any additional copies of these items, or have any questions related to the submission, please do not hesitate to contact me at 315-228-0036 or bbouchard@chacompanies.com

Very truly yours,

Brian F. Bouchard, PE.
Senior Engineer V

Enclosures
Cc: Charlie Breuer (Twin Ponds Housing LLC)
V:\Projects\ANY\K6\080118.000\07_Permitting\Local\4 - PUD District Plan-7-31-23\0 - Cover Letter District Plan -Twin Ponds-8-2-23.doc

One Park Place, 300 South State Street, Suite 600, Syracuse, NY 13202-2024
T 315.471.3920 • F 315.471.3569 • www.chacompanies.com

7/28/2023

Twin Ponds District Plan

A. Intent. This district is intended to be used primarily for multiple-family dwelling units in order to provide unique housing and outdoor recreation choices that may not be available in the other residential zoning districts within the Town. The design of the PUD District Plan provides for relatively high-density residential housing options with pedestrian access to outdoor recreation amenities. The PUD District Plan shall also include a limited amount of non-residential uses that do not interfere with the intent of the project and compliment its objectives.

B. PUD District Plan Description.

1. Types of land uses. The following structures and uses shall be permitted within the district, pursuant to site plan approval:

    a. Multi-family dwellings

    b. Townhouses

    c. Personal Service

    d. Professional Offices

    e. Restaurants

    f. Retail Sales

    g. Day-care facilities

    h. Parks and trails

    i. Artisan, maker

    j. Commercial business

    k. Accessory structures and uses incidental to multiple-family dwellings (including parking structures)

2. Bulk requirements

    a. Lot Area: 0.5 acres non-residential / 2 acres for residential

    b. Maximum Building height: 6 stories

3. Off-Street Parking requirements. A minimum of one off-street parking space for each one bedroom Dwelling and two off-street parking spaces for each two or three bedroom Dwelling shall be required. Up to 25 % of the required parking may be "banked" by the Owner until they are needed in order to minimize the amount of impermeable surface. The term "banked" parking spaces shall refer to the Planning Board approving the placement and construction of parking spaces, but allowing the Owner the option to not construct the approved spaces until and if those spaces are needed to accommodate conditions at the site. Off-street parking for non-residential uses shall be in accordance with Manlius Town Code §155-31, however, the Planning Board shall have the discretion to lower those requirements to fit unique site circumstances and uses.

4. Vehicle Circulation. Provisions for smooth internal vehicle circulation shall be made with storage space for snow which will not block parking spaces and with provision for access of emergency vehicles. The design for vehicular ingress and egress to the site from a public highway and for interior streets shall be approved by the Town Highway Superintendent and the Chief of the Fire Protection District in which the project is to be located.

C. PUD District Plan Map. Attached as **Appendix A** is a map identifying the location of permissible land uses, public roads, sidewalks and the total acreage of the proposed PUD District Plan.

D. Phasing Plan. The Project will be constructed in no more than four phases.

E. Application Timeline.

1. The Owner shall be required to apply for Site Plan Approval no later than 180 days after approval of the PUD District Plan.

2. The Owner shall be required to apply for a building permit to begin construction of the project no later than 18 months after receiving site plan approval.

F. Public Roadways. Appendix A depicts the location of lands that shall be dedicated to the Town for public use as roadways.

G. Recreational Areas. The PUD District Plan Map includes recreational areas in the form of an outdoor activity space, walking trails and clubhouse. The map attached as Appendix A depicts the location of these amenities.

H. Signage. All signage shall be in accordance with § 155-25 of the Manlius Town Code.

I. Utilities. All buildings will be served by public water and sewer systems.

J. Workforce Housing. 5 % of the Dwellings within the PUD District shall be designated for "Workforce Housing." Workforce Housing shall be available for a period of ten (10) years following the issuance of a certificate of occupancy.

1. Rent for a Dwelling that does not exceed 30 percent of the income of a family whose income equals 80 % of the Area Median Income (AMI) for Syracuse Metropolitan Area, shall qualify as Workforce Housing. AMI is determined annually by the U.S. Department of Housing and Urban Development.

2. In order to occupy a unit set aside as Workforce Housing, the occupant's income may not exceed 80 % of the Area Median Income (AMI) for Onondaga County.

3. The Town Board may reduce the number of Workforce Housing units required or the method for calculating the rent ceiling to be considered Workforce Housing if such an adjustment is necessary to support the continued financial viability of the project.

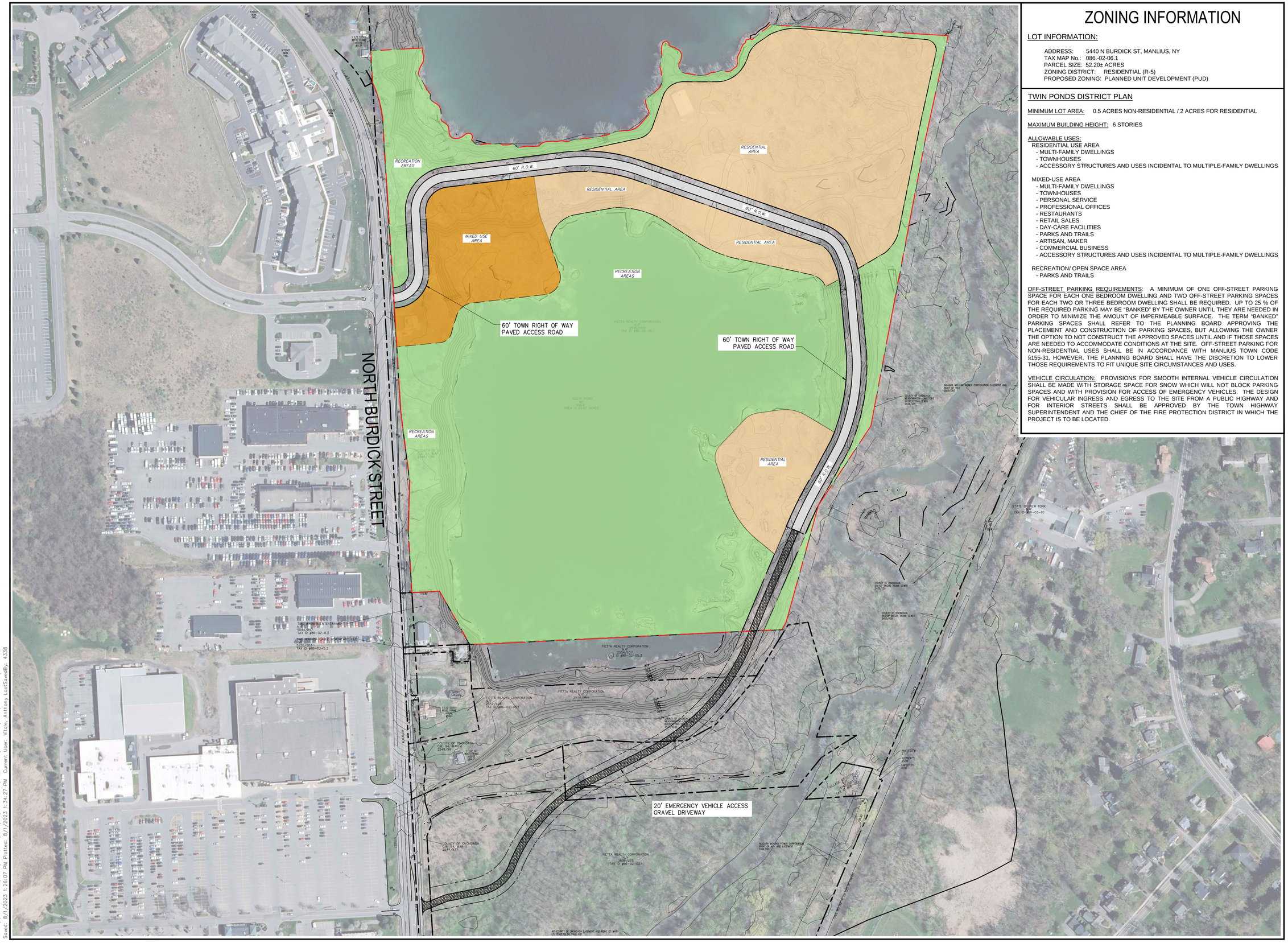
4. Temporary noncompliance with paragraph J is permitted if such noncompliance is caused by increases in the incomes of existing tenants. The Owner shall reduce the rent for the next available equivalent vacant unit in the event that a unit previously designated as Workforce Housing no longer qualifies due to an increase in a tenant's income.

5. The Owner shall provide information on an annual basis to the Codes Officer to confirm compliance with these Workforce Housing requirements.

K. Mixed-use. The Owner shall offer no less than 2,500 square feet of space for rent for non-residential purposes. The non-residential units may be located anywhere in the PUD District.

L. Trail Connections. The Owner will cooperate with the Town to connect walking trails within the PUD District with other trails constructed by the neighboring property owners in order to provide pedestrian access.

M. Sustainability. The project will include no less than 10 charging plugs for electric vehicles and all Dwellings will utilize electric rather than gas for heat and cooking appliances.



ZONING INFORMATION

LOT INFORMATION:

ADDRESS: 5440 N BURDICK ST, MANLIUS, NY
TAX MAP No.: 086.-02-06.1
PARCEL SIZE: 52.20± ACRES
ZONING DISTRICT: RESIDENTIAL (R-5)
PROPOSED ZONING: PLANNED UNIT DEVELOPMENT (PUD)

TWIN PONDS DISTRICT PLAN

MINIMUM LOT AREA: 0.5 ACRES NON-RESIDENTIAL / 2 ACRES FOR RESIDENTIAL

MAXIMUM BUILDING HEIGHT: 6 STORIES

ALLOWABLE USES:

RESIDENTIAL USE AREA
- MULTI-FAMILY DWELLINGS
- TOWNHOUSES
- ACCESSORY STRUCTURES AND USES INCIDENTAL TO MULTIPLE-FAMILY DWELLINGS

MIXED-USE AREA
- MULTI-FAMILY DWELLINGS
- TOWNHOUSES
- PERSONAL SERVICE
- PROFESSIONAL OFFICES
- RESTAURANTS
- RETAIL SALES
- DAY-CARE FACILITIES
- PARKS AND TRAILS
- ARTISAN, MAKER
- COMMERCIAL BUSINESS
- ACCESSORY STRUCTURES AND USES INCIDENTAL TO MULTIPLE-FAMILY DWELLINGS

RECREATION/ OPEN SPACE AREA
- PARKS AND TRAILS

OFF-STREET PARKING REQUIREMENTS: A MINIMUM OF ONE OFF-STREET PARKING SPACE FOR EACH ONE BEDROOM DWELLING AND TWO OFF-STREET PARKING SPACES FOR EACH TWO OR THREE BEDROOM DWELLING SHALL BE REQUIRED. UP TO 25 % OF THE REQUIRED PARKING MAY BE "BANKED" BY THE OWNER UNTIL THEY ARE NEEDED IN ORDER TO MINIMIZE THE AMOUNT OF IMPERMEABLE SURFACE. THE TERM "BANKED" PARKING SPACES SHALL REFER TO THE PLANNING BOARD APPROVING THE PLACEMENT AND CONSTRUCTION OF PARKING SPACES, BUT ALLOWING THE OWNER THE OPTION TO NOT CONSTRUCT THE APPROVED SPACES UNTIL AND IF THOSE SPACES ARE NEEDED TO ACCOMMODATE CONDITIONS AT THE SITE. OFF-STREET PARKING FOR NON-RESIDENTIAL USES SHALL BE IN ACCORDANCE WITH MANLIUS TOWN CODE §155-31, HOWEVER, THE PLANNING BOARD SHALL HAVE THE DISCRETION TO LOWER THOSE REQUIREMENTS TO FIT UNIQUE SITE CIRCUMSTANCES AND USES.

VEHICLE CIRCULATION: PROVISIONS FOR SMOOTH INTERNAL VEHICLE CIRCULATION SHALL BE MADE WITH STORAGE SPACE FOR SNOW WHICH WILL NOT BLOCK PARKING SPACES AND WITH PROVISION FOR ACCESS OF EMERGENCY VEHICLES. THE DESIGN FOR VEHICULAR INGRESS AND EGRESS TO THE SITE FROM A PUBLIC HIGHWAY AND FOR INTERIOR STREETS SHALL BE APPROVED BY THE TOWN HIGHWAY SUPERINTENDENT AND THE CHIEF OF THE FIRE PROTECTION DISTRICT IN WHICH THE PROJECT IS TO BE LOCATED.

Drawing Copyright © 2023

One Park Place, 300 South State Street, Suite 600
Syracuse, NY 13202
315.471.3920 : www.chacompanies.com

Applicant/Owner:

Twin Ponds Housing, LLC,
PO Box 515
Syracuse, NY 13210

0 120 240
Scale in feet

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT OR LAND SURVEYOR TO ALTER AN ITEM IN ANY WAY. IF AN ITEM BEARING THE STAMP OF A LICENSED PROFESSIONAL IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

Project Title:

TWIN PONDS
PUD

5440 N Burdick St,
Manlius, NY

No.	Submittal / Revision	App'd.	By	Date

DISTRICT PLAN

Designed By:	Drawn By:	Checked By:
AMV	AMV	BFB
Issue Date:	Project No:	Scale:
7/31/23	080118	AS SHOWN

Drawing No.:

DP-1

File: \\CHA-LLP-COM\PROJ\PROJECTS\ANY\K6\080118.000\09_DESIGN\DRAWINGS\CIVIL\MODEL FILES\MANLIUS_DISTRICT PLAN-08-01-23.DWG
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Instructions for Completing Part 1

Part 1 is to be completed by the applicant or project sponsor. Responses become part of the application for approval or funding, are subject to public review, and may be subject to further verification.

Complete Part 1 based on information currently available. If additional research or investigation would be needed to fully respond to any item, please answer as thoroughly as possible based on current information; indicate whether missing information does not exist, or is not reasonably available to the sponsor; and, when possible, generally describe work or studies which would be necessary to update or fully develop that information.

Applicants/sponsors must complete all items in Sections A & B. In Sections C, D & E, most items contain an initial question that must be answered either "Yes" or "No". If the answer to the initial question is "Yes", complete the sub-questions that follow. If the answer to the initial question is "No", proceed to the next question. Section F allows the project sponsor to identify and attach any additional information. Section G requires the name and signature of the applicant or project sponsor to verify that the information contained in Part 1is accurate and complete.

A. Project and Applicant/Sponsor Information.

Name of Action or Project: Twin Ponds Planned Unit Development (PUD)		
Project Location (describe, and attach a general location map): 5440 Burdick Street, Manlius NY		
Brief Description of Proposed Action (include purpose or need): The proposed action is for the development of a Planned Unit Development (PUD) consisting of multifamily residential dwelling units, commercial/mixed use tenants, and recreational / open space areas. The development will include new residential and mixed use buildings, along with a clubhouse and amenity areas for recreation. The project will construct necessary roadways, parking areas, landscaping, and site utilities to serve the proposed development.		
Name of Applicant/Sponsor: Twin Ponds Housing, LLC	Telephone: 315-476-7917 E-Mail: cbreuer@hb1872.build	
Address: PO Box 515		
City/PO: Syracuse	State: NY	Zip Code: 13210
Project Contact (if not same as sponsor; give name and title/role):	Telephone: E-Mail:	
Address:		
City/PO:	State:	Zip Code:
Property Owner (if not same as sponsor): Twin Shores Properties, LLC	Telephone: E-Mail:	
Address: 1333 13th Street		
City/PO: East Moline	State: IL	Zip Code: 061244

B. Government Approvals

B. Government Approvals, Funding, or Sponsorship. ("Funding" includes grants, loans, tax relief, and any other forms of financial assistance.)

Government Entity	If Yes: Identify Agency and Approval(s) Required	Application Date (Actual or projected)
a. City Council, Town Board, or Village Board of Trustees ☑Yes ☐No	Town Board - PUD District Plan	Aug 2023
b. City, Town or Village Planning Board or Commission ☑Yes ☐No	PUD Site Plans	Aug 2023
c. City, Town or Village Zoning Board of Appeals ☐Yes ☐No		
d. Other local agencies ☐Yes ☐No		
e. County agencies ☑Yes ☐No	SOCPA Referral, OCDOT Curb Cut Permit	Aug 2023 - Dec 2023
f. Regional agencies ☐Yes ☐No		
g. State agencies ☑Yes ☐No	NYSDEC Stormwater Permit	Dec 2023
h. Federal agencies ☐Yes ☐No		

i. Coastal Resources.

i. Is the project site within a Coastal Area, or the waterfront area of a Designated Inland Waterway? ☐Yes ☑No

ii. Is the project site located in a community with an approved Local Waterfront Revitalization Program? ☐Yes ☑No

iii. Is the project site within a Coastal Erosion Hazard Area? ☐Yes ☑No

C. Planning and Zoning

C.1. Planning and zoning actions.

Will administrative or legislative adoption, or amendment of a plan, local law, ordinance, rule or regulation be the only approval(s) which must be granted to enable the proposed action to proceed? ☐Yes ☑No

- **If Yes,** complete sections C, F and G.
- **If No,** proceed to question C.2 and complete all remaining sections and questions in Part 1

C.2. Adopted land use plans.

a. Do any municipally- adopted (city, town, village or county) comprehensive land use plan(s) include the site where the proposed action would be located? ☑Yes ☐No

If Yes, does the comprehensive plan include specific recommendations for the site where the proposed action would be located? ☑Yes ☐No

b. Is the site of the proposed action within any local or regional special planning district (for example: Greenway; Brownfield Opportunity Area (BOA); designated State or Federal heritage area; watershed management plan; or other?) ☐Yes ☑No

If Yes, identify the plan(s):

_____

_____

_____

c. Is the proposed action located wholly or partially within an area listed in an adopted municipal open space plan, or an adopted municipal farmland protection plan? ☐Yes ☑No

If Yes, identify the plan(s):

_____

_____

_____

C.3. Zoning

a. Is the site of the proposed action located in a municipality with an adopted zoning law or ordinance. ☑ Yes ☐ No
If Yes, what is the zoning classification(s) including any applicable overlay district?
Residential R-5 District with Planned Unit Development Overlay

b. Is the use permitted or allowed by a special or conditional use permit? ☑ Yes ☐ No

c. Is a zoning change requested as part of the proposed action? ☑ Yes ☐ No
If Yes,
i. What is the proposed new zoning for the site? Request to utilize the allowable PUD Overlay for development of the project site.

C.4. Existing community services.

a. In what school district is the project site located? Fayetteville-Manlius School District

b. What police or other public protection forces serve the project site?
Town of Manlius Police Department

c. Which fire protection and emergency medical services serve the project site?
Town of Manlius Fire Department

d. What parks serve the project site?
Town of Manlius Park Department

D. Project Details

D.1. Proposed and Potential Development

a. What is the general nature of the proposed action (e.g., residential, industrial, commercial, recreational; if mixed, include all components)? Residential and Mixed-Use (commercial)

b. a. Total acreage of the site of the proposed action? 52.20 acres
b. Total acreage to be physically disturbed? 20.00 acres
c. Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor? 52.20 acres

c. Is the proposed action an expansion of an existing project or use? ☐ Yes ☑ No
i. If Yes, what is the approximate percentage of the proposed expansion and identify the units (e.g., acres, miles, housing units, square feet)? % _____ Units: _____

d. Is the proposed action a subdivision, or does it include a subdivision? ☑ Yes ☐ No
If Yes,
i. Purpose or type of subdivision? (e.g., residential, industrial, commercial; if mixed, specify types)
Future subdivision to include public roadways and individual project phasing parcels.
ii. Is a cluster/conservation layout proposed? ☐ Yes ☑ No
iii. Number of lots proposed? TBD
iv. Minimum and maximum proposed lot sizes? Minimum 0.5 Maximum TBD

e. Will the proposed action be constructed in multiple phases? ☑ Yes ☐ No
i. If No, anticipated period of construction: _____ months
ii. If Yes:
- Total number of phases anticipated 4
- Anticipated commencement date of phase 1 (including demolition) Jan month 2024 year
- Anticipated completion date of final phase Dec month 2027 year
- Generally describe connections or relationships among phases, including any contingencies where progress of one phase may determine timing or duration of future phases:
Phasing of up to 4 project areas to construct the residential buildings and infrastructure according to building occupancy.

f. Does the project include new residential uses? ☑ Yes ☐ No

If Yes, show numbers of units proposed.

	One Family	Two Family	Three Family	Multiple Family (four or more)
Initial Phase				100 +/- dwelling units
At completion of all phases				375 +/- dwelling units

g. Does the proposed action include new non-residential construction (including expansions)? ☑ Yes ☐ No

If Yes,

i. Total number of structures 1

ii. Dimensions (in feet) of largest proposed structure: TBD height; TBD width; and TBD length

iii. Approximate extent of building space to be heated or cooled: minimum of 2,500 SF square feet

h. Does the proposed action include construction or other activities that will result in the impoundment of any liquids, such as creation of a water supply, reservoir, pond, lake, waste lagoon or other storage? ☑ Yes ☐ No

If Yes,

i. Purpose of the impoundment: stormwater management ponds and existing South Pond

ii. If a water impoundment, the principal source of the water: ☐ Ground water ☑ Surface water streams ☐ Other specify:

iii. If other than water, identify the type of impounded/contained liquids and their source.

iv. Approximate size of the proposed impoundment. Volume: TBD million gallons; surface area: TBD acres

v. Dimensions of the proposed dam or impounding structure: TBD height; TBD length

vi. Construction method/materials for the proposed dam or impounding structure (e.g., earth fill, rock, wood, concrete):

excavation of soils for storage and management of surface runoff from proposed impervious areas as per NYSDEC regulations.

D.2. Project Operations

a. Does the proposed action include any excavation, mining, or dredging, during construction, operations, or both? ☐ Yes ☑ No
(Not including general site preparation, grading or installation of utilities or foundations where all excavated materials will remain onsite)

*general site grading / excavations

If Yes:

i .What is the purpose of the excavation or dredging?

ii. How much material (including rock, earth, sediments, etc.) is proposed to be removed from the site?

- Volume (specify tons or cubic yards):
- Over what duration of time?

iii. Describe nature and characteristics of materials to be excavated or dredged, and plans to use, manage or dispose of them.

iv. Will there be onsite dewatering or processing of excavated materials? ☐ Yes ☐ No
If yes, describe.

v. What is the total area to be dredged or excavated? acres

vi. What is the maximum area to be worked at any one time? acres

vii. What would be the maximum depth of excavation or dredging? feet

viii. Will the excavation require blasting? ☐ Yes ☐ No

ix. Summarize site reclamation goals and plan:

b. Would the proposed action cause or result in alteration of, increase or decrease in size of, or encroachment into any existing wetland, waterbody, shoreline, beach or adjacent area? ☐ Yes ☑ No

If Yes:

i. Identify the wetland or waterbody which would be affected (by name, water index number, wetland map number or geographic description):

ii. Describe how the proposed action would affect that waterbody or wetland, e.g. excavation, fill, placement of structures, or alteration of channels, banks and shorelines. Indicate extent of activities, alterations and additions in square feet or acres: _____

iii. Will the proposed action cause or result in disturbance to bottom sediments? ☐Yes ☐No
If Yes, describe: _____

iv. Will the proposed action cause or result in the destruction or removal of aquatic vegetation? ☐ Yes ☐No
If Yes:

- acres of aquatic vegetation proposed to be removed: _____
- expected acreage of aquatic vegetation remaining after project completion: _____
- purpose of proposed removal (e.g. beach clearing, invasive species control, boat access): _____
- proposed method of plant removal: _____
- if chemical/herbicide treatment will be used, specify product(s): _____

v. Describe any proposed reclamation/mitigation following disturbance: _____

c. Will the proposed action use, or create a new demand for water? ☑Yes ☐No
If Yes:

i. Total anticipated water usage/demand per day: 68,000 gallons/day

ii. Will the proposed action obtain water from an existing public water supply? ☑Yes ☐No
If Yes:

- Name of district or service area: OCWA
- Does the existing public water supply have capacity to serve the proposal? ☑ Yes ☐ No
- Is the project site in the existing district? ☑ Yes ☐ No
- Is expansion of the district needed? ☐ Yes ☑ No
- Do existing lines serve the project site? ☐ Yes ☑ No

iii. Will line extension within an existing district be necessary to supply the project? ☑Yes ☐No
If Yes:

- Describe extensions or capacity expansions proposed to serve this project: Extension of public water main to service the proposed buildings
- Source(s) of supply for the district: OCWA

iv. Is a new water supply district or service area proposed to be formed to serve the project site? ☐ Yes ☑No
If, Yes:

- Applicant/sponsor for new district: _____
- Date application submitted or anticipated: _____
- Proposed source(s) of supply for new district: _____

v. If a public water supply will not be used, describe plans to provide water supply for the project: _____

vi. If water supply will be from wells (public or private), what is the maximum pumping capacity: _____ gallons/minute.

d. Will the proposed action generate liquid wastes? ☑ Yes ☐No
If Yes:

i. Total anticipated liquid waste generation per day: 68,000 gallons/day

ii. Nature of liquid wastes to be generated (e.g., sanitary wastewater, industrial; if combination, describe all components and approximate volumes or proportions of each): residential sanitary wastewater

iii. Will the proposed action use any existing public wastewater treatment facilities? ☑Yes ☐No
If Yes:

- Name of wastewater treatment plant to be used: Meadowbrook-Limestone
- Name of district: Meadowbrook-Limestone
- Does the existing wastewater treatment plant have capacity to serve the project? ☑Yes ☐No
- Is the project site in the existing district? ☑Yes ☐No
- Is expansion of the district needed? ☐Yes ☑No

- Do existing sewer lines serve the project site? ☑ Yes ☐ No
- Will a line extension within an existing district be necessary to serve the project? ☑ Yes ☐ No

  If Yes:
  - Describe extensions or capacity expansions proposed to serve this project: _____

  Public sewer extension from Meadowbrook-Limestone trunk sewer to service the proposed buildings

iv. Will a new wastewater (sewage) treatment district be formed to serve the project site? ☐ Yes ☑ No

If Yes:
- Applicant/sponsor for new district: _____
- Date application submitted or anticipated: _____
- What is the receiving water for the wastewater discharge? _____

v. If public facilities will not be used, describe plans to provide wastewater treatment for the project, including specifying proposed receiving water (name and classification if surface discharge or describe subsurface disposal plans):

_____

vi. Describe any plans or designs to capture, recycle or reuse liquid waste: _____

e. Will the proposed action disturb more than one acre and create stormwater runoff, either from new point sources (i.e. ditches, pipes, swales, curbs, gutters or other concentrated flows of stormwater) or non-point source (i.e. sheet flow) during construction or post construction? ☑ Yes ☐ No

If Yes:

i. How much impervious surface will the project create in relation to total size of project parcel?

_____ Square feet or 11.0 acres (impervious surface)

_____ Square feet or 52.2 acres (parcel size)

ii. Describe types of new point sources. surface runoff from parking areas and roof areas

iii. Where will the stormwater runoff be directed (i.e. on-site stormwater management facility/structures, adjacent properties, groundwater, on-site surface water or off-site surface waters)?

on site stormwater management collection system and existing surface pond

- If to surface waters, identify receiving water bodies or wetlands: _____
- Will stormwater runoff flow to adjacent properties? ☐ Yes ☑ No

iv. Does the proposed plan minimize impervious surfaces, use pervious materials or collect and re-use stormwater? ☐ Yes ☑ No

f. Does the proposed action include, or will it use on-site, one or more sources of air emissions, including fuel combustion, waste incineration, or other processes or operations? ☑ Yes ☐ No

If Yes, identify:

i. Mobile sources during project operations (e.g., heavy equipment, fleet or delivery vehicles)

none

ii. Stationary sources during construction (e.g., power generation, structural heating, batch plant, crushers)

typical construction equipment including generators and temporary heating

iii. Stationary sources during operations (e.g., process emissions, large boilers, electric generation)

none

g. Will any air emission sources named in D.2.f (above), require a NY State Air Registration, Air Facility Permit, or Federal Clean Air Act Title IV or Title V Permit? ☐ Yes ☑ No

If Yes:

i. Is the project site located in an Air quality non-attainment area? (Area routinely or periodically fails to meet ambient air quality standards for all or some parts of the year) ☐ Yes ☑ No

ii. In addition to emissions as calculated in the application, the project will generate:
- _____Tons/year (short tons) of Carbon Dioxide (CO_2)
- _____Tons/year (short tons) of Nitrous Oxide (N_2O)
- _____Tons/year (short tons) of Perfluorocarbons (PFCs)
- _____Tons/year (short tons) of Sulfur Hexafluoride (SF_6)
- _____Tons/year (short tons) of Carbon Dioxide equivalent of Hydroflourocarbons (HFCs)
- _____Tons/year (short tons) of Hazardous Air Pollutants (HAPs)

h. Will the proposed action generate or emit methane (including, but not limited to, sewage treatment plants, landfills, composting facilities)? ☐Yes ☑No

If Yes:

i. Estimate methane generation in tons/year (metric): _____

ii. Describe any methane capture, control or elimination measures included in project design (e.g., combustion to generate heat or electricity, flaring): _____

i. Will the proposed action result in the release of air pollutants from open-air operations or processes, such as quarry or landfill operations? ☐Yes ☑No

If Yes: Describe operations and nature of emissions (e.g., diesel exhaust, rock particulates/dust):

j. Will the proposed action result in a substantial increase in traffic above present levels or generate substantial new demand for transportation facilities or services? ☐Yes ☑No

If Yes:

i. When is the peak traffic expected (Check all that apply): ☑ Morning ☑ Evening ☐Weekend

☑ Randomly between hours of 7am-9am to 5pm-7pm.

ii. For commercial activities only, projected number of truck trips/day and type (e.g., semi trailers and dump trucks): _____

iii. Parking spaces: Existing zero Proposed ~500 +/- Net increase/decrease ~ 500 +/-

iv. Does the proposed action include any shared use parking? ☑Yes ☐No

v. If the proposed action includes any modification of existing roads, creation of new roads or change in existing access, describe: new public roadway for site access off North Burdick Street

vi. Are public/private transportation service(s) or facilities available within ½ mile of the proposed site? ☑Yes ☐No

vii Will the proposed action include access to public transportation or accommodations for use of hybrid, electric or other alternative fueled vehicles? ☑Yes ☐No

viii. Will the proposed action include plans for pedestrian or bicycle accommodations for connections to existing pedestrian or bicycle routes? ☑Yes ☐No

k. Will the proposed action (for commercial or industrial projects only) generate new or additional demand for energy? ☐Yes ☑No

*residential mixed use project

If Yes:

i. Estimate annual electricity demand during operation of the proposed action: _____

ii. Anticipated sources/suppliers of electricity for the project (e.g., on-site combustion, on-site renewable, via grid/local utility, or other): _____

iii. Will the proposed action require a new, or an upgrade, to an existing substation? ☐Yes ☐No

l. Hours of operation. Answer all items which apply.

i. During Construction:

- Monday - Friday: 7am-7pm
- Saturday: ---
- Sunday: ----
- Holidays: -----

ii. During Operations:

- Monday - Friday: commercial businesses 7am-9pm
- Saturday: commercial businesses 7am-9pm
- Sunday: commercial businesses 7am-9pm
- Holidays: -----

m. Will the proposed action produce noise that will exceed existing ambient noise levels during construction, operation, or both? ☑ Yes ☐ No

If yes:

i. Provide details including sources, time of day and duration:

Typical construction equipment (loaders, truck, excavators) during construction hours 7am-7pm

ii. Will the proposed action remove existing natural barriers that could act as a noise barrier or screen? ☐ Yes ☑ No

Describe: _____

n. Will the proposed action have outdoor lighting? ☑ Yes ☐ No

If yes:

i. Describe source(s), location(s), height of fixture(s), direction/aim, and proximity to nearest occupied structures:

typical parking lot and building mounted area lighting

ii. Will proposed action remove existing natural barriers that could act as a light barrier or screen? ☐ Yes ☑ No

Describe: _____

o. Does the proposed action have the potential to produce odors for more than one hour per day? ☐ Yes ☑ No

If Yes, describe possible sources, potential frequency and duration of odor emissions, and proximity to nearest occupied structures: _____

p. Will the proposed action include any bulk storage of petroleum (combined capacity of over 1,100 gallons) or chemical products 185 gallons in above ground storage or any amount in underground storage? ☐ Yes ☑ No

If Yes:

i. Product(s) to be stored _____

ii. Volume(s) _____ per unit time _____ (e.g., month, year)

iii. Generally, describe the proposed storage facilities: _____

q. Will the proposed action (commercial, industrial and recreational projects only) use pesticides (i.e., herbicides, insecticides) during construction or operation? ☐ Yes ☐ No

*Residential mixed use project

If Yes:

i. Describe proposed treatment(s):

ii. Will the proposed action use Integrated Pest Management Practices? ☐ Yes ☑ No

r. Will the proposed action (commercial or industrial projects only) involve or require the management or disposal of solid waste (excluding hazardous materials)? ☐ Yes ☐ No

*Residential mixed use project

If Yes:

i. Describe any solid waste(s) to be generated during construction or operation of the facility:

- Construction: _____ tons per _____ (unit of time)
- Operation : _____ tons per _____ (unit of time)

ii. Describe any proposals for on-site minimization, recycling or reuse of materials to avoid disposal as solid waste:

- Construction: _____
- Operation: _____

iii. Proposed disposal methods/facilities for solid waste generated on-site:

- Construction: _____
- Operation: _____

s. Does the proposed action include construction or modification of a solid waste management facility? ☐ Yes ☑ No

If Yes:

i. Type of management or handling of waste proposed for the site (e.g., recycling or transfer station, composting, landfill, or other disposal activities): _____

ii. Anticipated rate of disposal/processing:

- _____ Tons/month, if transfer or other non-combustion/thermal treatment, or
- _____ Tons/hour, if combustion or thermal treatment

iii. If landfill, anticipated site life: _____ years

t. Will the proposed action at the site involve the commercial generation, treatment, storage, or disposal of hazardous waste? ☐ Yes ☑ No

If Yes:

i. Name(s) of all hazardous wastes or constituents to be generated, handled or managed at facility: _____

ii. Generally describe processes or activities involving hazardous wastes or constituents: _____

iii. Specify amount to be handled or generated _____ tons/month

iv. Describe any proposals for on-site minimization, recycling or reuse of hazardous constituents: _____

v. Will any hazardous wastes be disposed at an existing offsite hazardous waste facility? ☐ Yes ☐ No

If Yes: provide name and location of facility: _____

If No: describe proposed management of any hazardous wastes which will not be sent to a hazardous waste facility: _____

E. Site and Setting of Proposed Action

E.1. Land uses on and surrounding the project site

a. Existing land uses.

i. Check all uses that occur on, adjoining and near the project site.

☐ Urban ☐ Industrial ☑ Commercial ☑ Residential (suburban) ☐ Rural (non-farm)
☐ Forest ☐ Agriculture ☐ Aquatic ☐ Other (specify): _____

ii. If mix of uses, generally describe:

Commercial Fayetteville Towne Center, Medical Facility, and residential apartments

b. Land uses and covertypes on the project site.

Land use or Covertype	Current Acreage	Acreage After Project Completion	Change (Acres +/-)
• Roads, buildings, and other paved or impervious surfaces	0.0	11.0	+ 11.0
• Forested	0.0		
• Meadows, grasslands or brushlands (non-agricultural, including abandoned agricultural)	28.7	17.7	-11.0
• Agricultural (includes active orchards, field, greenhouse etc.)	0.0		
• Surface water features (lakes, ponds, streams, rivers, etc.)	23.5	23.5	0.0
• Wetlands (freshwater or tidal)	0.0		
• Non-vegetated (bare rock, earth or fill)	0.0		
• Other Describe: _____			

c. Is the project site presently used by members of the community for public recreation? ☐ Yes ☑ No

i. If Yes: explain: _____

d. Are there any facilities serving children, the elderly, people with disabilities (e.g., schools, hospitals, licensed day care centers, or group homes) within 1500 feet of the project site? ☑ Yes ☐ No

If Yes,

i. Identify Facilities:

Northeast Medical Center, Towne Center Retirement Community

e. Does the project site contain an existing dam? ☐ Yes ☑ No

If Yes:

i. Dimensions of the dam and impoundment:

- Dam height: _____ feet
- Dam length: _____ feet
- Surface area: _____ acres
- Volume impounded: _____ gallons OR acre-feet

ii. Dam's existing hazard classification: _____

iii. Provide date and summarize results of last inspection:

_____

f. Has the project site ever been used as a municipal, commercial or industrial solid waste management facility, or does the project site adjoin property which is now, or was at one time, used as a solid waste management facility? ☐ Yes ☑ No

If Yes:

i. Has the facility been formally closed? ☐ Yes ☐ No

- If yes, cite sources/documentation: _____

ii. Describe the location of the project site relative to the boundaries of the solid waste management facility:

_____

iii. Describe any development constraints due to the prior solid waste activities: _____

g. Have hazardous wastes been generated, treated and/or disposed of at the site, or does the project site adjoin property which is now or was at one time used to commercially treat, store and/or dispose of hazardous waste? ☐ Yes ☑ No

If Yes:

i. Describe waste(s) handled and waste management activities, including approximate time when activities occurred:

_____

h. Potential contamination history. Has there been a reported spill at the proposed project site, or have any remedial actions been conducted at or adjacent to the proposed site? ☐ Yes ☑ No

If Yes:

i. Is any portion of the site listed on the NYSDEC Spills Incidents database or Environmental Site Remediation database? Check all that apply: ☐ Yes ☑ No

☐ Yes – Spills Incidents database Provide DEC ID number(s): _____

☐ Yes – Environmental Site Remediation database Provide DEC ID number(s): _____

☐ Neither database

ii. If site has been subject of RCRA corrective activities, describe control measures: _____

iii. Is the project within 2000 feet of any site in the NYSDEC Environmental Site Remediation database? ☐ Yes ☑ No

If yes, provide DEC ID number(s): _____

iv. If yes to (i), (ii) or (iii) above, describe current status of site(s):

_____

v. Is the project site subject to an institutional control limiting property uses? ☐ Yes ☑ No

- If yes, DEC site ID number: _____
- Describe the type of institutional control (e.g., deed restriction or easement): _____
- Describe any use limitations: _____
- Describe any engineering controls: _____
- Will the project affect the institutional or engineering controls in place? ☐ Yes ☐ No
- Explain: _____

E.2. Natural Resources On or Near Project Site

a. What is the average depth to bedrock on the project site? 0 -15ft feet

b. Are there bedrock outcroppings on the project site? ☐ Yes ☑ No
If Yes, what proportion of the site is comprised of bedrock outcroppings? _____%

c. Predominant soil type(s) present on project site:

Cazenovia Silt Loam	5.0 %
Gravel pit	29.0 %
surface water	66.0 %

d. What is the average depth to the water table on the project site? Average: > 30ft feet

e. Drainage status of project site soils:
☑ Well Drained: 100 % of site
☐ Moderately Well Drained: _____% of site
☐ Poorly Drained _____% of site

f. Approximate proportion of proposed action site with slopes:
☑ 0-10%: 75 % of site
☑ 10-15%: 15 % of site
☑ 15% or greater: 10 % of site

g. Are there any unique geologic features on the project site? ☐ Yes ☑ No
If Yes, describe: _____

h. Surface water features.

i. Does any portion of the project site contain wetlands or other waterbodies (including streams, rivers, ponds or lakes)? ☑ Yes ☐ No

ii. Do any wetlands or other waterbodies adjoin the project site? ☑ Yes ☐ No

If Yes to either *i* or *ii*, continue. If No, skip to E.2.i.

iii. Are any of the wetlands or waterbodies within or adjoining the project site regulated by any federal, state or local agency? ☑ Yes ☐ No

iv. For each identified regulated wetland and waterbody on the project site, provide the following information:

- Streams: Name 899-222 Classification C
- Lakes or Ponds: Name 899-224.3 Classification C
- Wetlands: Name Federal waters, NYS wetlands Approximate Size _____
- Wetland No. (if regulated by DEC) SYE-22

v. Are any of the above water bodies listed in the most recent compilation of NYS water quality-impaired waterbodies? ☑ Yes ☐ No

If yes, name of impaired water body/bodies and basis for listing as impaired: _____
Limestone creek lower and minor tributaries - Pathogens, dissolved oxygen / oxygen demand, aesthetics.

i. Is the project site in a designated Floodway? ☐ Yes ☑ No

j. Is the project site in the 100-year Floodplain? ☑ Yes ☐ No

k. Is the project site in the 500-year Floodplain? ☐ Yes ☑ No

l. Is the project site located over, or immediately adjoining, a primary, principal or sole source aquifer? ☐ Yes ☑ No
If Yes:
i. Name of aquifer: _____

m. Identify the predominant wildlife species that occupy or use the project site: _____
squirrels, deer, birds _____ _____ _____
_____ _____ _____

n. Does the project site contain a designated significant natural community? ☐ Yes ☑ No
If Yes:
i. Describe the habitat/community (composition, function, and basis for designation): _____
_____
ii. Source(s) of description or evaluation: _____
iii. Extent of community/habitat:
- Currently: _____ acres
- Following completion of project as proposed: _____ acres
- Gain or loss (indicate + or -): _____ acres

o. Does project site contain any species of plant or animal that is listed by the federal government or NYS as endangered or threatened, or does it contain any areas identified as habitat for an endangered or threatened species? ☑ Yes ☐ No

If Yes:
i. Species and listing (endangered or threatened): _____
northern long-eared bat
_____

p. Does the project site contain any species of plant or animal that is listed by NYS as rare, or as a species of special concern? ☐ Yes ☑ No

If Yes:
i. Species and listing: _____
_____

q. Is the project site or adjoining area currently used for hunting, trapping, fishing or shell fishing? ☐ Yes ☑ No
If yes, give a brief description of how the proposed action may affect that use: _____
_____

E.3. Designated Public Resources On or Near Project Site

a. Is the project site, or any portion of it, located in a designated agricultural district certified pursuant to Agriculture and Markets Law, Article 25-AA, Section 303 and 304? ☐ Yes ☑ No
If Yes, provide county plus district name/number: _____

b. Are agricultural lands consisting of highly productive soils present? ☐ Yes ☑ No
i. If Yes: acreage(s) on project site? _____
ii. Source(s) of soil rating(s): _____

c. Does the project site contain all or part of, or is it substantially contiguous to, a registered National Natural Landmark? ☐ Yes ☑ No
If Yes:
i. Nature of the natural landmark: ☐ Biological Community ☐ Geological Feature
ii. Provide brief description of landmark, including values behind designation and approximate size/extent: _____
_____
_____

d. Is the project site located in or does it adjoin a state listed Critical Environmental Area? ☐ Yes ☑ No
If Yes:
i. CEA name: _____
ii. Basis for designation: _____
iii. Designating agency and date: _____

e. Does the project site contain, or is it substantially contiguous to, a building, archaeological site, or district which is listed on the National or State Register of Historic Places, or that has been determined by the Commissioner of the NYS Office of Parks, Recreation and Historic Preservation to be eligible for listing on the State Register of Historic Places? ☑ Yes ☐ No

If Yes:

i. Nature of historic/archaeological resource: ☐ Archaeological Site ☑ Historic Building or District

ii. Name: Eligible property: Limestone Creek aqueduct & crossover bridge

iii. Brief description of attributes on which listing is based: _____

f. Is the project site, or any portion of it, located in or adjacent to an area designated as sensitive for archaeological sites on the NY State Historic Preservation Office (SHPO) archaeological site inventory? ☐ Yes ☑ No

g. Have additional archaeological or historic site(s) or resources been identified on the project site? ☐ Yes ☑ No

If Yes:

i. Describe possible resource(s): _____

ii. Basis for identification: _____

h. Is the project site within fives miles of any officially designated and publicly accessible federal, state, or local scenic or aesthetic resource? ☑ Yes ☐ No

If Yes:

i. Identify resource: Erie Canal Trail

ii. Nature of, or basis for, designation (e.g., established highway overlook, state or local park, state historic trail or scenic byway, etc.): State trail

iii. Distance between project and resource: 0.5 miles.

i. Is the project site located within a designated river corridor under the Wild, Scenic and Recreational Rivers Program 6 NYCRR 666? ☐ Yes ☑ No

If Yes:

i. Identify the name of the river and its designation: _____

ii. Is the activity consistent with development restrictions contained in 6NYCRR Part 666? ☐ Yes ☐ No

F. Additional Information

Attach any additional information which may be needed to clarify your project.

If you have identified any adverse impacts which could be associated with your proposal, please describe those impacts plus any measures which you propose to avoid or minimize them.

G. Verification

I certify that the information provided is true to the best of my knowledge.

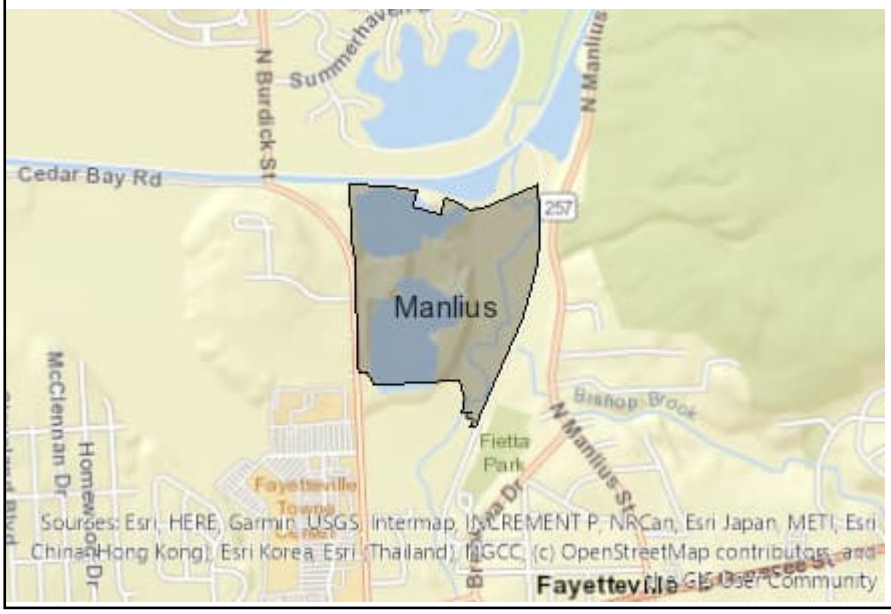
Applicant/Sponsor Name CHA Consulting Inc (c/o Brian Bouchard) Date 7/31/23

Signature _____ Title Project Engineer

PRINT FORM

EAF Mapper Summary Report

Monday, July 31, 2023 3:07 PM



Disclaimer: The EAF Mapper is a screening tool intended to assist project sponsors and reviewing agencies in preparing an environmental assessment form (EAF). Not all questions asked in the EAF are answered by the EAF Mapper. Additional information on any EAF question can be obtained by consulting the EAF Workbooks. Although the EAF Mapper provides the most up-to-date digital data available to DEC, you may also need to contact local or other data sources in order to obtain data not provided by the Mapper. Digital data is not a substitute for agency determinations.

B.i.i [Coastal or Waterfront Area]	No
B.i.ii [Local Waterfront Revitalization Area]	No
C.2.b. [Special Planning District]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h [DEC Spills or Remediation Site - Potential Contamination History]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.i [DEC Spills or Remediation Site - Listed]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.i [DEC Spills or Remediation Site - Environmental Site Remediation Database]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.iii [Within 2,000' of DEC Remediation Site]	No
E.2.g [Unique Geologic Features]	No
E.2.h.i [Surface Water Features]	Yes
E.2.h.ii [Surface Water Features]	Yes
E.2.h.iii [Surface Water Features]	Yes - Digital mapping information on local and federal wetlands and waterbodies is known to be incomplete. Refer to EAF Workbook.
E.2.h.iv [Surface Water Features - Stream Name]	899-222
E.2.h.iv [Surface Water Features - Stream Classification]	C
E.2.h.iv [Surface Water Features - Lake/Pond Name]	899-224.3
E.2.h.iv [Surface Water Features - Lake/Pond Classification]	C
E.2.h.iv [Surface Water Features - Wetlands Name]	Federal Waters, NYS Wetland

E.2.h.iv [Surface Water Features - Wetlands Size]	NYS Wetland (in acres):892.6
E.2.h.iv [Surface Water Features - DEC Wetlands Number]	SYE-22
E.2.h.v [Impaired Water Bodies]	Yes
E.2.h.v [Impaired Water Bodies - Name and Basis for Listing]	Name - Pollutants - Uses:Limestone Creek, Lower, and minor tribs – Pathogens;D.O./Oxygen Demand;Aesthetics – Recreation;Aquatic Life
E.2.i. [Floodway]	Yes
E.2.j. [100 Year Floodplain]	Yes
E.2.k. [500 Year Floodplain]	Yes
E.2.l. [Aquifers]	No
E.2.n. [Natural Communities]	No
E.2.o. [Endangered or Threatened Species]	Yes
E.2.o. [Endangered or Threatened Species - Name]	Northern Long-eared Bat
E.2.p. [Rare Plants or Animals]	No
E.3.a. [Agricultural District]	No
E.3.c. [National Natural Landmark]	No
E.3.d [Critical Environmental Area]	No
E.3.e. [National or State Register of Historic Places or State Eligible Sites]	Yes - Digital mapping data for archaeological site boundaries are not available. Refer to EAF Workbook.
E.3.e.ii [National or State Register of Historic Places or State Eligible Sites - Name]	Eligible property:LIMESTONE CREEK AQUEDUCT & CROSSOVER BRIDGE
E.3.f. [Archeological Sites]	No
E.3.i. [Designated River Corridor]	No

GRANT OF EASEMENT

TOWN OF MANLIUS, having an address at **301 Brooklea Drive**, **Fayetteville**, **New York 13066** (hereinafter referred to as "Grantor"), is the owner of that certain parcel of real property commonly known as **5701 Bowman Road** located in the Town of **Manlius**, County of **Onondaga** in the State of New York, identified on the tax maps of the County of **Onondaga** as Section **074**/Block **01**/Lot **06.1** (SBL **#074.-01-06.1**) **FL 53 & 64** and pursuant to that certain deed recorded with the County Clerk of the County of **Onondaga** on **12/31/1975** in Liber **2571** at Page **863,** that certain deed recorded with the County Clerk of the County of **Onondaga** on **12/31/1986** in Liber **3321** at Page **232,** Instrument **#1986-00018808,** that certain deed recorded with the County Clerk of the County of **Onondaga** on **04/10/1958** in Liber **1899** at Page **347,** and that certain deed recorded with the County Clerk of the County of **Onondaga** on **04/10/1958** in Liber **1899** at Page **351** (the "Grantor's Land"), and Grantor, for consideration in the amount of One Dollar ($1.00) and other valuable considerations, the receipt and sufficiency of which are hereby acknowledged, hereby grants to **NIAGARA MOHAWK POWER CORPORATION**, a New York corporation, having an address at 300 Erie Boulevard West, Syracuse, New York 13202 and **VERIZON** having an address at **140 West Street, New York, New York 10007** (hereinafter collectively referred to as "Grantees"), for Grantees and their lessees, licensees, successors, and assigns a perpetual and nonexclusive easement and right of way through, over, across, under and upon the Grantor's Land (the "Easement") under the following terms and conditions.

Section 1 – Description of the Easement. The Easement provides the Grantees with the right, privilege, and authority to:

a. construct, reconstruct, relocate, extend, repair, maintain, operate, inspect, patrol, and, at their pleasure, remove any poles or lines of poles, supporting structures, cables, crossarms, overhead and underground wires, guys, guy stubs, insulators, transformers, braces, fittings, foundations, anchors, lateral service lines, communications facilities, and other fixtures and appurtenances (collectively, the "Facilities"), which the Grantees shall require now and from time to time, for the transmission and distribution of high and low voltage electric current and for the purpose of transmitting intelligence and communication data, by any means, whether now existing or hereafter devised, for public or private use, in, through, upon, over, under, and across that certain portion of the Grantor's Land described in Section 2 below (the "Easement Area"), and any highways abutting or running through the Grantor's Land, and to renew, replace, remove, add to, and otherwise change the Facilities and each and every part thereof and the location thereof within the Easement Area, and utilize the Facilities within the Easement Area for the purpose of providing service to the Grantor and others; and

b. from time to time, without further payment therefor, to clear the Easement Area of obstructions or structures, and clear and keep cleared the Easement Area by physical and/or mechanical means, of any and all brush, trees, limbs, branches, roots, vegetation, or other obstructions; and

c. from time to time, without further payment therefor, to clear and keep cleared by physical and/or mechanical means, the Grantor's Land beyond the bounds of the Easement Area, of any and all trees, limbs, branches, roots or vegetation that, in the sole judgment of the Grantees, due to species or structural defects or their tall growing nature, are likely to fall into or encroach upon the Easement Area or interfere in any way with the safe and reliable operation of Grantees' existing or proposed Facilities; and

d. excavate or change the grade of the Grantor's Land as is reasonable, necessary, and proper for any and all purposes described in this Easement; provided, however, that the Grantees will, upon completion of the work, backfill and restore any excavated areas to reasonably the same condition as existed prior to such excavation; and

e. pass and repass on foot and with vehicles and equipment, along, over, across and upon the Easement Area and the Grantor's Land in order to access the Easement Area and construct, reconstruct, relocate, use, and maintain roads, paths, causeways, and ways of access to and from the Easement Area as is reasonable and necessary in order to exercise to the fullest extent the Easement.

Section 2 – Location of the Easement Area. The "Easement Area" shall consist of a portion of the Grantor's Land twenty (20) feet in width throughout its extent, the centerline of the Easement Area being the centerline of the Facilities. The general location of the Easement Area is shown on the sketches entitled, **"Easement Sketch - Exhibit A, WR #11-23-30267687"** and **"Easement Sketch - Exhibit A, WR #11-23-30634008",** which sketches are attached hereto as Exhibit A and recorded herewith. The final and definitive location(s) of the Easement Area shall become established by and upon the final installation and erection of the Facilities by the Grantees in substantial compliance with Exhibit A hereto.

Section 3 – Facilities Ownership. It is agreed that the Facilities shall remain the property of the Grantees, their successors and assigns.

Section 4 – General Provisions. The Grantor, for itself, its heirs, legal representatives, successors, and assigns, hereby covenants and agrees with the Grantees that no act will be permitted within the Easement Area which is inconsistent with the Easement hereby granted; no buildings or structures, or replacements thereof or additions thereto, swimming pools, or obstructions will be erected or constructed above or below grade within the Easement Area; no trees shall be grown, cultivated, or harvested, and no excavating, mining, or blasting shall be undertaken within the Easement Area without the prior written consent of the Grantees; the Easement shall not be modified nor the Easement Area relocated by the Grantor without the Grantees' prior written consent; the present grade or ground level of the Easement Area will not be changed by excavation or filling; the Grantees shall quietly enjoy the Grantor's Land; and the Grantor will forever warrant title to the Grantor's Land.

The Grantees, their successors and assigns, are hereby expressly given and granted the right to assign this Easement, or any part thereof, or interest therein, and the same shall be divisible between or among two or more owners, as to any right or rights created hereunder, so that each assignee or owner shall have the full right, privilege, and authority herein granted, to be owned and enjoyed either in common or severally. This Grant of Easement shall at all times be deemed to be and shall be a continuing covenant running with the Grantor's Land and shall inure to and be binding upon the successors, heirs, legal representatives, and assigns of the parties named in this Grant of Easement.

IN WITNESS WHEREOF, the Grantor has duly executed this Grant of Easement under seal this _____ day of _____, 2023.

TOWN OF MANLIUS

By: _____
(signature)

Name: _____
(printed)

Its: _____
(title)

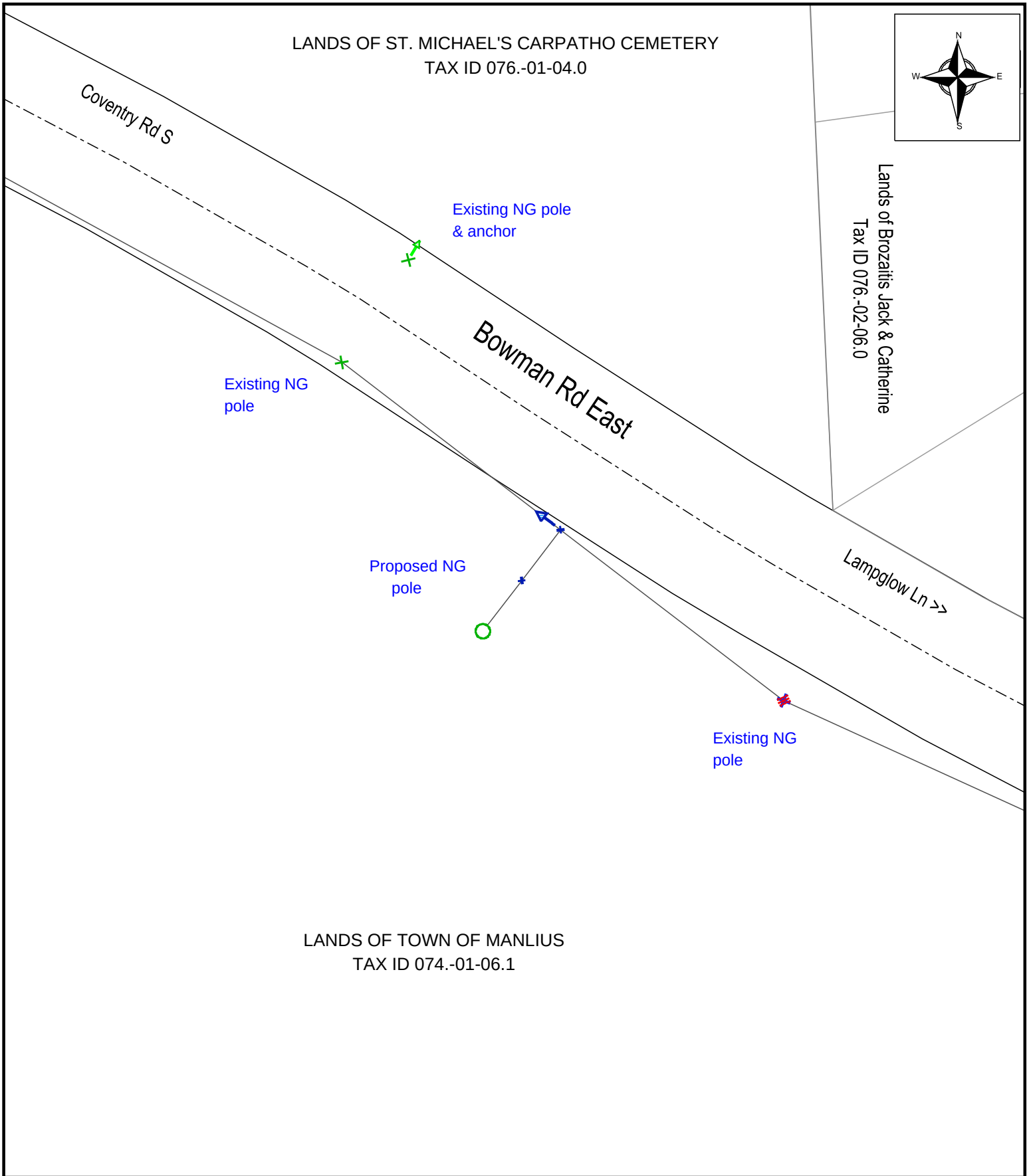
State of _____)
) ss:
County of _____)

On the ____ day of _____ in the year 2023, before me, the undersigned, personally appeared _____ , personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument

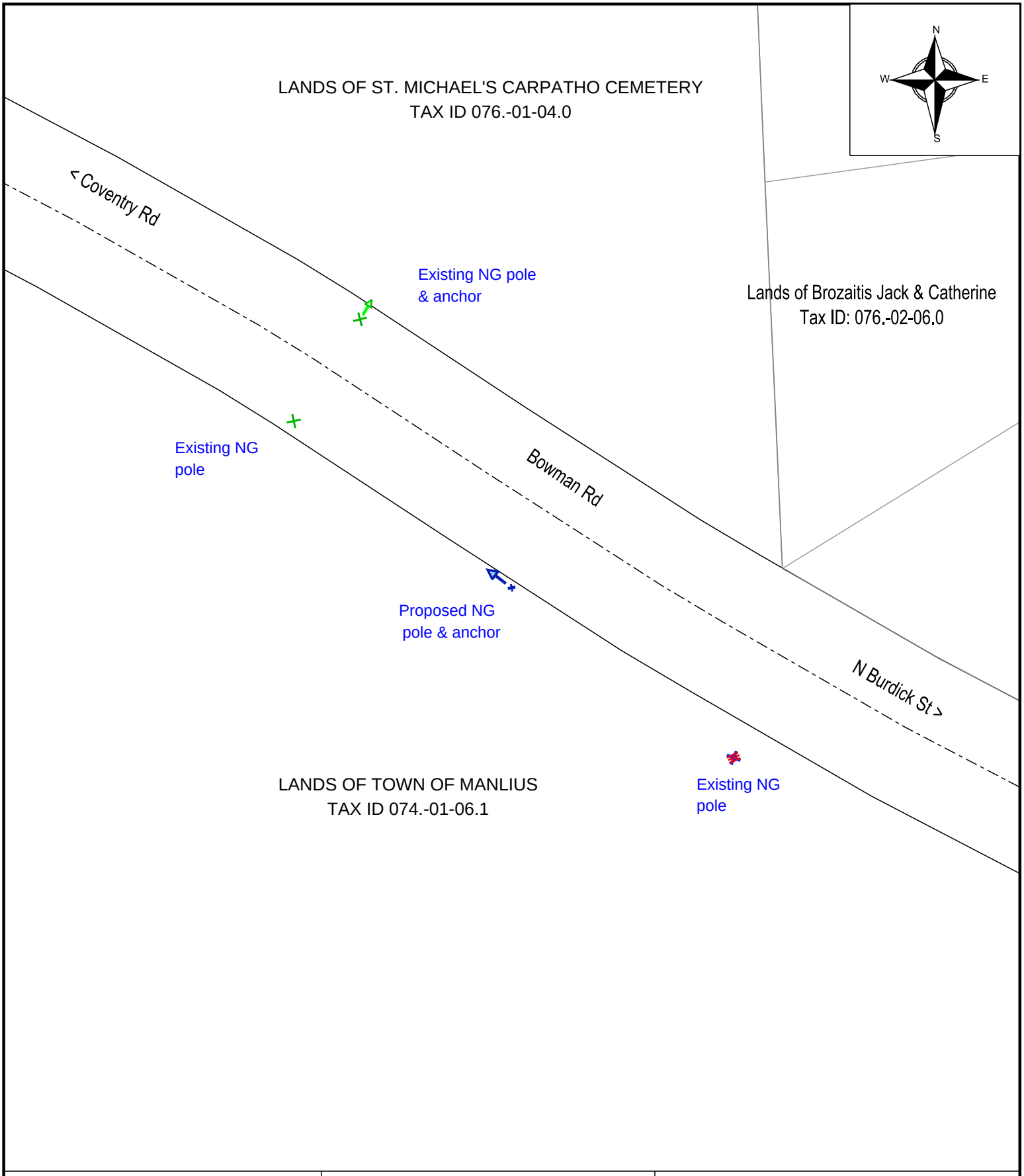
_____
Notary Public

RETURN TO:

National Grid
Attention: Michelle Trentmann
Right of Way, D-Mezz.
300 Erie Boulevard West
Syracuse, NY 13202



	EASEMENT SKETCH - EXHIBIT A	NOT TO SCALE
DESIGNER: Villnave, Douglas DATE: 07/07/2023 WORK ORDER #: 11-23-30267687	LANDS OF TOWN OF MANLIUS 5701 BOWMAN ROAD TOWN OF MANLIUS, NEW YORK ONONDAGA COUNTY SBL: 074.-01-06.1	nationalgrid SHEET 1 OF 1



EASEMENT #:	EASEMENT SKETCH - EXHIBIT A	NOT TO SCALE
DESIGNER: Villnave, Douglas DATE: 02/15/2023 WORK ORDER #: 11-23-30634008	LANDS OF TOWN OF MANLIUS 5701 BOWMAN ROAD TOWN OF MANLIUS, NEW YORK ONONDAGA COUNTY SBL: 074.-01-06.1	nationalgrid SHEET 1 OF 1

IN THE MATTER Of ESTABLISHING A SPECIAL ELECTION	RESOLUTION

The **TOWN BOARD OF THE TOWN OF MANLIUS**, in the County of Onondaga, State of New York, met in regular session at the Town Hall in the Town of Manlius, located at 301 Brooklea Drive in the Village of Fayetteville, County of Onondaga, State of New York, and virtually on the platform commonly referred to as Zoom, the Town Facebook page and YouTube on the 23rd of August, 2023, at 6:30 p.m.

The meeting was called to order by John T. Deer, Supervisor, and the following were present, namely:

John T. Deer	Supervisor
Sara Bollinger	Councilor
Elaine Denton	Councilor
Alissa Italiano	Councilor
Katelyn M. Kriesel	Councilor
William Nicholson	Councilor
Heather Allison Waters	Councilor

The following resolution was moved, seconded and adopted:

WHEREAS, on July 14, 2023, a petition (the "Petition") was filed with Town Clerk of the Town of Manlius (the "Town Clerk") to establish a ward system in the Town of Manlius (the "Town");

WHEREAS, on August 4, 2023, the Town Clerk issued a letter stating that the Petion met the standards required under Election Law of nominating petitions and indicated to the Town Board that a special election shall be held within 60 to 75 days of the filing of the Petition;

WHEREAS, the 60 to 75 day period falls within September 12 – September 27, 2023; and

WHEREAS, after discussing with the Onondaga County Board of Elections when the voting machines will be available, September 23, 2023 is the date that works the best for the availability of the machines; and

WHEREAS, the Town Board wishes to establish the date, time and location for a special election to consider the question of establishing a ward system in the Town on September 23, 2023 (the "Special Election"), and, to set forth the parameters of the Special Election.

NOW, THEREFORE BE IT RESOLVED, that:

1. The Special Election shall be held on September 23, 2023.

2. The Proposition before the voters, as set forth on the Petion, shall be:

"Shall a ward system be established in the Town of Manlius for the election of town councilors?"

3. The polling place for the Proposition shall be Manlius Town Hall, 301 Brooklea Drive, Fayetteville, New York 13066.

4. The time the polling place shall be open shall be from 9:00 am to 5:00 pm.

5. The Special Election shall be noticed in accordance with the provisions of New York Town Law Section 82 by the Town Clerk by causing to be published in a newspaper published in the Town a notice specifying the time when and place where the Special Election will be held, the hours during which the polls will remain open for the purpose of receiving ballots and setting forth in full the proposition to be voted on (the "Special Election Notice"). The Special Election Notice shall be published no later than September 13, 2023. In addition, the Town Clerk shall post or cause to be posted a copy of the Special Election Notice on the sign-board of the Town at Town Hall no later than September 13, 2023.

6. The Town shall allocate the necessary funds to pay the cost of the Special Election and hereby designates the Onondaga County Board of Elections (the "Board of Elections") to administer the Special Election in accordance with the relevant provisions of New York State law. Notwithstanding the foregoing, the Town Board shall appoint the election inspectors and ballot clerks for the Special Election based on the advice and counsel of the County Board of Elections and through the existing election inspectors and ballot clerk's list it maintains.

7. The Town hereby establishes the Board of Registration (with two to four members to be appointed by the Town Board and based on the advice and counsel of the County Board of Elections and through the existing election inspectors and ballot clerk's list maintained at the Board of Elections) (the "Board of Registration"). The members of the Board of Registration will be appointed at a special meeting to be held on September 6th, 2023 at 6:30 pm at Manlius Town Hall, 301 Brooklea Drive, Fayetteville, New York. The Board of Registration shall meet at Manlius Town Hall, 301 Brooklea Drive, Fayetteville, New York on September 8th, 2023 from 2:00 pm to 6:00 pm, September 9th, 2023 from 10:00 am to 2:00 pm, and September 11th, 2023 from 10:00 am to 2:00 pm (the "Board of Registration Dates"). The purpose of the Board of Registration and the Board of Registration Dates shall be to prepare a register of voters of the Town qualified to vote in the Special Election (the "Register").

8. Prior to the first meeting of the Board of Registration, the Town Clerk shall (i) no later than August 30th, 2023 (a) cause to be published in a newspaper published in the Town a notice specifying the place and hours during which the Board of Registration shall meet for the purpose of preparing a register of qualified voters of the Town for the Special Election (the "Board of Registration Notice"), and (b) cause to be posted in five conspicuous places in the Town the Board of Registration Notice, and (ii) no later than August 31, 2023, obtain from the Board of Elections the list of names and addresses of all voters registered with the Board of Elections in the Town and shall turn the List over to the Board of Registration prior to their first meeting.

9. The Board of Registration shall compile the Register which shall consist of the following: (i) the names of all qualified voters and all other qualified voters who personally appear before the Board of Registration to register for the Special Election, (ii) those military voters; (iii) other voters who are absent by reason of confining illness or physical disability or whose duties, occupation or business required them to be outside of the State of New York, having the qualifications prescribed in this Paragraph and who have made application for absentee ballots as certified to them by the Town Clerk; and (iv) the names and addresses of all voters registered with the Board of Elections in the Town. The Register shall include, at a minimum, a space for the name of the voter and his or her address within the Town, a space for the voter's signature to be signed on the day of the election and a space in which there shall be entered the qualifications for voters. All the provisions of Election Law in relation to the registration of voters shall, so far as applicable, apply to the registration

provided for by this Paragraph, except that no person shall be entitled to vote in the Special Election if their name does not appear in the Register.

10. The Register shall immediately upon its completion (and no more than eighteen hours thereafter) be filed in the Town Clerk's Office and shall be open, at all reasonable times, to inspection by any qualified voter of the Town on each day up to and including the day next preceding the day set forth for the Special Election. The Register shall be completed no later than September 13, 2023.

11. Absentee voting shall be allowed for the Special Election and shall be coordinated with the Board of Elections. The Town Clerk is hereby authorized and directed to work with the Board of Elections to prepare the necessary documents to issue absentee ballots and rely on its expertise in processing the absentee ballots and spend the necessary funds to coordinate this effort. Notwithstanding the foregoing, an application for an absentee ballot must be received by the Town Clerk (i) at least seven days before the election if the ballot is to be mailed to the voter, or (ii) at the day before the election if the ballot is to be personally delivered to the voter or his or her agent. For an absentee ballot to be eligible for the Special Election, all absentee ballots shall be received by the Town Clerk no later than 5:00 P.M. on September 23, 2023. The Town Clerk shall, on the day of the Special Election, transmit all absentee voters' envelopes, received by her, to the inspectors of election.

12. The Town Clerk shall make a list of all persons to whom absentee voter's ballots have been issued and keep such list on file in her office where it shall be available for public inspection during regular office hours until the day of the Special Election. Any qualified voter may, upon examination of such list, file a written challenge of the qualifications as a voter of any person whose name appears on such list, stating the reasons for such challenge. Such written challenge shall be transmitted by the Town Clerk to the election inspectors on September 23, 2023. Such list shall also be posted in a conspicuous place during the Special Election, and any qualified voter may challenge the acceptance of the absentee voter's ballot of any person on such list, by making his or her challenge and the reasons therefor known to the election inspectors before the close of the polls. All other provisions of Town Law Section 84-a shall also apply to absentee ballots.

13. Upon the closing of the polls on September 23, 2023, the election inspectors shall proceed to canvass the votes thereat and shall complete such canvass without adjournment. As soon as possible after completion, the inspectors shall file with the Town Clerk a certificate setting forth the holding of the election, the total number of votes cast upon the proposition and the number of votes cast for an against the proposition, together with the name and address of every person voting at such election upon such proposition.

14. Aside from the notice requirements of Town Law (as set forth herein this Resolution), the Town Supervisor is hereby authorized to expend the necessary funds to undertake a community outreach effort to inform the Town electors about the Special Election.

15. The Town Supervisor is hereby authorized to take all steps necessary to ensure the Special Election shall take place pursuant to Town Law and Election Law and hereby has the authority to enter into an agreement with the Board of Elections to administer the Special Election pursuant to this Resolution.

16. The Town Board hereby further authorizes the Town Supervisor to work with the Board of Elections to make provision at the Special Election for affidavit ballots under the same terms, conditions and regulations allowed for under New York State Law.

I, ALLISON WEBER, Town Clerk of the Town of Manlius, **DO HEREBY CERTIFY** that the preceding Resolution was duly adopted by the Town Board of the Town of Manlius at a regular meeting of the Board duly called and held on the 23rd day of August 2023; that said Resolution was entered in the minutes of said meeting; that I have compared the foregoing copy with the original thereof now on file in my office; and that the same is a true and correct transcript of said Resolution and of the whole thereof.

I FURTHER CERTIFY that all members of said Board had due notice of said meeting.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Town of Manlius, this 23rd day of August, 2023.

DATED: **August 23, 2023**
Fayetteville, New York

_____
Allison Weber
Town Clerk of the Town of Manlius
Onondaga County, New York

/IN THE MATTER

Of

ESTABLISHING A SPECIAL ELECTION

RESOLUTION

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The meeting was called to order by John T. Deer, Supervisor, and the following were present, namely:

John T. Deer	Supervisor
Sara Bollinger	Councilor
Elaine Denton	Councilor
Alissa Italiano	Councilor
Katelyn M. Kriesel	Councilor
William Nicholson	Councilor
Heather Allison Waters	Councilor

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7. The Town hereby establishes the Board of Registration (with two to four members to be appointed by the Town Board and based on the advice and counsel of the County Board of Elections and through the existing election inspectors and ballot clerk's list maintained at the Board of Elections) (the "Board of Registration"). The members of the Board of Registration will be appointed at a special meeting to be held on September 6th, 2023 at 6:00 pm at Manlius Town Hall, 301 Brooklea Drive, Fayetteville, New York. The Board of Registration shall meet at Manlius Town Hall, 301 Brooklea Drive, Fayetteville, New York on September 8th, 2023 from 2:00 pm to 6:00 pm, September 9th, 2023 from 10:00 am to 2:00 pm, and September 11th, 2023 from 10:00 am to 2:00 pm (the "Board of Registration Dates"). The purpose of the Board of Registration and the Board of Registration Dates shall be to prepare a register of voters of the Town qualified to vote in the Special Election (the "Register").

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I, ALLISON WEBER, Town Clerk of the Town of Manlius, **DO HEREBY CERTIFY** that the preceding Resolution was duly adopted by the Town Board of the Town of Manlius at a regular meeting of the Board duly called and held on the 23rd day of August 2023; that said Resolution was entered in the minutes of said meeting; that I have compared the foregoing copy with the original thereof now on file in my office; and that the same is a true and correct transcript of said Resolution and of the whole thereof.

I FURTHER CERTIFY that all members of said Board had due notice of said meeting.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Town of Manlius, this 23rd day of August, 2023.

DATED: **August 23, 2023**
Fayetteville, New York

Allison Weber
Town Clerk of the Town of Manlius
Onondaga County, New York

AMENDED AND RESTATED
AGREEMENT PURSUANT TO SECTION 119-0
OF THE GENERAL MUNICIPAL LAW

THIS AGREEMENT, as amended and restated with respect to the Agreement entered into the 26th day of September, 1984 by and between the VILLAGE OF FAYETTEVILLE, with offices at 425 East Genesee Street, Fayetteville, New York; the VILLAGE OF MANLIUS, with offices at Manlius Village Center, One Arkie Albanese Avenue Manlius, New York; the VILLAGE OF MINOA, with offices at 213 Osborne Street, Minoa, New York; and the TOWN OF MANLIUS, with offices at 301 Brooklea Drive, Fayetteville New York, (hereinafter collectively referred to as the "Municipalities").

WITNESSETH:

WHEREAS, the Municipalities have previously entered into an agreement pursuant to Section 119-0 of the General Municipal Law on September 26, 1984 to ensure police services would be provided for all of their citizens; and

WHEREAS, there have been subsequent amendments to the General Municipal Law that affect provisions of the 1984 agreement; and

WHEREAS, it is in the best interests of the Municipalities to amend the 1984 agreement to ensure it complies with New York State law; and

WHEREAS, the Municipalities have agreed that police services continue to be a vital function of municipal government, which service has come to be expected by all the citizens in the Town and Villages; and

WHEREAS, the Village of Fayetteville, the Village of Manlius; the Village of Minoa have previously taken steps to abolish their existing police forces in favor of a consolidated police department under the administrative authority of the Town of Manlius for the benefit of all the Municipalities; and

WHEREAS, the Municipalities each have the power to provide police services individually; and

WHEREAS, it is in the best interests of all the citizens of the Municipalities for the Municipalities to work cooperatively to ensure that police services are adequately provided throughout the Town and in the Villages; and

WHEREAS, the following provisions have been duly approved by a majority vote of the Town Board of the Town and by a majority vote of the Board of Trustees of each Village, each having respectively authorized their representatives to execute this Agreement as set forth below;

NOW, THEREFORE, the Municipalities agree as follows;

1. The Municipalities will work cooperatively to ensure that police services are provided to their citizens through the Town of Manlius Police Department (hereinafter "Department").

2. The Police Committee will convene bi-monthly, or more often as it deems appropriate, to serve as a mechanism by which the Department and the Municipalities can share information, answer questions, and develop policy, as a Committee, for the Chief of Police. The Police Committee will consist of five members, one appointed by the Village of Fayetteville, one appointed by the Village of Manlius, one appointed by the Village of Minoa, and two appointed by the Town of Manlius. Committee members will serve at the pleasure of their appointing municipality without compensation.

3. The responsibilities of the Police Committee are as follows:

a. To understand the rules and regulations of the Department, and to provide input on the content and enforcement of said rules and regulations when appropriate;

b. To provide input as to the conduct of disciplinary hearings and as to the issues raised thereat as they relate to the operation of the Department, all in accordance with law and applicable labor contracts;

c. To make recommendations about the Department's personnel matters, including, but not limited to, the manner of employing, engaging, transferring, or discharging necessary personnel, subject to applicable provisions of law and in relation to the individual needs of the Municipalities;

d. To provide input and recommendations to the Town Board regarding employing and discharging the Chief of the Police Department, in accordance with law and as the Committee members deem necessary, and to the extent practicable to provide input as to the employment and discharge of such other officers, patrolmen, and personnel as may be needed including the amount of their compensation within available appropriations;

e. To review the annual budget of the Department as submitted by Chief of Police and make recommendations to approve or amend said budget to the Supervisor of the Town of Manlius, with revisions as the Committee deems appropriate on or before September 10 of each year;

f. To make recommendations for the purchase and contracts in the name of the Town, on behalf of the Department, for equipment, supplies and such other personal and real property as is needed by the Department, within available appropriations;

g. To submit recommendations, in its discretion, as to permitting attendance by employees of the Department at conventions, conferences, and schools and to approve the payment of travel and other expenses incurred in the performance of official duties, within available appropriations;

h. To make such recommendations to the Town Board of the Town of Manlius as the Committee shall deem advisable regarding matters relating to the Department; and

i. To formulate such rules of procedure or otherwise for the conduct of its business as the Committee shall deem necessary.

4. For all purposes, including but not limited to bonding, filing of oaths and resignations, membership in a retirement system, and receiving employee benefits, the employees of the Department shall be deemed to be employees of the Town.

5. The Chief of Police shall be responsible for the development and administration of the rules and regulations of the Department and shall direct the day-to day operations of the Department, including scheduling and assignment of duties, evaluation and discipline of personnel, and recruitment of prospective employees. The Chief of Police shall be responsible for preparation of the Department budget and for operation of the Department within the budget, as adopted. The Chief of Police shall also be responsible for keeping the records and making the reports of the Department, except as otherwise provided herein.

6. The Town Board of the Town of Manlius shall assume responsibility for all budgetary and financial matters relating to the operation of the Department. Revenue for the Department will be raised through the general town tax. All such revenues will be collected by the Chief Fiscal Officer of the Town of Manlius, who shall receive deposits and invest moneys in the name of the Department in depositories or institutions as authorized by law.

7. The Town Supervisor shall notify the Mayor of each Village, as soon as practicable, of any pending changes to the status of the Police Chief including, but not limited to, resignation, suspension, discharge, or disciplinary action, so that the Committee may provide input and recommendations to the Town regarding such matters.

8. The Chief Fiscal Officer shall make payments of Department moneys, in accordance with law, only upon audit of the Town.

9. The Chief Fiscal Officer of the Town of Manlius will keep such records and make such reports as are required by law, including those required by Article Three of the General Municipal Law.

10. Gifts, grants, or bequests to the Department shall be accepted by the Town Board, in its discretion, and applied to the account established for the operation of the Department.

11. The Town shall respond to any claim arising out of the operation of the Department and will maintain appropriate liability insurance covering the activities of the Department.

12. An annual budget for the Department will be prepared by the Chief of Police and submitted to the Police Committee on or before August 10th of each year. The Police Committee will review the Chief's proposal and submit it to the Supervisor of the Town of Manlius, with such recommendations as it deems necessary, on or before September 10th of each year. The Supervisor will then prepare and submit his budget as required by law.

13. The Municipalities will do everything in their power that is necessary to effectuate the intent of this Agreement in a continuing spirit of cooperation. The Town of Manlius will allocate sufficient funds to ensure the proper operation of the Department, including, but not limited to, moneys necessary to compensate needed personnel, to purchase proper equipment, uniforms, and any other necessary property, real or personal, and to provide for travel or other expenses incurred in the performance of official duties. The Town may also provide, on the written request of the Police Committee, sufficient funds to pay the costs of the Committee's work.

14. The term of this Agreement shall be five (5) years. Any Municipality which chooses to withdraw from this Agreement may do so on sixty days' written notice to the other participating Municipalities.

15. This Agreement will be effective upon execution by all of the Municipalities.

16. This Agreement shall be interpreted in accordance with the laws of the State of New York. It shall be interpreted liberally so as to effectuate the intent of the parties to cooperatively ensure

police services for all of their citizens. In the event that any Section of this Agreement shall be held to be invalid by any competent court, this Agreement shall be interpreted as if such invalid Sections were not contained herein.

17. This Agreement embodies the entire understanding of the parties. There are no promises, terms, conditions, or obligations other than those contained herein. This Agreement shall supersede all previous communications, representations, or agreements, either verbal or written, between the parties hereto. This Agreement may not be modified except by written agreement executed by all the participating Municipalities.

VILLAGE OF FAYETTEVILLE

_____

By: Mark A. Olson, Mayor

VILLAGE OF MANLIUS

_____

By: Paul Whorrall, Mayor

VILLAGE OF MINOA

_____

By: William F. Brazill, Mayor

TOWN OF MANLIUS

_____

By: John T, Deer, Supervisor

Special Patrol Officer Agreement Between the Town of Manlius and the East Syracuse Minoa Central School District

This Special Patrol Officer Agreement (the "Agreement") is made as of the 1st day of September, 2023, by and between the Town of Manlius by and through its Police Department, a municipal corporation situated in the County of Onondaga, State of New York, whose principal address is 1 Arkie Albanese Ave., Manlius, New York (the "Town'); and the East Syracuse Minoa Central School District, of the County of Onondaga and State of New York, a municipal corporation whose principal address is 407 Fremont Road, East Syracuse, New York (the "School District"). The Town of Manlius Police Department ("Police Department') is a specific department within the Town's government structure and does not constitute a separate entity or party to the Agreement. However, the Police Department will have primary responsibility for carrying out the duties and obligations set forth in this Agreement on behalf of the Town.

WHEREAS, Article 5-G of the New York State's General Municipal Law ("GML") provides the authority for "municipal corporations" to enter into agreements for the performance between themselves, or one for the other, of their respective functions, powers and duties on a cooperative contract basis, and

WHEREAS, the School District and the Town are both deemed to be "municipal corporations" as that term is defined by GML 119-n(a); and

WHEREAS, the School District and the Town have determined that it is in their mutual best interests to enter into this Agreement to provide for the assignment of dedicated officers of the Manlius Police Department to serve as Special Patrol Officer(s) in the School District.

NOW, THEREFORE, the parties hereby agree as follows:

1.0 TERM OF AGREEMENT

1.1 This Agreement is for the academic school year of 2023-2024 and begins on September 1, 2023 and expires on June 30, 2024, without notice, unless terminated earlier as provided in this Agreement (the "Term").

2.0 General Terms and Conditions

2.1 The Town and School District have voluntarily chosen to enter into the Agreement in order to have Peace Officer(s) placed within the School District.

2.2 These Peace Officer(s) shall be referred to under this Agreement as Special Patrol Officers ("SPOs'). For the purposes of this Agreement, the term "SPO" shall include those officers specifically selected for (and assigned to) the Schools for a specific academic year. SPOs will be responsible to serve and perform the job duties described herein, to the extent consistent with the parties overall objectives and responsibilities described herein (collectively "SPO Services').

2.3 The SPO assignment is intended to be a daytime assignment to be performed Monday through Friday, eight (8) hours per day concurrent with the school day and the School District's academic calendar, The SPO worksite shall include the SPOs assigned School, as well as any other associated buildings and grounds on the assigned school premise. Occasionally, the SPOs may be temporarily assigned to other schools within the School District on an as-needed basis.

2.4 The Town agrees that the SPO Services rendered under this Agreement will be in compliance with applicable federal, state, or local laws, rules and regulations pertaining to the Town's provision of services under an inter-municipal agreement pursuant to GML Article 5-G.

3.0 SPO Program Objectives The objectives of the SPO program are to:

3.1 Provide a Police presence in the Schools in order to promote and provide an atmosphere of enhanced school safety for faculty, staff, students and school visitors;

3.2 Provide a law enforcement resource to students, teachers, school administrators and parents, so as to increase student awareness about crime prevention, internet safety, conflict resolution, violence prevention, restorative justice and peer mediation;

3.3 Increase school faculty and staff awareness about policies and procedures for preventing/responding to incidents of violence and other threats to school safety;

3.4 Facilitate crime prevention, law enforcement and security consultation;

3.5 Build lines of communication and promote positive attitudes between students and the Police Department;

3.6 Provide a counseling resource to students who may be experiencing a variety of school, family, or social problems;

3.7 Proactively address problems and pressures as they relate to students before such problems manifest into socially and legally unacceptable behavior (including, but not limited to, the use of alcohol, drugs, and/or tobacco, as well as issues involving peer pressure, gang activity, sexual activity, etc.);

3.8 Provide a positive role model for students; and

3.9 Provide education in law enforcement, as requested and appropriate.

4.0 Qualifications for SPO

The SPO shall:

4.1 Be, and remain at all times, properly licensed and/or credentialed as a Peace Officer in accordance with applicable law;

4.1.1 Upon request, the Town shall provide the School District with copies of any assigned SPO's license(s) and/or credentials(s); 4.1.2 If, at any time during the Agreement, the license and/or required credentials of an SPO providing SPO services are revoked, terminated, suspended or otherwise impaired, the Town shall remove the individual from performing SPO services under this Agreement, and shall promptly notify the School District.

5.0 HIRING AND IMPLEMENTATION OF THE SPO

5.1 The School District reserves the right to participate in the Town's hiring and interview process for any individual proposed to perform SPO Services at the School.

5.2 The School District also reserves the right to reject any individual assigned by the Town to perform SPO Services at the Schools for failure to properly perform the SPO services or to request a cancellation of any component of the SPO Services which the School District reasonably believes is inappropriate or inapplicable. However, no such action by the School District shall result in a reduction in the agreed upon the Contract Fees and Expenses set forth in the Agreement, nor require and SPO to conduct himself or herself in a manner contrary to, or in violation of proper Peace Officer policies, protocols and procedures.

5.3 The Town shall notify the School District in writing within one (1) school day of the termination of the services of the SPO assigned to the School District. The parties shall meet and confer within two (2) school days of such notice to discuss the replacement of the SPO. The School District may refuse the services of a particular replacement SPO for reasonable cause and shall provide the Town with one (1) school days' notice of its intent to do so.

5.4 In the event the SPO is absent from work, the SPO shall notify the School District clerk prior to the SPO's scheduled arrival time. The Town shall, in such event, provide a substitute SPO for that day.

6.0 Fingerprints and Criminal Clearance

6.1 To the extent necessary to obtain clearance, the Town shall be responsible for facilitating and conducting criminal background checks and criminal clearance reviews for SPOs.

6.2 The Town shall be responsible for all costs associated with the required finger-printing and criminal background checks and clearance for SPOs under the Agreement.

7.0 SPECIFIC RESPONSIBILITIES OF THE TOWN OF MANLIUS POLICE DEPARTMENT

7.1 In addition to any other responsibilities of the Town set forth in this Agreement, the Town and the Manlius Police Department will cooperate with the School District to implement the SPO Program in the Schools with the least possible disruption to the educational process.

7.2 The Town - through the Manlius Police Department - may enlist the assistance of other law enforcement agencies with appropriate jurisdiction as circumstances warrant, under the Agreement.

7.3 The Town will be responsible for submitting requests for retirement waivers pursuant to Section 212(3) of the New York State Retirement and Social Security Law, as applicable. However, the Town is not responsible for the outcome of any such waiver request, nor can the Town guarantee that any such waiver request will be approved by New York State.

8.0 SPECIFIC RESPONSIBILITIES OF THE SCHOOL DISTRICT

In addition to any other responsibilities of the School District set forth in the Agreement, the School District will:

8.1 Designate a School Building Administrator who shall serve as the building-level School representative for the SPO program;

8.2 Provide the SPO with access to its School facilities, personnel and students as reasonably required to fulfill the SPO's duties under this Agreement;

8.3 Ensure that school personnel, School Board Members, students and parents are informed of the duties and presence of the SPO in the School;

8.4 Provide time and appropriate space for the SPO to conduct approved staff, student and parent training;

8.5 Provide space for the SPO to store instructional materials and perform necessary tasks directly related to the SPO program;

8.6 Cooperate with the Town to supply any relevant information needed for purposes of submitting retirement waivers for the SPOs; and

8.7 Cooperate with the Police Department and SPO relative to the scheduling of time off in the event of an SPO's illness or injury.

9.0 INFORMATION SHARING

9.1 The School District will share relevant information about school safety issues with the SPO including, but not limited to:

9.1.1 School District and School building safety/crisis plans, including for any other school to which the SPO may be assigned;

9.1.2 The School District's Code of Conduct;

9.1.3 Uniform violent incident reports in accordance with New York State Education Law and the Safe Schools against Violence in Education Act; and

9.1.4 Reports pertaining to alleged incidents of Child Abuse in an Educational Setting.

10.0 INFORMATION SHARING BY THE TOWN

The Town and SPO will share relevant information, to the extent permitted by law, about school safety issues with the School District including, but not limited to:

10.1.1 Any necessary interventions/referrals to service providers arising from incidents/reports received on school property, e.g., suicide prevention, drug or alcohol abuse, reports of sexual abuse.

10.1.2 Any information pertinent to school safety and/or safety of individuals on School property; and

10.1.3 Any training or educational opportunities for an SPO or School District representatives relative to school safety.

11.0 SPECIFIC DUTIES OF SPECIAL PATROL OFFICERS (SPOs)

In addition to any other duties specifically set forth in the Agreement, an SPO assigned to the School District shall provide SPO Services intended to meet the program objectives, including, but not limited to the following:

11.1 Patrol and observe all areas of the assigned School(s) and corresponding grounds;

11.2 Be visible and available to the students, faculty, and administration;

11.3 Keep the peace and help maintain a safe and orderly school community;

11.4 Develop and maintain a positive and open relationship with students, faculty and parents;

11.5 Present educational programs to students on various topics, including conflict resolution, restorative justice, crime awareness, anger management, etc.

11.6 Present educational programs to School employees, parents and School Board Members;

11.7 Build community relationships by serving as liaison between the Town (which includes the Manlius Police Department) and the School District;

11.8 Survey the needs of the Schools and address crime and disorder problems, as well as drug activities affecting or occurring in or around the Schools;

11.9 Assist Schools with security concerns and identify physical changes in the environment that may reduce crime in or around the Schools;

11.10 Develop or expand crime prevention efforts for students;

11.11 Educate potential school-age victims in crime prevention and safety;

11.12 Assist in the development of School policies that address crime issues and recommend procedural change(s), where appropriate;

11.13 Assist Schools in meeting safety and security goals and any related requirements mandated by New York State Law;

11.14 Take appropriate law enforcement action with regard to any criminal activities that the SPO observes or that are reported directly to the SPO, including investigation of any suspected or actual criminal activity that might otherwise be investigated by a local police agency; and

11.15 Investigate other emergency situations and summon aid and assistance as needed (e.g., Fire Department, ambulance, etc.);

11.16 The SPO shall not be responsible for, or have authority to, enforce School rules. Matters of school discipline shall be referred to the appropriate School Principal or School District Administrator for further review and action;

11.17 The SPO shall not detain or question students regarding their immigration status;

11.18 In fulfilling his/her duties the SPO shall not discriminate on the basis of race, color, sex, national origin, language status, disability, religion, sexual orientation, or membership in any other protected class.

11.19 The SPO shall comply with all Federal, State and local laws as well as school District policies.

12.0 SUPERVISORY AUTHORITY

12.1 The SPOs assigned to the School District pursuant to the Agreement are under the direct and sole supervision and authority of the Town's Chief of Police and other Command Officers within the Manlius Police Department.

12.2 The SPOs assigned to the School District shall comply with all general and specific SPO policies or protocol/procedure directives prepared by the Manlius Police Department.

12.3 The Manlius Police Department will share a copy of any SPO policy or protocol/procedure direction with the School District.

12.4 The Police Department will also provide a copy of all SPO policies or protocol/procedure directives to SPOs assigned to the School District.

12.5 In the performance of the duties described herein, the SPO shall regularly coordinate and communicate with the Principal or the Principals' designee of the schools to which they are assigned. The Principal or designee shall contact the SPO Supervisor assigned by the Town for such purpose in the event of any question regarding the performance of duties by an SPO. However, the SPO shall remain under the direct and exclusive control and supervision of the Town on all matters relating to the duties of the SPO under this Agreement.

12.6 The SPO shall not be an employee of the School District.

12.7 The Parties shall confer and agree regarding the SPO's attire while on duty.

13.0 PROGRAM EVALUATION

13.1 The School District will provide timely evaluations to the Police Department to enable required progress reports to be completed in an efficient and timely manner.

13.2 Any evaluation instruments for completion by selected students, school staff, school administrators, and community members will be developed collaboratively by the School District and the Police Department in order to ensure objective evaluation criteria are established and applied.

14.0 CONTRACT FEES AND ADDITIONAL COSTS

14.1 The School District agrees to pay the Town for Contract Fees and Costs associated with the placement of SPOs in the School District as set forth herein.

14.2 SPOs will be assigned to the School District for a period of approximately one hundred eighty six (186) days per academic year for a minimum of eight (8) hours each day, at a rate of pay of forty dollars ($40.00) per hour plus reimbursement to the Town for the Town's expenses and contributions for FICA, Medicare, Workers' Compensation, if any, and other mandated employer payments or contributions made on behalf of these employees.

14.3 The SPO's regular duty hours shall be 8:30a.m. until 4:30p.m. unless this schedule is modified by mutual agreement between the Town and the School District, or the Principal of the building to which the SPO is assigned on a given day,

14.4 Additional expenses (e.g., meals, tolls, travel, etc.) may be incurred, for In Service Training (48 hours annual minimum), supplemental schools, seminars or additional services, at the agreed-upon reimbursement and hourly rate, with prior authorization from the School District's Superintendent.

14.5 The Police Department will design appropriate verification forms which will be made available to authorized School District personnel for auditable proof of services performed for the School District. The School District will be invoiced two times per year - once in December and once in June - for the actual costs incurred by the Town in accordance with this Agreement. The School District agrees to make full payment to the Town within 30 business days from receipt of the invoice.

14.6 The School District further agrees to reimburse the Town for up to $10,000 per SPO officer, per academic year, to cover the costs for uniforms, equipment and training (Additional Costs). Any applicable reimbursement for the Additional Costs will be invoiced to the School District. The equipment and uniforms purchased in the Agreement shall remain the property of the Town, except as otherwise provided herein.

14.7 The parties acknowledge, however, that the cost of living, as well as costs for uniforms, equipment and training may increase from year one to year two of this Agreement. Accordingly, the parties understand and agree that future rate increases will be mutually agreed upon in writing prior to implementation.

14.8 Except as otherwise provided herein, the Town agrees that the Contract Fees and Additional Costs set forth herein are the exclusive fees for all SPO services provided under the Agreement.

15.0 TOWN AS AN INDEPENDENT CONTRACTOR

15.1 The Town shall provide SPO Services to the School District as an independent contractor, and any and all SPO Services performed by the Town and its employees or agents under this Agreement shall be performed in such capacity.

15.2 The Town's employees, consultants, or agents shall not hold himself/herself out as, nor claim to be, an officer or employee of the School District, nor make any claim, demand, or application to or for any right or privilege applicable to an officer or employee of the School District, including, but not limited to, Workers' Compensation coverage, unemployment Insurance benefits, Social Security coverage, Disability benefits, New York State Retirement membership or credit, etc.

15.3 The Town shall not have, nor hold itself out as having, the authority or power to bind or create liability for the School District by the Town's acts or omissions.

15.4 It is agreed by the Town and the School District that neither federal, state, or local income taxes nor payroll taxes of any kind, including, but not limited to F.I.C.A. or F.U.T.A., will be withheld or paid by the School District on behalf of any Town employee, consultant, or agent in connection with this Agreement.

15.5 Said employment withholdings and/or payments are to be made by the Town in compliance with all federal, state, and local laws, rules or regulations.

15.6 Provided the School District timely pays the Town the Fees established, the Town agrees to pay and/or withhold all applicable taxes, including income taxes, Workers' Compensation Insurance, unemployment insurance payment, disability insurance payment, and/or any other payments that may be required under the laws, rules, or regulations of any government agency having jurisdiction over the Town or its relationship with the School District, and further agrees to indemnify and hold the School District harmless against any claim, cost, penalty, damage, or expense (including reasonable attorneys' fees) related to either parties nonpayment and/or underpayment of any such taxes or payments.

15.7 The School District acknowledges that it shall have no ability to control the manner, means, details or methods by which the Town or its agents perform SPO Services under this Agreement, unless otherwise addressed in this Agreement and except as required by federal, state, or local laws, rules, and regulations.

15.8 These provisions shall survive any expiration, termination, or non-renewal of the Agreement.

16.0 TERMINATION OF THE AGREEMENT

Either party may terminate this Agreement, at any time, for any reason, by providing thirty (30) days advance notice to the other party. Such notification shall be made, in writing and sent via a trackable overnight delivery method (e.g., FedEx, UPS, USPS Express Mail, etc.) to the other party at its principal address.

17.0 EXTENSION OR RENEWAL

17.1 Negotiations for any contract renewal will begin during the month of May 2024.

17.2 The parties will each be responsible for initiating such negotiations. The failure of a party to initiate or to be affirmatively non-receptive to such initiation by the other party shall be deemed treated as a firm intent not to renew the Agreement.

18.0 RECIPROCAL INDEMNIFICATION

18.1 The Town shall defend, indemnify and hold harmless the School District from and against any and all losses, damages, judgments, claims, causes of action, costs, expenses, and other liabilities (collectively, "Liabilities") to the extent such liabilities arise from the negligent or other wrongful acts or omissions, or any such legal or contractual duties or obligations assumed by the School District, of the Town, its officers, and employees, (including the SPO), or from the Town or any such person's or the Town's material breach of, or default hereunder.

18.2 The School District shall defend, indemnify and hold harmless the Town from and against any and all losses, damages, judgments, claims, causes of action, costs, expenses, and other liabilities (collectively, "liabilities") to the extent such liabilities arise from negligent or other wrongful acts or omissions or of any such legal or contracted duties or obligations assumed by the School District, of the School District, its officers, and employees, or from the School District's material breach of, or default hereunder.

19.0 CONTROLLING LAW AND VENUE

This Agreement shall be interpreted pursuant to the laws of the State of New York, without regard to New York's conflict of laws provision. If an action is filed to enforce this Agreement, the parties agree that such action must be filed exclusively in a court of competent jurisdiction in Onondaga County, New York, and the parties expressly consent to the jurisdiction of such court.

20.0 ASSIGNMENT

This Agreement may not be assigned by either party.

21.0 ENTIRE AGREEMENT

This Agreement may not be altered except by a writing signed by both parties. Furthermore, this Agreement represents the entire agreement and understanding between the parties and supersedes all prior agreements between the parties, written or oral.

22.0 INTERPRETATION

The language of all parts of this Agreement in all cases shall be construed as a whole, according to its fair meaning, and not strictly for or against any party, regardless of who drafted it.

23.0 INSURANCES

The District agrees to obtain and continue to maintain in full force and effect its general liability insurance, public insurance, and automotive insurance relative to the SPO Services to be performed under the Agreement, with limits of not less than $500,000 per occurrence and $1,000,000 in the annual aggregate.

24.0 PROTECTION OF CONFIDENTIAL DATA

The Town shall provide its Services in a manner which protects Student Data (as defined by 8 NYCRR 121.1()) and Teacher or Principal Data (as defined by 8 NYCRR 121.1(r)) (hereinafter "Confidential Data") in accordance with the requirements articulated under Federal, New York State and local laws and regulations, including but not limited to the foregoing:

24.1 The Town will adopt technologies, safeguards and practices that align with the NIST Cybersecurity Framework.

24.2 The Town will comply with the School District Data Security and Privacy Policy, Education Law §2-d, and 8 NYCRR §121.

24.3 The Town will limit internal access to personally identifiable information to only those employees or subcontractors that need access to provide the contracted services.

24.4 The Town will not use the personally identifiable information for any purpose not explicitly authorized in this Agreement.

24.5 The Town will not disclose any personally identifiable information to any other party without the prior written consent of the parent or eligible student, unless otherwise authorized pursuant to applicable law.

24.6 The Town will maintain reasonable administrative, technical and physical safeguards to protect the security, confidentiality and integrity of personally identifiable information in its custody.

24.7 The Town will use encryption to protect personally identifiable information in its custody while in motion or at rest.

24.8 The Town will not sell personally identifiable information nor use or disclose it for any marketing or commercial purpose or facilitate its use or disclosure by any other party for any marketing or commercial purpose or permit another party to do so.

24.9 In the event The Town engages a subcontractor to perform its contractual obligations, the data protection obligations imposed on the Town shall apply to the subcontractor.

25.0 DATA BREACH

In the event that Confidential Data is accessed or obtained by an unauthorized individual, The Town shall provide notification to the School District without unreasonable delay and not more than seven calendar days after the discovery of such breach. The Town shall follow the following process.

25.1 The security breach notification shall be titled "Notice of Data Breach," shall be clear, concise, use language that is plain and easy to understand, and to the extent available, shall include: a brief description of the breach or unauthorized release; the dates of the incident in the date of discovery; a description of the types of Confidential affected; an estimate of the number of records affected; a brief description of the Town's investigation or plan to investigate; and contact information for representatives who can assist the School District with additional questions.

25.2 The Town shall also prepare a statement for parents and eligible students which provides information under the following categories: "What Happened," "What Information Was Involved," "What We Are Doing," "What You Can Do," and "For More Information."

25.3 Where a breach or unauthorized release of Confidential Data is attributed to The Town, and/or a subcontractor or affiliate of The Town, The Town shall pay for or promptly reimburse the School District for the cost of notification to parents and eligible students of the breach.

25.4 The Town shall cooperate with the School District and law enforcement to protect the integrity of investigations into the breach or unauthorized release of Confidential Data.

25.4.1 The name and contact information of the reporting School District subject to this section.

25.4.2 A list of the types of personal information that were or are reasonably believed to have been the subject of a breach.

25.4.3 If the information is possible to determine at the time the notice is provided, then either (1) the date of the breach, (2) the estimated date of the breach, or (3) the date range within which the breach occurred. The notification shall also include the date of the notice.

25.4.4 Whether the notification was delayed as a result of a law enforcement investigation, if that information is possible to determine at the time the notice is provided.

25.4.5 A general description of the breach incident, if that information is possible to determine at the time the notice is provided.

25.4.6 Information about what the agency has done to protect individuals whose information has been breached.

25.4.7 Advice on steps that the person whose information has been breached may take to protect himself or herself.

Addendum C

TOWN'S DATA SECURITY AND PRIVACY PLAN
DATA SECURITY AND PRIVACY PLAN

WHEREAS, the East Syracuse Minoa Central School District (hereinafter "School District") and the Town of Manlius (hereinafter "Contractor") entered into an agreement dated September 1, 2023 (hereinafter "Agreement") for Special Patrol Officer (hereinafter "Services").

WHEREAS, pursuant to the requirements under §NYCRR 121, Contractor maintains the data security and privacy plan described herein in connection with the Services provided to the School District.

1. During the term of the Agreement, Contractor will implement all state, federal and local data security and privacy requirements, consistent with the School District's Data Security and Privacy Policy in the following way(s):

2. Contractor has in place the following administrative, operational and technical safeguards and practices to protect personally identifiable information that it will receive under the Agreement:

3. Contractor shall comply with 8 NYCRR 121 in that it acknowledges that it has reviewed the School District's Parents Bill of Rights for Data Privacy and Security and will comply with same.

a. Contractor will use the student data or teacher or principal data only for the exclusive purposes defined in the Agreement.
b. Contractor will ensure that the subcontractor(s) or other authorized persons or entities to whom Contractor will disclose the student data or teacher and principal data, if any, will abide by all applicable data protection and security requirements as described in the "Supplemental Information" appended to the Agreement.
c. At the end of the term of the Agreement, the Contractor will destroy, transition or return, at the direction of the School District, all student data and all teacher and principal data in accordance with the "Supplemental Information" appended to the Agreement.
d. Student data and teacher and principal data will be stored in accordance with the "Supplemental Information" appended to the Agreement.
e. Student data and teacher and principal data in motion and at rest will be protected using an encryption method that meets the standards described in 8 NYCRR 121.

4. Prior to receiving access to student data and/or teacher and principal data, officer(s) and employee(s) of Contractor and any assignees who will have access to student data or teacher or principal data shall receive training on the federal and state laws governing confidentiality of such data. Such training shall be provided: Specify date of each training

5. Subcontractors (check one):

Contractor shall not utilize sub-contractors.

Contractor shall utilize sub-contractors. Contractor shall manage the relationships and contracts with such sub-contractors in the following ways in order to ensure personally identifiable information is protected.

6. Contractor has the following procedures, plans or protocols in place to manage data security and privacy incidents that implicate personally identifiable information: *Procedures, plans or protocols must, at a minimum, specify plans to identify breaches and unauthorized disclosures, and to promptly notify the School District.*

7. Termination of Agreement.

a. Within _____days of termination of the Agreement, Contractor shall delete or destroy all student data or teacher or principal data in its possession; AND

b. Within_____days of termination of the Agreement, Contractor shall

_____Return all data to the School District using _____OR

_____Transition all data to a successor contractor designated by the School District in writing using _____.

8. In the event of a conflict between the terms of this Data Security and Privacy Plan and the terms of the Agreement, the terms of this Data Security and Privacy Plan shall control. All of the defined terms in the Agreement shall have the same definitions in the Data Security and Privacy Plan, unless otherwise defined herein. Except as expressly set forth in this Data Security and Privacy Plan, the terms and conditions of the A unmodified and in full force and effect.

IN WITNESS WHEREOF, the Contractor hereto has executed this Data Security and

Privacy Plan as of _____.

CONTRACTOR: _____

By:

Title:

Addendum B

PARENTS' BILL OF RIGHTS - SUPPLEMENTAL INFORMATION ADDENDUM

1. EXCLUSIVE PURPOSES FOR DATA USE: The exclusive purposes for which "student data" or "teacher or principal data" (as those terms are defined in Education Law Section 2-d and collectively referred to as the "Confidential Data") will be used by Town of Manlius (the "Contractor") are limited to the purposes authorized in the contract between the Contractor and the East Syracuse Minoa Central School District (the "School District") commencing on September 1, 2023, and expiring on June 30, 2024 (the "Contract').

2. SUBCONTRACTOR OVERSIGHT DETAILS: The Contractor will ensure that any subcontractors, or other authorized persons or entities to whom the Contractor will disclose the Confidential Data, if any, are contractually required to abide by all applicable data protection and security requirements, including but not limited to those outlined in applicable state and federal laws and regulations (e.g., Family Educational Rights and Privacy Act ("FERPA"); Education Law §2-d; 8 NYCRR Part 121).

3. CONTRACT PRACTICES: The Contract commences and expires on the dates set forth in the Contract, unless earlier terminated or renewed pursuant to the terms of the Contract. On or before the date the Contract expires, protected data will be exported to the School District in **[insert data format]** format and/or destroyed by the Contractor as directed by the School District.

4. DATA ACCURACY/CORRECTION PRACTICES: A parent or eligible student can challenge the accuracy of any "education record", as that term is defined in the FERPA, stored by the School District in a Contractor's product and/or service by following the School District's procedure for requesting the amendment of education records under the FERPA, Teachers and principals may be able to challenge the accuracy of APPR data stored by School District in Contractor's product and/or service by following the appeal procedure in the School District's APPR Plan. Unless otherwise required above or by other applicable law, challenges to the accuracy of the Confidential Data shall not be permitted.

5. SECURITY PRACTICES: Confidential Data provided to Contractor by the School District will be stored **[insert location]**. The measures that Contractor takes to protect Confidential Data will align with the NIST Cybersecurity Framework including, but not necessarily limited to, disk encryption, file encryption, firewalls, and password protection.

6. ENCRYPTION PRACTICES: The Contractor will apply encryption to the Confidential Data while in motion and at rest at least to the extent required by Education Law Section 2-d and other applicable law.

Addendum A

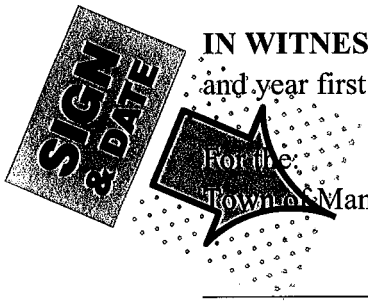
PARENTS' BILL OF RIGHTS FOR DATA PRIVACY AND SECURITY

East Syracuse Minoa Central School District is committed to ensuring student privacy in accordance with local, state and federal regulations and district policies. To this end and pursuant to U.S. Department of Education (DOE) regulations (Education Law 82-d), the district is providing the following Parents' Bill of Rights for Data Privacy and Security:

- A student's personally identifiable information cannot be sold or released for any commercial or marketing purposes.
- Parents have the right to inspect and review the complete contents of their child's education record, including any student data maintained by the School District. This right of inspection of records is consistent with the federal Family Educational Rights and Privacy Act (FERPA). Under the more recently adopted regulations (Education Law §2-d), the rights of inspection are extended to include data, meaning parents have the right to inspect any data in their child's educational record. The New York State Education Department (SED) will develop further policies and procedures related to these rights in the future.
- State and federal laws protect the confidentiality of personally identifiable information and safeguards associated with industry standards and best practices, including but not limited to, encryption, firewalls and password protection, must be in place when data is stored or transferred.
- A complete list of all student data elements collected by the state is available for public review in an Excel file at http://www.p12.nysed.gov/irs/sirs/documentation/NYSEDstudentData.xlsx.
- Parents may also obtain a copy of this list by writing to the Office of Information & Reporting Services, New York State Education Department, Room 863 EBA, 89 Washington Avenue, Albany, N.Y. 12234.
- Parents have the right to have complaints about possible breaches of student data addressed. Complaints should be directed to: Kieran O'Connor, Executive Director of Planning, Development and Technology, East Syracuse Minoa Central School District, 407 Fremont Road, East Syracuse, New York 13057. Complaints to SED should be directed to: Chief Privacy Officer, New York State Education Department, 89 Washington Avenue, Albany, NY 12234; the e-mail address is cpo@mail.nysed.gov.

a deadline date/time well prior to the event, to suitably accomplish scheduling needs. Once the deadline date/time has passed, and only if openings still exist, SPO's may be offered those jobs accordingly. In a timely manner, the PBA shall communicate to the secondary employment requester the results of said postings.

School specific events, which were never traditionally offered to full-time PBA members as secondary employment opportunities; to include non-scheduled unforeseen incidents or circumstances where an SPO is needed immediately (e.g., school threats, potential for harm) may be offered to an SPO at the discretion of the appropriate school official without first posting.



IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals the day and year first above written.

For the:
Town of Manlius

John T. Deer, Supervisor

Date

For the:
East Syracuse Minoa Central School District

Dr. Donna J. DeSiato, Superintendent

7-31-2023

Date

25.5 The Town further acknowledges and agrees to have a written incident response plan that reflects best practices and is consistent with industry standards and federal and state law for responding to a data breach, breach of security, privacy incident or unauthorized acquisition or use of Protected Data or any portion thereof, and agrees to provide Client, upon request, with a copy of said written incident response plan

26.0 ADDENDUM

The following addenda attached hereto shall be incorporated into the Agreement:

Addendum A: Parents' Bill of Rights for Data Privacy and Security

Addendum B: Parents' Bill of Rights - Supplemental Information Addendum

Addendum C: The Town's Data Security and Privacy Plan

27.0 WAIVER

The failure of any party to insist on the strict performance of any provision of this Agreement or to exercise any right under this Agreement shall not constitute a waiver of such provisions or rights. A waiver is effective only if in writing and signed and delivered by the waiving party.

28.0 MUTUAL COVENANTS

28.1 The undersigned representatives of the two contracting parties, in signing, hereby represent that they are authorized and empowered by their respective Boards (as applicable) to enter into this Agreement. Consent to the terms of this Agreement is signified by the signatures below.

28.2 It is agreed by and between the parties that any provision of this Agreement requiring legislative action to permit its implementation by amendment of law or by providing the additional funds therefore shall not become effective until the appropriate legislative body has given approval.

29.0 OVERTIME

SPO's shall only work school related functions and events. SPO's will not routinely be asked to work beyond their normal schedule; however, if the need exists, and falls within the below listed criteria, they may work overtime and will be compensated accordingly.

For planned/scheduled extracurricular school activities (e.g., sporting events, dances, graduations) where secondary employment requests were traditionally made, and offered to full-time PBA members, the PBA shall offer those jobs to full-time PBA members first, through regular posting. Posting shall be made well in advance to ensure the fair and equitable distribution of secondary employment opportunities. All postings shall include

AGREEMENT BETWEEN THE TOWN OF MANLIUS POLICE DEPARTMENT AND FAYETTEVILLE-MANLIUS CENTRAL SCHOOL DISTRICT SIRO PROGRAM 2023-24* (A. PALMER)

THIS AGREEMENT is made this ____th day of August, 2023 by and between the TOWN OF MANLIUS POLICE DEPARTMENT (hereinafter "POLICE DEPARTMENT") and the FAYETTEVILLE-MANLIUS CENTRAL SCHOOL DISTRICT (hereinafter "SCHOOL DISTRICT") as follows:

WHEREAS, the SCHOOL DISTRICT wishes to implement a SCHOOL INFORMATION RESOURCE OFFICER to promote the goal of ensuring a caring, safe, respectful, and orderly learning environment in its schools; and

WHEREAS, the SCHOOL DISTRICT and the POLICE DEPARTMENT desire to establish the terms and scope of duties in this SCHOOL INFORMATION and RESOURCE OFFICER (hereinafter referred to as ("SIRO") Agreement the specific terms and conditions of the services to be provided by the said SIROs in the SCHOOL DISTRICT:

NOW, THEREFORE, THE PARTIES HERETO AGREE AS FOLLOWS:

Defined terms

For the purposes of this Agreement, the following terms have the meanings listed:

SIRO Supervisor – The POLICE DEPARTMENT employee assigned to supervise the SIRO's activities.

School Liaison – The SCHOOL DISTRICT employee who is designated as the primary contact for the SIRO and POLICE DEPARTMENT regarding the SIRO's work.

School grounds – The school grounds shall consist of all buildings and grounds under jurisdiction of the SCHOOL DISTRICT, including but not limited to the high school, the middle school, the elementary school and the school district offices.

1.0 Goals and Objectives

It is understood and agreed that the SCHOOL DISTRICT and the POLICE DEPARTMENT officials share the following goals and objectives regarding the SIRO Program in the schools:

1.1 The primary duty of the SIRO is to establish relationships with students and to act as a mentor. The SIRO's law enforcement function is a part of relationship-building with the student body and community.

*Due to contract negotiations, the prior rates remain in force until ratification.

1.2 The SIRO will foster educational programs and activities that increase student knowledge of and respect for the law and the function of law enforcement agencies;

1.3 The SIRO will be available to work cooperatively with teachers to assist in developing specialty programs specific to areas of study including but not limited to court procedures, citizenship and forensic science;

1.4 The SIRO will conduct criminal investigations with the goals of promoting safety for the school community and establishing a deterrent to delinquent student behavior and promoting and ensuring the safety of the students, faculty and administration of the SCHOOL DISTRICT;

1.5 The SIRO will work with school administrators to identify and address safety issues within the schools;

1.6 The SIRO will serve as a mentor and role model for students attending school in the SCHOOL DISTRICT.

2.0 Employment and Assignment of School Resource Officers

2.1 The SIRO shall be an employee of the POLICE DEPARTMENT and shall be subject to the administration, supervision and control of the POLICE DEPARTMENT, except as such administration, supervision and control is subject to the terms and conditions of this Agreement.

2.2 The POLICE DEPARTMENT agrees to provide and to pay the SIRO's salary and employment benefits in accordance with the applicable salary schedules and employment practices of the POLICE DEPARTMENT. The SIRO shall be subject to all other personnel and practices of the POLICE DEPARTMENT except as such policies or practices may have to be modified to comply with the terms and conditions of this Agreement.

2.3 The parties shall use a collaborative process in the assignment of a SIRO. Both parties shall have the right to attend and participate in candidate interviews. The POLICE DEPARTMENT shall select three finalists from the candidate pool and the SCHOOL DISTRICT shall select the candidate to be assigned.

2.4 The POLICE DEPARTMENT shall notify the SCHOOL DISTRICT within 24 hours of the termination of the services of a SIRO assigned to the SCHOOL DISTRICT. The SCHOOL DISTRICT has the right to refuse the services of a particular SIRO and shall provide the POLICE DEPARTMENT with 24 hours notice of its intent to do so. Upon such notice by either party, the parties shall meet and confer within 48 hours of such notice to discuss the replacement of the SIRO.

SIRO OFFICER PALMER
*Due to contract negotiations, the prior rates remain in force until ratification.

2.5 The POLICE DEPARTMENT shall hold the SCHOOL DISTRICT free, harmless and indemnified from and against any and all claims, suits or causes of action arising out of allegations of unfair or unlawful employment practices bought by SIROs.

2.6 In the event a SIRO is absent from work, the SIRO shall notify both his supervisor in the POLICE DEPARTMENT and the principal of the school to which the SIRO is assigned on that particular day. To the extent possible, the POLICE DEPARTMENT shall provide an interim replacement

2.7 The relationship of the POLICE DEPARTMENT to the SCHOOL DISTRICT shall be that of independent contractor and neither party shall be an agent of or otherwise have authority to bind the other party.

3.0 Payment Terms and Duty Hours

3.1 The SIRO's regular duty shall be 40 hours per week for 186 days, and the schedule of these hours shall be set by mutual agreement between the SCHOOL DISTRICT and the POLICE DEPARTMENT. The SCHOOL DISTRICT may contract for additional service days beyond the required 186 days at the per diem rate.

3.2 The SCHOOL DISTRICT shall pay the POLICE DEPARTMENT for the services of SIRO OFFICER PALMER at an average per diem rate of $722.17 for the 2023-24 school year. The SCHOOL DISTRICT will pay the POLICE DEPARTMENT at this per diem rate based upon the actual service of SIRO OFFICER PALMER.

3.3 From time to time the SIRO may be required to work more than the 8 hours of regular scheduled duty in a given day. For planned/scheduled extracurricular school activities (e.g., sporting events, dances, graduations) where secondary employment requests were traditionally made, and offered to full-time PBA members, the PBA shall offer those jobs to full-time PBA members first, through regular posting. Posting shall be made well in advance to ensure the fair and equitable distribution of secondary employment opportunities. All postings shall include a deadline date/time well prior to the event, to suitably accomplish scheduling needs. Once the deadline date/time has passed, and only if openings still exist, SPO's may be offered those jobs accordingly. In a timely manner, the PBA shall communicate to the secondary employment requester the results of said postings.

School specific events, which were never traditionally offered to full-time PBA members as secondary employment opportunities; to include non-scheduled unforeseen incidents or circumstances where an SPO is needed immediately (e.g., school threats, potential for harm) may be offered to an SPO at the discretion of the appropriate school official without first posting.

SIRO OFFICER PALMER
*Due to contract negotiations, the prior rates remain in force until ratification.

In such instances of overtime, the additional time worked by the SIRO shall be credited as "school comp time" or overtime. The choice of either school comp time or overtime shall be at the discretion of the SIRO. School comp time may be used to offset days where the SIRO is scheduled to work, but does not have to report due to the closing of school. The maximum amount of comp time that may accumulate at any one time is 40 hours. At the end of the school year, any school comp time that has not been utilized by the SIRO shall be converted to overtime or carried forward into the next school year based upon the SIRO's request. Authorized overtime for SIRO OFFICER PALMER shall be billed at a rate of $82.45 per hour for the 2023 calendar year and $82.45 for the 2024 calendar year.

3.4 The SIRO shall be on duty upon the school grounds fifteen minutes before the beginning of the student instructional day and shall remain on duty for eight (8) hours unless this schedule modified by the mutual agreement between the POLICE DEPARTMENT and the SCHOOL DISTRICT, or the Principal of the building to which the SIRO is assigned on a given day.

3.5 It is understood and agreed that time spent by the SIRO attending court juvenile and/or criminal cases arising from and/or out of their employment as an SIRO shall be considered as hours worked under this Agreement.

3.6 In the event of an emergency the SIRO may be ordered by the POLICE DEPARTMENT to leave school grounds during normal duty hours as described above to perform other services for the POLICE DEPARTMENT. In such instances, the time spent by the SIRO away from the school grounds shall not be considered billable time by the POLICE DEPARTMENT.

3.7 For school vacations, holidays and other times when school is not in session and/or the SIRO is not required to be on school grounds, the officer may take available leave balances, or report to the SIRO supervisor for reassignment.

4.0 Basic Qualifications of the School Information and Resource Officers (SIRO)

To be an SIRO, an officer must first meet all of the following basic qualifications:

4.1 Shall be a sworn officer and should have a minimum of five years of law enforcement experience;

4.2 Shall possess a sufficient knowledge of the applicable Federal and State laws, Town and County ordinances, and Board of Education policies and regulations;

4.3 Shall be capable of conducting in depth criminal investigations;

4.4 Shall possess even temperament and set a good example for students; and

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4.5 Shall possess communication skills that would enable the officer to function effectively within the school environment.

5.0 Duties of School Resource Officer

5.1 To assist school officials with the enforcement of Board of Education Policies and Administrative Regulations regarding student conduct and to provide usual and customary police services to the SCHOOL DISTRICT. The role of school discipline shall remain with the school district administration.

5.2 To counsel public school students in special situations when requested by the principal or the principal's designee or by the parents of a student;

5.3 To answer questions and conduct classroom presentations for students in law-related fields;

5.4 To perform such other duties as the parties may agree from time to time.

5.5 The SIRO shall not detain or question students regarding their immigration status.

6.0 Chain of Command

6.1 As employees of the POLICE DEPARTMENT, the SIRO shall follow the chain of command as set forth in the POLICE DEPARTMENT Policies and Procedure Manual, except where such procedures conflict with the policies of the Board of Education of the SCHOOL DISTRICT. It is expressly recognized and acknowledged by the SCHOOL DISTRICT that policies of the Board of Education cannot supersede the SIRO's duty to act in accordance with state and federal law.

6.2 In the performance of the duties described herein, the SIRO shall regularly coordinate and communicate with the principal or the principals' designee of the schools to which they are assigned. The principal or designee shall contact the SIRO Supervisor assigned by the POLICE DEPARTMENT for such purpose in the event of any question regarding the performance of duties by an SIRO.

7.0 Training/Briefing

7.1 The SIRO may be required by the POLICE DEPARTMENT to attend monthly training and briefing sessions. These sessions will be held at the direction of the POLICE DEPARTMENT Operations commander. Briefing Sessions will be conducted to provide for the exchange of information between the department and the school liaison.

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7.2 The SCHOOL DISTRICT and the POLICE DEPARTMENT shall schedule training for the SIRO in Board of Education Policies, regulations and procedures, including the Code of Conduct for students and others and the programs and practices of the SCHOOL DISTRICT regarding student discipline.

8.0 Dress Code

8.1 The SIRO shall work primarily in either a departmental issued uniform or plain clothes business attire while on duty. The decision regarding the attire to be worn shall be made in consultation between the parties.

9.0 Supplies and Equipment

9.1 Motor vehicles. The POLICE DEPARTMENT shall provide a vehicle for the SIRO. Beginning in 2017, newly assigned vehicles shall be marked in the same manner as patrol vehicles assigned to the Field Services Section.

9.2 Office Supplies. The SCHOOL DISTRICT agrees to provide each SIRO with the usual and customary office supplies and forms required in the performance of their duties. In addition, the SIRO shall be provided a private office within the school that is accessible by the students. The SIRO shall also be provided by the SCHOOL DISTRICT a computer, printer and access to a private fax machine for confidential intelligence sharing with other POLICE DEPARTMENT personnel, and a communication device.

9.3 Body Worn Camera (BWC): Body worn cameras are a common law enforcement tool and are utilized by all TMPD patrol officers. A BWC will be utilized by the SIRO; in the school setting the SIRO shall have the discretion to record contacts when they consider it to be in the best interest of the student, staff, school administrators or the SIRO.

10.0 Transporting Students

10.1 It is agreed that SIROs shall not transport students in their vehicles except when the students are victims of a crime, under arrest, or some other emergency circumstance exists.

10.2 If circumstances other than an arrest require that the SIRO transport a student, then an effort shall be made to have a school administrator shall accompany the officer and the student in the vehicle. When a school administrator is not available the SIRO shall record the transport using a body worn camera.

10.3 Students shall not be transported to any location unless it is determined that the student's parent, guardian or custodian is at the destination to which the student is

being transported. The SIRO shall not transport students in their personal vehicles.

10.4 The SIRO shall notify the building principal before moving a student from the school grounds.

11.0 Access to Education Records

11.1 School officials shall allow SIROs to inspect and copy any public records maintained by the school that is permissible by law.

11.2 If some information in a student's cumulative record is needed in an emergency to protect the health or safety of the student or other individuals, school officials may disclose to the SIRO that information which is needed to respond to the emergency situation based on the seriousness of the threat to someone's health or safety; the need of the information to meet the emergency situation and the extent to which time is of the essence.

11.3 If confidential student records information is needed, but no emergency situation exists, the information may be released only upon the issuance of a search warrant or subpoena to produce the records, or as may otherwise comply with the Family Educational Rights and Privacy Act (FERPA).

11.4 Pursuant to FERPA, the SCHOOL DISTRICT hereby designates each SIRO as the District's "law enforcement unit" for the purpose of enforcing any Federal, State or local law and maintaining the physical security and safety of the schools to which they are assigned, and as such shall have access to student education records as appropriate in order to carry out their SIRO duties.

12.0 Term of Agreement

12.1 The term of this agreement is one year commencing on July 1, 2021 and ending on June 30, 2023. The Agreement may be renewed and extended annually by the written agreement of both the SCHOOL DISTRICT and the POLICE DEPARTMENT. Written notice of intent to extend the Agreement must be sent by each party no later than June 1st of the current year.

12.2 In the event that the SCHOOL DISTRICT opts not to extend the Agreement in a given year, it shall remain responsible to pay the per diem charges that would otherwise have been due for the months of September and October of the succeeding year.

13.0 Insurance and Indemnification

*Due to contract negotiations, the prior rates remain in force until ratification.

13.1 The POLICE DEPARTMENT shall maintain in full force and effect during the term of this Agreement a comprehensive liability insurance policy with coverage that is consistent with police department policies and procedures.

13.2 Without waiving any defenses, the POLICE DEPARTMENT agrees to, at its sole cost and expense, indemnify, protect, defend and hold the SCHOOL DISTRICT harmless against any and all damages, losses, liabilities, obligations, penalties, claims, litigation, demands, defenses, judgments, suits, actions, proceedings, costs, disbursements and/or expenses (including reasonable attorney's fees) arising out of the performance of the SIRO's authorized duties as described in this Agreement. The SCHOOL DISTRICT shall provide notice to the POLICE DEPARTMENT within twenty (20) days of obtaining the same, of any potential claim or action which, if decided adversely to the SCHOOL DISTRICT, would cause the SCHOOL DISTRICT to suffer or incur loss or expense.

13.3 Without waiving any defenses, the SCHOOL DISTRICT agrees to, at its sole cost and expense, indemnify, protect, defend and hold the POLICE DEPARTMENT harmless against any and all damages, losses, liabilities, obligations, penalties, claims, litigation, demands, defenses, judgments, suits, actions, proceedings, costs, disbursements and/or expenses (including reasonable attorney's fees) arising out of the performance of the SIRO's authorized duties as described in this Agreement. POLICE DEPARTMENT shall provide notice to the SCHOOL DISTRICT within twenty (20) days of obtaining the same, of any potential claim or action which, if decided adversely to the POLICE DEPARTMENT, would cause the POLICE DEPARTMENT to suffer or incur loss or expense.

14.0 Evaluation

It is mutually agreed that the SCHOOL DISTRICT shall annually evaluate the SIRO Program and the parties agree that an exchange of data related to the SIRO's performance shall be a part of the annual evaluation process.

15.0 Protection of Confidential Data

The Town shall provide their Services in a manner which protects Student Data (as defined by 8 NYCRR 121.1(q)) and Teacher or Principal Data (as defined by 8 NYCRR 121.1(r)) (hereinafter "Confidential Data") in accordance with the requirements articulated under Federal, New York State and local laws and regulations, including but not limited to the foregoing:

(a) The Town will adopt technologies, safeguards and practices that align with the NIST Cybersecurity Framework.

(b) The Town will comply with the School District Data Security and Privacy Policy, Education Law § 2-d, and 8 NYCRR §121.

(c) The Town will limit internal access to personally identifiable information to only those employees or sub-contractors that need access to provide the contracted services.

SIRO OFFICER PALMER

*Due to contract negotiations, the prior rates remain in force until ratification.

(d) The Town will not use the personally identifiable information for any purpose not explicitly authorized in this Agreement.
(e) The Town will not disclose any personally identifiable information to any other party without the prior written consent of the parent or eligible student, unless otherwise authorized pursuant to applicable law.
(f) The Town will maintain reasonable administrative, technical and physical safeguards to protect the security, confidentiality and integrity of personally identifiable information in its custody.
(g) The Town will use encryption to protect personally identifiable information in its custody while in motion or at rest.
(h) The Town will not sell personally identifiable information nor use or disclose it for any marketing or commercial purpose or facilitate its use or disclosure by any other party for any marketing or commercial purpose or permit another party to do so.
(i) In the event the Town engages a subcontractor to perform their contractual obligations, the data protection obligations imposed on the Town shall apply to the subcontractor.

16.0 Data Breach

In the event that Confidential Data is accessed or obtained by an unauthorized individual, the Town shall provide notification to the School District without unreasonable delay and not more than seven calendar days after the discovery of such breach. The Town shall follow the following process:

(a) The security breach notification shall be titled "Notice of Data Breach," shall be clear, concise, use language that is plain and easy to understand, and to the extent available, shall include: a brief description of the breach or unauthorized release; the dates of the incident in the date of discovery; a description of the types of Confidential affected; an estimate of the number of records affected; a brief description of the Town's investigation or plan to investigate; and contact information for representatives who can assist the School District with additional questions.
(b) The Town shall also prepare a statement for parents and eligible students which provides information under the following categories: "What Happened," "What Information Was Involved," "What We Are Doing," "What You Can Do," and "For More Information."
(c) Where a breach or unauthorized release of Confidential Data is attributed to Contractor, and/or a subcontractor or affiliate of the Town, The Town shall pay for or promptly reimburse the School District for the cost of notification to parents and eligible students of the breach.
(d) The Town shall cooperate with the School District and law enforcement to protect the integrity of investigations into the breach or unauthorized release of Confidential Data.

i. The name and contact information of the reporting School District subject to this section.

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ii. A list of the types of personal information that were or are reasonably believed to have been the subject of a breach.

iii. If the information is possible to determine at the time the notice is provided, then either (1) the date of the breach, (2) the estimated date of the breach, or (3) the date range within which the breach occurred. The notification shall also include the date of the notice.

iv. Whether the notification was delayed as a result of a law enforcement investigation, if that information is possible to determine at the time the notice is provided.

v. A general description of the breach incident, if that information is possible to determine at the time the notice is provided.

vi. Information about what the agency has done to protect individuals whose information has been breached.

vii. Advice on steps that the person whose information has been breached may take to protect himself or herself.

(e) The Town further acknowledges and agrees to have a written incident response plan that reflects best practices and is consistent with industry standards and federal and state law for responding to a data breach, breach of security, privacy incident or unauthorized acquisition or use of Protected Data or any portion thereof, and agrees to provide Client, upon request, with a copy of said written incident response plan.

SIRO OFFICER PALMER

*Due to contract negotiations, the prior rates remain in force until ratification.

IN WITNESS WHEREOF, the parties hereto have caused this Operations Agreement to be executed the day and year first written above.

FAYETTEVILLE-MANLIUS CENTRAL SCHOOL DISTRICT

By:_____ 8/15/23
Dr. Craig Tice, Superintendent of Schools

MANLIUS POLICE DEPARTMENT

By:_____
Jason Cassalia, Chief of Police

TOWN OF MANLIUS

By:_____ 8/21/23
John Deer, Town Supervisor

SIRO OFFICER PALMER
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AGREEMENT BETWEEN THE TOWN OF MANLIUS POLICE DEPARTMENT AND FAYETTEVILLE-MANLIUS CENTRAL SCHOOL DISTRICT SIRO PROGRAM 2034-24* (D. GOLDEN)

THIS AGREEMENT is made this ____th day of August, 2023 by and between the TOWN OF MANLIUS POLICE DEPARTMENT (hereinafter "POLICE DEPARTMENT") and the FAYETTEVILLE-MANLIUS CENTRAL SCHOOL DISTRICT (hereinafter "SCHOOL DISTRICT") as follows:

WHEREAS, the SCHOOL DISTRICT wishes to implement a SCHOOL INFORMATION RESOURCE OFFICER to promote the goal of ensuring a caring, safe, respectful, and orderly learning environment in its schools; and

WHEREAS, the SCHOOL DISTRICT and the POLICE DEPARTMENT desire to establish the terms and scope of duties in this SCHOOL INFORMATION and RESOURCE OFFICER (hereinafter referred to as ("SIRO") Agreement the specific terms and conditions of the services to be provided by the said SIROs in the SCHOOL DISTRICT:

NOW, THEREFORE, THE PARTIES HERETO AGREE AS FOLLOWS:

Defined terms

For the purposes of this Agreement, the following terms have the meanings listed:

SIRO Supervisor – The POLICE DEPARTMENT employee assigned to supervise the SIRO's activities.

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1.0 Goals and Objectives

It is understood and agreed that the SCHOOL DISTRICT and the POLICE DEPARTMENT officials share the following goals and objectives regarding the SIRO Program in the schools:

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1.2 The SIRO will foster educational programs and activities that increase student knowledge of and respect for the law and the function of law enforcement agencies;

1.3 The SIRO will be available to work cooperatively with teachers to assist in developing specialty programs specific to areas of study including but not limited to court procedures, citizenship and forensic science;

1.4 The SIRO will conduct criminal investigations with the goals of promoting safety for the school community and establishing a deterrent to delinquent student behavior and promoting and ensuring the safety of the students, faculty and administration of the SCHOOL DISTRICT;

1.5 The SIRO will work with school administrators to identify and address safety issues within the schools;

1.6 The SIRO will serve as a mentor and role model for students attending school in the SCHOOL DISTRICT.

2.0 Employment and Assignment of School Resource Officers

2.1 The SIRO shall be an employee of the POLICE DEPARTMENT and shall be subject to the administration, supervision and control of the POLICE DEPARTMENT, except as such administration, supervision and control is subject to the terms and conditions of this Agreement.

2.2 The POLICE DEPARTMENT agrees to provide and to pay the SIRO's salary and employment benefits in accordance with the applicable salary schedules and employment practices of the POLICE DEPARTMENT. The SIRO shall be subject to all other personnel and practices of the POLICE DEPARTMENT except as such policies or practices may have to be modified to comply with the terms and conditions of this Agreement.

2.3 The parties shall use a collaborative process in the assignment of a SIRO. Both parties shall have the right to attend and participate in candidate interviews. The POLICE DEPARTMENT shall select three finalists from the candidate pool and the SCHOOL DISTRICT shall select the candidate to be assigned.

2.4 The POLICE DEPARTMENT shall notify the SCHOOL DISTRICT within 24 hours of the termination of the services of a SIRO assigned to the SCHOOL DISTRICT. The SCHOOL DISTRICT has the right to refuse the services of a particular SIRO and shall provide the POLICE DEPARTMENT with 24 hours notice of its intent to do so. Upon such notice by either party, the parties shall meet and confer within 48 hours of such notice to discuss the replacement of the SIRO.

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2.5 The POLICE DEPARTMENT shall hold the SCHOOL DISTRICT free, harmless and indemnified from and against any and all claims, suits or causes of action arising out of allegations of unfair or unlawful employment practices bought by SIROs.

2.6 In the event a SIRO is absent from work, the SIRO shall notify both his supervisor in the POLICE DEPARTMENT and the principal of the school to which the SIRO is assigned on that particular day. To the extent possible, the POLICE DEPARTMENT shall provide an interim replacement

2.7 The relationship of the POLICE DEPARTMENT to the SCHOOL DISTRICT shall be that of independent contractor and neither party shall be an agent of or otherwise have authority to bind the other party.

3.0 Payment Terms and Duty Hours

3.1 The SIRO's regular duty shall be 40 hours per week for 186 days, and the schedule of these hours shall be set by mutual agreement between the SCHOOL DISTRICT and the POLICE DEPARTMENT. The SCHOOL DISTRICT may contract for additional service days beyond the required 186 days at the per diem rate.

3.2 The SCHOOL DISTRICT shall pay the POLICE DEPARTMENT for the services of SIRO OFFICER GOLDEN at an average per diem rate of $702.91 for the 2034-24 school year. The SCHOOL DISTRICT will pay the POLICE DEPARTMENT at this per diem rate based upon the actual service of SIRO OFFICER GOLDEN.

3.3 From time to time the SIRO may be required to work more than the 8 hours of regular scheduled duty in a given day. For planned/scheduled extracurricular school activities (e.g., sporting events, dances, graduations) where secondary employment requests were traditionally made, and offered to full-time PBA members, the PBA shall offer those jobs to full-time PBA members first, through regular posting. Posting shall be made well in advance to ensure the fair and equitable distribution of secondary employment opportunities. All postings shall include a deadline date/time well prior to the event, to suitably accomplish scheduling needs. Once the deadline date/time has passed, and only if openings still exist, SPO's may be offered those jobs accordingly. In a timely manner, the PBA shall communicate to the secondary employment requester the results of said postings.

School specific events, which were never traditionally offered to full-time PBA members as secondary employment opportunities; to include non-scheduled unforeseen incidents or circumstances where an SPO is needed immediately (e.g., school threats, potential for harm) may be offered to an SPO at the discretion of the appropriate school official without first posting.

SIRO OFFICER GOLDEN
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In such instances of overtime, the additional time worked by the SIRO shall be credited as "school comp time" or overtime. The choice of either school comp time or overtime shall be at the discretion of the SIRO. School comp time may be used to offset days where the SIRO is scheduled to work, but does not have to report due to the closing of school. The maximum amount of comp time that may accumulate at any one time is 40 hours. At the end of the school year, any school comp time that has not been utilized by the SIRO shall be converted to overtime or carried forward into the next school year based upon the SIRO's request. Authorized overtime for SIRO OFFICER GOLDEN shall be billed at a rate of $81.48 per hour for the 2023 calendar year and $81.48 per hour for the 2024 calendar year.

3.4 The SIRO shall be on duty upon the school grounds fifteen minutes before the beginning of the student instructional day and shall remain on duty for eight (8) hours unless this schedule modified by the mutual agreement between the POLICE DEPARTMENT and the SCHOOL DISTRICT, or the Principal of the building to which the SIRO is assigned on a given day.

3.5 It is understood and agreed that time spent by the SIRO attending court juvenile and/or criminal cases arising from and/or out of their employment as an SIRO shall be considered as hours worked under this Agreement.

3.6 In the event of an emergency the SIRO may be ordered by the POLICE DEPARTMENT to leave school grounds during normal duty hours as described above to perform other services for the POLICE DEPARTMENT. In such instances, the time spent by the SIRO away from the school grounds shall not be considered billable time by the POLICE DEPARTMENT.

3.7 For school vacations, holidays and other times when school is not in session and/or the SIRO is not required to be on school grounds, the officer may take available leave balances, or report to the SIRO supervisor for reassignment.

4.0 Basic Qualifications of the School Information and Resource Officers (SIRO)

To be an SIRO, an officer must first meet all of the following basic qualifications:

4.1 Shall be a sworn officer and should have a minimum of five years of law enforcement experience;

4.2 Shall possess a sufficient knowledge of the applicable Federal and State laws, Town and County ordinances, and Board of Education policies and regulations;

4.3 Shall be capable of conducting in depth criminal investigations;

4.4 Shall possess even temperament and set a good example for students; and

4.5 Shall possess communication skills that would enable the officer to function effectively within the school environment.

5.0 Duties of School Resource Officer

5.1 To assist school officials with the enforcement of Board of Education Policies and Administrative Regulations regarding student conduct and to provide usual and customary police services to the SCHOOL DISTRICT. The role of school discipline shall remain with the school district administration.

5.2 To counsel public school students in special situations when requested by the principal or the principal's designee or by the parents of a student;

5.3 To answer questions and conduct classroom presentations for students in law-related fields;

5.4 To perform such other duties as the parties may agree from time to time.

5.5 The SIRO shall not detain or question students regarding their immigration status.

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6.1 As employees of the POLICE DEPARTMENT, the SIRO shall follow the chain of command as set forth in the POLICE DEPARTMENT Policies and Procedure Manual, except where such procedures conflict with the policies of the Board of Education of the SCHOOL DISTRICT. It is expressly recognized and acknowledged by the SCHOOL DISTRICT that policies of the Board of Education cannot supersede the SIRO's duty to act in accordance with state and federal law.

6.2 In the performance of the duties described herein, the SIRO shall regularly coordinate and communicate with the principal or the principals' designee of the schools to which they are assigned. The principal or designee shall contact the SIRO Supervisor assigned by the POLICE DEPARTMENT for such purpose in the event of any question regarding the performance of duties by an SIRO.

7.0 Training/Briefing

7.1 The SIRO may be required by the POLICE DEPARTMENT to attend monthly training and briefing sessions. These sessions will be held at the direction of the POLICE DEPARTMENT Operations commander. Briefing Sessions will be conducted to provide for the exchange of information between the department and the school liaison.

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10.3 Students shall not be transported to any location unless it is determined that the student's parent, guardian or custodian is at the destination to which the student is

being transported. The SIRO shall not transport students in their personal vehicles.

10.4 The SIRO shall notify the building principal before moving a student from the school grounds.

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11.1 School officials shall allow SIROs to inspect and copy any public records maintained by the school that is permissible by law.

11.2 If some information in a student's cumulative record is needed in an emergency to protect the health or safety of the student or other individuals, school officials may disclose to the SIRO that information which is needed to respond to the emergency situation based on the seriousness of the threat to someone's health or safety; the need of the information to meet the emergency situation and the extent to which time is of the essence.

11.3 If confidential student records information is needed, but no emergency situation exists, the information may be released only upon the issuance of a search warrant or subpoena to produce the records, or as may otherwise comply with the Family Educational Rights and Privacy Act (FERPA).

11.4 Pursuant to FERPA, the SCHOOL DISTRICT hereby designates each SIRO as the District's "law enforcement unit" for the purpose of enforcing any Federal, State or local law and maintaining the physical security and safety of the schools to which they are assigned, and as such shall have access to student education records as appropriate in order to carry out their SIRO duties.

12.0 Term of Agreement

12.1 The term of this agreement is one year commencing on July 1, 2021 and ending on June 30, 2023. The Agreement may be renewed and extended annually by the written agreement of both the SCHOOL DISTRICT and the POLICE DEPARTMENT. Written notice of intent to extend the Agreement must be sent by each party no later than June 1st of the current year.

12.2 In the event that the SCHOOL DISTRICT opts not to extend the Agreement in a given year, it shall remain responsible to pay the per diem charges that would otherwise have been due for the months of September and October of the succeeding year.

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*Due to contract negotiations, the prior rates remain in force until ratification.

13.1 The POLICE DEPARTMENT shall maintain in full force and effect during the term of this Agreement a comprehensive liability insurance policy with coverage that is consistent with police department policies and procedures.

13.2 Without waiving any defenses, the POLICE DEPARTMENT agrees to, at its sole cost and expense, indemnify, protect, defend and hold the SCHOOL DISTRICT harmless against any and all damages, losses, liabilities, obligations, penalties, claims, litigation, demands, defenses, judgments, suits, actions, proceedings, costs, disbursements and/or expenses (including reasonable attorney's fees) arising out of the performance of the SIRO's authorized duties as described in this Agreement. The SCHOOL DISTRICT shall provide notice to the POLICE DEPARTMENT within twenty (20) days of obtaining the same, of any potential claim or action which, if decided adversely to the SCHOOL DISTRICT, would cause the SCHOOL DISTRICT to suffer or incur loss or expense.

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The Town shall provide their Services in a manner which protects Student Data (as defined by 8 NYCRR 121.1(q)) and Teacher or Principal Data (as defined by 8 NYCRR 121.1(r)) (hereinafter "Confidential Data") in accordance with the requirements articulated under Federal, New York State and local laws and regulations, including but not limited to the foregoing:

(a) The Town will adopt technologies, safeguards and practices that align with the NIST Cybersecurity Framework.

(b) The Town will comply with the School District Data Security and Privacy Policy, Education Law § 2-d, and 8 NYCRR §121.

(c) The Town will limit internal access to personally identifiable information to only those employees or sub-contractors that need access to provide the contracted services.

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(d) The Town will not use the personally identifiable information for any purpose not explicitly authorized in this Agreement.
(e) The Town will not disclose any personally identifiable information to any other party without the prior written consent of the parent or eligible student, unless otherwise authorized pursuant to applicable law.
(f) The Town will maintain reasonable administrative, technical and physical safeguards to protect the security, confidentiality and integrity of personally identifiable information in its custody.
(g) The Town will use encryption to protect personally identifiable information in its custody while in motion or at rest.
(h) The Town will not sell personally identifiable information nor use or disclose it for any marketing or commercial purpose or facilitate its use or disclosure by any other party for any marketing or commercial purpose or permit another party to do so.
(i) In the event the Town engages a subcontractor to perform their contractual obligations, the data protection obligations imposed on the Town shall apply to the subcontractor.

16.0 Data Breach

In the event that Confidential Data is accessed or obtained by an unauthorized individual, the Town shall provide notification to the School District without unreasonable delay and not more than seven calendar days after the discovery of such breach. The Town shall follow the following process:

(a) The security breach notification shall be titled "Notice of Data Breach," shall be clear, concise, use language that is plain and easy to understand, and to the extent available, shall include: a brief description of the breach or unauthorized release; the dates of the incident in the date of discovery; a description of the types of Confidential affected; an estimate of the number of records affected; a brief description of the Town's investigation or plan to investigate; and contact information for representatives who can assist the School District with additional questions.
(b) The Town shall also prepare a statement for parents and eligible students which provides information under the following categories: "What Happened," "What Information Was Involved," "What We Are Doing," "What You Can Do," and "For More Information."
(c) Where a breach or unauthorized release of Confidential Data is attributed to Contractor, and/or a subcontractor or affiliate of the Town, The Town shall pay for or promptly reimburse the School District for the cost of notification to parents and eligible students of the breach.
(d) The Town shall cooperate with the School District and law enforcement to protect the integrity of investigations into the breach or unauthorized release of Confidential Data.

i. The name and contact information of the reporting School District subject to this section.

ii. A list of the types of personal information that were or are reasonably believed to have been the subject of a breach.

iii. If the information is possible to determine at the time the notice is provided, then either (1) the date of the breach, (2) the estimated date of the breach, or (3) the date range within which the breach occurred. The notification shall also include the date of the notice.

iv. Whether the notification was delayed as a result of a law enforcement investigation, if that information is possible to determine at the time the notice is provided.

v. A general description of the breach incident, if that information is possible to determine at the time the notice is provided.

vi. Information about what the agency has done to protect individuals whose information has been breached.

vii. Advice on steps that the person whose information has been breached may take to protect himself or herself.

(e) The Town further acknowledges and agrees to have a written incident response plan that reflects best practices and is consistent with industry standards and federal and state law for responding to a data breach, breach of security, privacy incident or unauthorized acquisition or use of Protected Data or any portion thereof, and agrees to provide Client, upon request, with a copy of said written incident response plan.

*Due to contract negotiations, the prior rates remain in force until ratification.

IN WITNESS WHEREOF, the parties hereto have caused this Operations Agreement to be executed the day and year first written above.

FAYETTEVILLE-MANLIUS CENTRAL SCHOOL DISTRICT

By:_____ 8/15/23

Dr. Craig Tice, Superintendent of Schools

MANLIUS POLICE DEPARTMENT

By:_____

Jason Cassalia, Chief of Police

TOWN OF MANLIUS

By: John T Peer 8/21/23

John Peer, Town Supervisor

SIRO OFFICER GOLDEN

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AGREEMENT BETWEEN THE TOWN OF MANLIUS POLICE DEPARTMENT AND FAYETTEVILLE-MANLIUS CENTRAL SCHOOL DISTRICT SIRO PROGRAM 2023-24* (M. GROGAN)

THIS AGREEMENT is made this ____th day of August, 2023 by and between the TOWN OF MANLIUS POLICE DEPARTMENT (hereinafter "POLICE DEPARTMENT") and the FAYETTEVILLE-MANLIUS CENTRAL SCHOOL DISTRICT (hereinafter "SCHOOL DISTRICT") as follows:

WHEREAS, the SCHOOL DISTRICT wishes to implement a SCHOOL INFORMATION RESOURCE OFFICER to promote the goal of ensuring a caring, safe, respectful, and orderly learning environment in its schools; and

WHEREAS, the SCHOOL DISTRICT and the POLICE DEPARTMENT desire to establish the terms and scope of duties in this SCHOOL INFORMATION and RESOURCE OFFICER (hereinafter referred to as ("SIRO") Agreement the specific terms and conditions of the services to be provided by the said SIROs in the SCHOOL DISTRICT:

NOW, THEREFORE, THE PARTIES HERETO AGREE AS FOLLOWS:

Defined terms

For the purposes of this Agreement, the following terms have the meanings listed:

SIRO Supervisor – The POLICE DEPARTMENT employee assigned to supervise the SIRO's activities.

School Liaison – The SCHOOL DISTRICT employee who is designated as the primary contact for the SIRO and POLICE DEPARTMENT regarding the SIRO's work.

School grounds – The school grounds shall consist of all buildings and grounds under jurisdiction of the SCHOOL DISTRICT, including but not limited to the high school, the middle school, the elementary school and the school district offices.

1.0 Goals and Objectives

It is understood and agreed that the SCHOOL DISTRICT and the POLICE DEPARTMENT officials share the following goals and objectives regarding the SIRO Program in the schools:

1.1 The primary duty of the SIRO is to establish relationships with students and to act as a mentor. The SIRO's law enforcement function is a part of relationship-building with the student body and community.

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1.2 The SIRO will foster educational programs and activities that increase student knowledge of and respect for the law and the function of law enforcement agencies;

1.3 The SIRO will be available to work cooperatively with teachers to assist in developing specialty programs specific to areas of study including but not limited to court procedures, citizenship and forensic science;

1.4 The SIRO will conduct criminal investigations with the goals of promoting safety for the school community and establishing a deterrent to delinquent student behavior and promoting and ensuring the safety of the students, faculty and administration of the SCHOOL DISTRICT;

1.5 The SIRO will work with school administrators to identify and address safety issues within the schools;

1.6 The SIRO will serve as a mentor and role model for students attending school in the SCHOOL DISTRICT.

2.0 Employment and Assignment of School Resource Officers

2.1 The SIRO shall be an employee of the POLICE DEPARTMENT and shall be subject to the administration, supervision and control of the POLICE DEPARTMENT, except as such administration, supervision and control is subject to the terms and conditions of this Agreement.

2.2 The POLICE DEPARTMENT agrees to provide and to pay the SIRO's salary and employment benefits in accordance with the applicable salary schedules and employment practices of the POLICE DEPARTMENT. The SIRO shall be subject to all other personnel and practices of the POLICE DEPARTMENT except as such policies or practices may have to be modified to comply with the terms and conditions of this Agreement.

2.3 The parties shall use a collaborative process in the assignment of a SIRO. Both parties shall have the right to attend and participate in candidate interviews. The POLICE DEPARTMENT shall select three finalists from the candidate pool and the SCHOOL DISTRICT shall select the candidate to be assigned.

2.4 The POLICE DEPARTMENT shall notify the SCHOOL DISTRICT within 24 hours of the termination of the services of a SIRO assigned to the SCHOOL DISTRICT. The SCHOOL DISTRICT has the right to refuse the services of a particular SIRO and shall provide the POLICE DEPARTMENT with 24 hours notice of its intent to do so. Upon such notice by either party, the parties shall meet and confer within 48 hours of such notice to discuss the replacement of the SIRO.

SIRO OFFICER GROGAN
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2.5 The POLICE DEPARTMENT shall hold the SCHOOL DISTRICT free, harmless and indemnified from and against any and all claims, suits or causes of action arising out of allegations of unfair or unlawful employment practices bought by SIROs.

2.6 In the event a SIRO is absent from work, the SIRO shall notify both his supervisor in the POLICE DEPARTMENT and the principal of the school to which the SIRO is assigned on that particular day. To the extent possible, the POLICE DEPARTMENT shall provide an interim replacement

2.7 The relationship of the POLICE DEPARTMENT to the SCHOOL DISTRICT shall be that of independent contractor and neither party shall be an agent of or otherwise have authority to bind the other party.

3.0 Payment Terms and Duty Hours

3.1 The SIRO's regular duty shall be 40 hours per week for 186 days, and the schedule of these hours shall be set by mutual agreement between the SCHOOL DISTRICT and the POLICE DEPARTMENT. The SCHOOL DISTRICT may contract for additional service days beyond the required 186 days at the per diem rate.

3.2 The SCHOOL DISTRICT shall pay the POLICE DEPARTMENT for the services of SIRO OFFICER GROGAN at an average per diem rate of $582.73 for the 2023-24 school year. The SCHOOL DISTRICT will pay the POLICE DEPARTMENT at this per diem rate based upon the actual service of SIRO OFFICER GROGAN.

3.3 From time to time the SIRO may be required to work more than the 8 hours of regular scheduled duty in a given day. For planned/scheduled extracurricular school activities (e.g., sporting events, dances, graduations) where secondary employment requests were traditionally made, and offered to full-time PBA members, the PBA shall offer those jobs to full-time PBA members first, through regular posting. Posting shall be made well in advance to ensure the fair and equitable distribution of secondary employment opportunities. All postings shall include a deadline date/time well prior to the event, to suitably accomplish scheduling needs. Once the deadline date/time has passed, and only if openings still exist, SPO's may be offered those jobs accordingly. In a timely manner, the PBA shall communicate to the secondary employment requester the results of said postings.

School specific events, which were never traditionally offered to full-time PBA members as secondary employment opportunities; to include non-scheduled unforeseen incidents or circumstances where an SPO is needed immediately (e.g., school threats, potential for harm) may be offered to an SPO at the discretion of the appropriate school official without first posting. In such instances of overtime,

the additional time worked by the SIRO shall be credited as "school comp time" or overtime. The choice of either school comp time or overtime shall be at the discretion of the SIRO. School comp time may be used to offset days where the SIRO is scheduled to work, but does not have to report due to the closing of school. The maximum amount of comp time that may accumulate at any one time is 40 hours. At the end of the school year, any school comp time that has not been utilized by the SIRO shall be converted to overtime or carried forward into the next school year based upon the SIRO's request. Authorized overtime for SIRO OFFICER GROGAN shall be billed at a rate of $79.25 per hour for the 2023 calendar year and $79.25 for the 2024 calendar year.

3.4 The SIRO shall be on duty upon the school grounds fifteen minutes before the beginning of the student instructional day and shall remain on duty for eight (8) hours unless this schedule modified by the mutual agreement between the POLICE DEPARTMENT and the SCHOOL DISTRICT, or the Principal of the building to which the SIRO is assigned on a given day.

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16.0 Data Breach

In the event that Confidential Data is accessed or obtained by an unauthorized individual, the Town shall provide notification to the School District without unreasonable delay and not more than seven calendar days after the discovery of such breach. The Town shall follow the following process:

(a) The security breach notification shall be titled "Notice of Data Breach," shall be clear, concise, use language that is plain and easy to understand, and to the extent available, shall include: a brief description of the breach or unauthorized release; the dates of the incident in the date of discovery; a description of the types of Confidential affected; an estimate of the number of records affected; a brief description of the Town's investigation or plan to investigate; and contact information for representatives who can assist the School District with additional questions.
(b) The Town shall also prepare a statement for parents and eligible students which provides information under the following categories: "What Happened," "What Information Was Involved," "What We Are Doing," "What You Can Do," and "For More Information."
(c) Where a breach or unauthorized release of Confidential Data is attributed to Contractor, and/or a subcontractor or affiliate of the Town, The Town shall pay for or promptly reimburse the School District for the cost of notification to parents and eligible students of the breach.
(d) The Town shall cooperate with the School District and law enforcement to protect the integrity of investigations into the breach or unauthorized release of Confidential Data.

i. The name and contact information of the reporting School District subject to this section.

ii. A list of the types of personal information that were or are reasonably believed to have been the subject of a breach.

iii. If the information is possible to determine at the time the notice is provided, then either (1) the date of the breach, (2) the estimated date of the breach, or (3) the date range within which the breach occurred. The notification shall also include the date of the notice.

iv. Whether the notification was delayed as a result of a law enforcement investigation, if that information is possible to determine at the time the notice is provided.

v. A general description of the breach incident, if that information is possible to determine at the time the notice is provided.

vi. Information about what the agency has done to protect individuals whose information has been breached.

vii. Advice on steps that the person whose information has been breached may take to protect himself or herself.

(e) The Town further acknowledges and agrees to have a written incident response plan that reflects best practices and is consistent with industry standards and federal and state law for responding to a data breach, breach of security, privacy incident or unauthorized acquisition or use of Protected Data or any portion thereof, and agrees to provide Client, upon request, with a copy of said written incident response plan.

*Due to contract negotiations, the prior rates remain in force until ratification.

IN WITNESS WHEREOF, the parties hereto have caused this Operations Agreement to be executed the day and year first written above.

FAYETTEVILLE-MANLIUS CENTRAL SCHOOL DISTRICT

By: 8/15/23

Dr. Craig Tice, Superintendent of Schools

MANLIUS POLICE DEPARTMENT

By:

Jason Cassalia, Chief of Police

TOWN OF MANLIUS

By: 8/21/23

John Deer, Town Supervisor

SIRO OFFICER GROGAN

*Due to contract negotiations, the prior rates remain in force until ratification.

Special Patrol Officer Agreement Between the

Town of Manlius and the Fayetteville-Manlius Central School District
(Officer B. Damon)

This Special Patrol Officer Agreement (the "Agreement") is made as of the _____ day of _____, 2023, by and between the Town of Manlius, a municipal corporation situated in the County of Onondaga, State of New York, whose principal address is 301 Brooklea Drive, Fayetteville, New York 13066 (the "Town"); and the Fayetteville-Manlius School District of the County of Onondaga and State of New York, a municipal corporation whose principal address is, 8199 East Seneca Turnpike Manlius, New York 13104 (the "School District"). The Town of Manlius Police Department ("Manlius Police Department") is a specific department within the Town's government structure and does not constitute a separate entity or party to the Agreement. However, the Manlius Police Department will have primary responsibility for carrying out the duties and obligations set forth in this Agreement on behalf of the Town.

WHEREAS, Article 5-G of the New York State's General Municipal Law ("GML") provides the authority for "municipal corporations" to enter into agreements for the performance between themselves, or one for the other, of their respective functions, powers and duties on a cooperative contract basis; and

WHEREAS, the School District and the Town are both deemed to be "municipal corporations" as that term is defined by GML 119-n(a); and

WHEREAS, the School District and the Town have determined that it is in their mutual best interests to enter into this Agreement to provide for the assignment of dedicated officers of the Manlius Police Department to serve as Special Patrol Officer(s) in the School District.

NOW, THEREFORE, the parties hereby agree as follows:

1.0 TERM OF AGREEMENT

1.1 This Agreement is for the academic school years of 2023-24 and begins on September 1, 2023 and expires on June 30, 2024, without notice, unless terminated earlier as provided in this Agreement (the "Term").

2.0 General Terms and Conditions

2.1 The Town and School District have voluntarily chosen to enter into the Agreement in order to have Peace Officer(s) placed within the School District.

2.2 These Peace Officer(s) shall be referred to under this Agreement as Special Patrol Officers ("SPOs"). For the purposes of this Agreement, the term "SPO" shall include those officers specifically selected for (and assigned to) the Schools for a specific academic year as SPOs will be responsible to serve and perform the job duties described herein, to the extent consistent with the parties overall objectives and responsibilities described herein (collectively "SPO Services").

2.3 The SPO assignment is intended to be a daytime assignment to be performed Monday through Friday, eight (8) hours per day concurrent with the school day and the School District's academic calendar. The SPO worksite shall include the SPOs assigned School, as well as any other associated buildings and grounds on the assigned school premise. Occasionally, the SPOs may be temporarily assigned to other schools within the School District on an as-needed basis.

2.4 The Town agrees that the SPO Services rendered under this Agreement will be in compliance with applicable federal, state, or local laws, rules and regulations pertaining to the Town's provision of services under an inter-municipal agreement pursuant to GML Article 5-G.

3.0 SPO Program Objectives

The objectives of the SPO program are to:

3.1 Provide a police presence in the Schools in order to promote and provide an atmosphere of enhanced school safety for faculty, staff, students and school visitors;

3.2 Provide a law enforcement resource to students, teachers, school administrators and parents, so as to increase student awareness about crime prevention, internet safety, conflict resolution, violence prevention, restorative justice and peer mediation;

3.3 Increase school faculty and staff awareness about policies and procedures for preventing/responding to incidents of violence and other threats to school safety;

3.4 Facilitate crime prevention, law enforcement and security consultation;

3.5 Build lines of communication and promote positive attitudes between students and the Manlius Police Department;

3.6 Provide a counseling resource to students who may be experiencing a variety of school, family, or social problems;

3.7 Proactively address problems and pressures as they relate to students before such problems manifest into socially and legally unacceptable behavior (including, but not limited to, the use of alcohol, drugs, and/or tobacco, as well as issues involving peer pressure, gang activity, sexual activity, etc.);

3.8 Provide a positive role model for students; and

3.9 Provide education in law enforcement, as requested and appropriate.

4.0 Qualifications for SPO

The SPO shall:

4.1 Be, and remain at all times, properly licensed and/or credentialed as a Peace Officer in accordance with applicable law;

4.1.1 Upon request, the Town shall provide the School District with copies of any assigned SPO's license(s) and/or credentials(s);

4.1.2 If, at any time during the Agreement, the license and/or required credentials of an SPO providing SPO services are revoked, terminated, suspended or otherwise impaired, the Town shall remove the individual from performing SPO services under this Agreement, and shall promptly notify the School District.

5.0 HIRING AND IMPLEMENTATION OF THE SPO

5.1 The School District reserves the right to participate in the Town's hiring and interview process for any individual proposed to perform SPO Services at the School.

5.2 The School District also reserves the right to reject any individual assigned by the Town to perform SPO Services at the Schools for failure to properly perform the SPO services or to request a cancellation of any component of the SPO Services which the School District reasonably believes is inappropriate or inapplicable. However, no such action by the School District shall result in a reduction in the agreed upon the Contract Fees and Expenses set forth in the Agreement, nor require and SPO to conduct himself or herself in a manner contrary to, or in violation of, proper Peace Officer policies, protocols and procedures.

5.3 The Town shall notify the School District in writing within one (1) school day of the termination of the services of the SPO assigned to the School District. The parties shall meet and confer within two (2) school days of such notice to discuss the replacement of the SPO. The School District may refuse the services of a particular replacement SPO for reasonable cause and shall provide the Town with one (1) school days' notice of its intent to do so

5.4 In the event the SPO is absent from work, the SPO shall notify a Police Supervisor and the School District clerk prior to the SPO's scheduled arrival time.

6.0 Fingerprints and Criminal Clearance

6.1 To the extent necessary to obtain clearance, the Town shall be responsible for facilitating and conducting criminal background checks and criminal clearance reviews for SPOs.

6.2 The Town shall be responsible for all costs associated with the required fingerprinting and criminal background checks and clearance for SPOs under the Agreement.

7.0 SPECIFIC RESPONSIBILITIES OF THE TOWN OF MANLIUS POLICE DEPARTMENT

7.1 In addition to any other responsibilities of the Town set forth in this Agreement, the Town and the Manlius Police Department will cooperate with the School District to implement the SPO Program in the Schools with the least possible disruption to the educational process.

7.2 The Town – through the Manlius Police Department – may enlist the assistance of other law enforcement agencies with appropriate jurisdiction as circumstances warrant, under the Agreement.

7.3 The Town will be responsible for submitting requests for retirement waivers pursuant to Section 212(3) of the New York State Retirement and Social Security Law, as applicable. However, the Town is not responsible for the outcome of any such waiver request, nor can the Town guarantee that any such waiver request will be approved by New York State.

8.0 SPECIFIC RESPONSIBILITIES OF THE SCHOOL DISTRICT

In addition to any other responsibilities of the School District set forth in the Agreement, the School District will:

8.1 Designate a School Building Administrator who shall serve as the building-level School representative for the SPO program;

8.2 Provide the SPO with access to its School facilities, personnel and students as reasonably required to fulfill the SPO's duties under this Agreement;

8.3 Ensure that school personnel, School Board Members, students and parents are informed of the duties and presence of the SPO in the School;

8.4 Provide time and appropriate space for the SPO to conduct approved staff, student and parent training;

8.5 Provide space for the SPO to store instructional materials and perform necessary tasks directly related to the SPO program;

8.6 Cooperate with the Town to supply any relevant information needed for purposes of submitting retirement waivers for the SPOs; and

8.7 Cooperate with the Manlius Police Department and SPO relative to the scheduling of time off in the event of an SPO's illness or injury.

9.0 INFORMATION SHARING

9.1 The School District will share relevant information about school safety issues with the SPO including, but not limited to:

9.1.1 School District and School building safety/crisis plans, including for any other school to which the SPO may be assigned;

9.1.2 The School District's Code of Conduct;

9.1.3 Uniform violent incident reports in accordance with New York State Education Law and the Safe Schools against Violence in Education Act; and

9.1.4 Reports pertaining to alleged incidents of Child Abuse in an Educational Setting.

10.0 INFORMATION SHARING BY THE TOWN

The Town and SPO will share relevant information, to the extent permitted by law, about school safety issues with the School District including, but not limited to:

10.1.1 Any necessary interventions/referrals to service providers arising from incidents/reports received on school property, e.g., suicide prevention, drug or alcohol abuse, reports of sexual abuse.

10.1.2 Any information pertinent to school safety and/or safety of individuals on School property; and

10.1.3 Any training or educational opportunities for an SPO or School District representatives relative to school safety.

11.0 SPECIFIC DUTIES OF SPECIAL PATROL OFFICERS (SPOs)

In addition to any other duties specifically set forth in the Agreement, an SPO assigned to the School District shall provide SPO Services intended to meet the program objectives, including, but not limited to the following:

11.1 Patrol and observe all areas of the assigned School(s) and corresponding grounds;

11.2 Be visible and available to the students, faculty, and administration;

11.3 Keep the peace and help maintain a safe and orderly school community;

11.4 Develop and maintain a positive and open relationship with students, faculty and parents;

11.5 Present educational programs to students on various topics, including conflict resolution, restorative justice, crime awareness, anger management, etc.;

11.6 Present educational programs to School employees, parents and School Board Members;

11.7 Build community relationships by serving a liaison between the Town (which includes the Manlius Police Department) and the School District;

11.8 Survey the needs of the Schools and address crime and disorder problems, as well as drug activities affecting or occurring in or around the Schools;

11.9 Assist Schools with security concerns and identify physical changes in the environment that may reduce crime in or around the Schools;

11.10 Develop or expand crime prevention efforts for students;

11.11 Educate potential school-age victims in crime prevention and safety;

11.12 Assist in the development of School policies that address crime issues and recommend procedural change(s), where appropriate;

11.13 Assist Schools in meeting safety and security goals and any related requirements mandated by New York State Law;

11.14 Take appropriate law enforcement action with regard to any criminal activities that the SPO observes or that are reported directly to the SPO, including investigation of any suspected or actual criminal activity that might otherwise be investigated by a local police agency; and

11.15 Investigate other emergency situations and summon aid and assistance as needed (e.g., Fire Department, ambulance, etc.);

11.16 The SPO shall not be responsible for, or have authority to, enforce School rules. Matters of school discipline shall be referred to the appropriate School Principal or School District Administrator for further review and action;

11.17 The SPO shall not detain or question students regarding their immigration status;

11.18 In fulfilling his/her duties the SPO shall not discriminate on the basis of race, color, sex, national origin, language status, disability, religion, sexual orientation, or membership in any other protected class.

11.19 The SPO shall comply with all Federal, State and local laws as well as school District policies.

12.0 SUPERVISORY AUTHORITY

12.1 The SPOs assigned to the School District pursuant to the Agreement are under the direct and sole supervision and authority of the Town's Chief of Police and other Command Officers within the Manlius Police Department. The SPOs assigned to the School District shall comply with all general and specific SPO policies or protocol/procedure directives prepared by the Manlius Police Department.

12.3 The Manlius Police Department will share a copy of any SPO policy or protocol/procedure direction with the School District.

12.4 The Manlius Police Department will also provide a copy of all SPO policies or protocol/procedure directives to SPOs assigned to the School District.

12.5 In the performance of the duties described herein, the SPO shall regularly coordinate and communicate with the Principal or the Principals' designee of the schools to which they are assigned. The Principal or designee shall contact the SPO Supervisor assigned by the Town for such purpose in the event of any question regarding the performance of duties by an SPO. However, the SPO shall remain under the direct and exclusive control and supervision of the Town on all matters relating to the duties of the SPO under this Agreement.

12.6 The SPO shall not be an employee of the School District.

12.7 The Parties shall confer and agree regarding the SPO's attire while on duty.

13.0 PROGRAM EVALUATION

13.1 The School District will provide timely evaluations to the Manlius Police Department to enable required progress reports to be completed in an efficient and timely manner.

13.2 Any evaluation instruments for completion by selected students, school staff, school administrators, and community members will be developed collaboratively by the School District and the Manlius Police Department in order to ensure objective evaluation criteria are established and applied.

14.0 CONTRACT FEES AND ADDITIONAL COSTS

14.1 The School District agrees to pay the Town for Contract Fees and Costs associated with the placement of SPOs in the School District as set forth herein.

14.2 SPOs will be assigned to the School District for a period of approximately one hundred eighty six (186) days per academic year for a minimum of eight (8) hours each day, at a rate of pay of Forty dollars **($40.00)** per hour plus reimbursement to the Town for the Town's expenses and contributions for FICA, Medicare, Workers' Compensation, if any, and other mandated employer payments or contributions made on behalf of these employees.

To be compensated, a SPO must "clock-in" utilizing the department's payroll software from a computer or portable electronic device, which is necessary for accounting, administrative, and billing purposes and must be strictly adhered to in the following manner:

a. When scheduled, a SPO may only clock-in when they are physically present at their assigned school or when assigned to an off-site detail authorized by a supervisor or the appropriate school administrator.

b. If a SPO neglects to clock-in or out, has been assigned to an off-site detail, or any circumstances exist where manual adjustments need be made, the SPO should contact their supervisor, explain the circumstances, and request the appropriate adjustments.

c. If a SPO is required to work overtime due to an active event they are on they will need to add a note in the software stating the reason for the overtime and who approved it.

d. If a SPO is requested for a preplanned event they have been approved to work, they need to let their supervisor know they are working the event and ensure they make a note in the payroll software indicating the event worked and who approved it from the school.

14.3 SPO's shall only work school related functions and events. SPO's will not routinely be asked to work beyond their normal schedule; however, if the need exists, and falls within the below listed criteria, they may work overtime and will be compensated accordingly.

For planned/scheduled extracurricular school activities (e.g., sporting events, dances, graduations) where secondary employment requests were traditionally made, and offered to full-time PBA members, the PBA shall offer those jobs to full-time PBA members first, through regular posting. Posting shall be made well in advance to ensure the fair and equitable distribution of secondary employment opportunities. All postings shall include a deadline date/time well prior to the event, to suitably accomplish scheduling needs. Once the deadline date/time has passed, and only if openings still exist, SPO's may be offered those jobs accordingly. In a timely manner, the PBA shall communicate to the secondary employment requester the results of said postings.

School specific events, which were never traditionally offered to full-time PBA members as secondary employment opportunities; to include non-scheduled unforeseen incidents or circumstances where an SPO is needed immediately (e.g., school threats, potential for harm) may be offered to an SPO at the discretion of the appropriate school official without first posting.

14.4 The SPO's regular duty hours shall be 7:45 a.m. until 3:45 p.m. unless this schedule is modified by mutual agreement between the Town and the School District, or the Principal of the building to which the SPO is assigned on a given day.

14.5 Additional expenses (e.g., meals, tolls, travel, etc.) may be incurred, for In Service Training (48 hours annual minimum), supplemental schools, seminars or additional services, at the agreed-upon reimbursement and hourly rate, with prior authorization from the School District's Superintendent.

14.6 The Manlius Police Department will design appropriate verification forms which will be made available to authorized School District personnel for auditable proof of services performed for the School District. The School District will be invoiced three times per year – in January for services rendered from September through December, in April for services rendered from January through March and in July for services rendered from April through June – for the actual costs incurred by the Town in accordance with this Agreement. The School District agrees to make full payment to the Town within 30 business days from receipt of the invoice.

14.7 The School District further agrees to reimburse the Town for up to **$10,000** per SPO officer, per academic year, to cover the costs for uniforms, equipment and training (Additional Costs). Any applicable reimbursement for the Additional Costs will be invoiced to the School District. The equipment and uniforms purchased in the Agreement shall remain the property of the Town, except as otherwise provided herein.

14.8 The parties acknowledge, however, that the cost of living, as well as costs for uniforms, equipment and training may increase from year one to year two of this Agreement. Accordingly, the parties understand and agree that future rate increases will be mutually agreed upon in writing prior to implementation.

14.9 Except as otherwise provided herein, the Town agrees that the Contract Fees and Additional Costs set forth herein are the exclusive fees for all SPO services provided under the Agreement.

15.0 TOWN AS AN INDEPENDENT CONTRACTOR

15.1 The Town shall provide SPO Services to the School District as an independent contractor, and any and all SPO Services performed by the Town and its employees or agents under this Agreement shall be performed in such capacity.

15.2 The Town's employees, consultants, or agents shall not hold himself/herself out as, nor claim to be, an officer or employee of the School District, nor make any claim, demand, or application to or for any right or privilege applicable to an officer or employee of the

School District, including, but not limited to, Workers' Compensation coverage, unemployment Insurance benefits, Social Security coverage, Disability benefits, New York State Retirement membership or credit, etc.

15.3 The Town shall not have, nor hold itself out as having, the authority or power to bind or create liability for the School District by the Town's acts or omissions.

15.4 It is agreed by the Town and the School District that neither federal, state, or local income taxes nor payroll taxes of any kind, including, but not limited to F.I.C.A. or F.U.T.A., will be withheld or paid by the School District on behalf of any Town employee, consultant, or agent in connection with this Agreement.

15.5 Said employment withholdings and/or payments are to be made by the Town in compliance with all federal, state, and local laws, rules or regulations.

15.6 Provided the School District timely pays the Town the Fees established, the Town agrees to pay and/or withhold all applicable taxes, including income taxes, Workers' Compensation Insurance, unemployment insurance payment, disability insurance payment, and/or any other payments that may be required under the laws, rules, or regulations of any government agency having jurisdiction over the Town or its relationship with the School District, and further agrees to indemnify and hold the School District harmless against any claim, cost, penalty, damage, or expense (including reasonable attorneys' fees) related to either parties nonpayment and/or underpayment of any such taxes or payments.

15.7 The School District acknowledges that it shall have no ability to control the manner, means, details or methods by which the Town or its agents perform SPO Services under this Agreement, unless otherwise addressed in this Agreement and except as required by federal, state, or local laws, rules, and regulations.

15.8 These provisions shall survive any expiration, termination, or non-renewal of the Agreement.

16.0 TERMINATION OF THE AGREEMENT

Either party may terminate this Agreement, at any time, for any reason, by providing thirty (30) days advance notice to the other party. Such notification shall be made, in writing, and sent via a trackable overnight delivery method (e.g., FedEx, UPS, USPS Express Mail, etc.) to the other party at its principal address.

17.0 EXTENSION OR RENEWAL

17.1 Negotiations for any contract renewal will begin during the month of May 2024.

17.2 The parties will each be responsible for initiating such negotiations. The failure of a party to initiate or to be affirmatively non-receptive to such initiation by the other party shall be deemed treated as a firm intent not to renew the Agreement.

18.0 RECIPROCAL INDEMNIFICATION

18.1 The Town shall indemnify and hold harmless the School District from and against any and all losses, damages, judgments, claims, causes of action, costs, expenses, and other liabilities (collectively, "Liabilities") to the extent such liabilities arise from the negligent or other wrongful acts or omissions, or any such legal or contractual duties or obligations assumed by the School District, of the Town, its officers, and employees, (including the SPO), or from the Town or any such person's or the Town's material breach of, or default hereunder.

18.2 The School District shall indemnify and hold harmless the Town from and against any and all losses, damages, judgments, claims, causes of action, costs, expenses, and other liabilities (collectively, "liabilities") to the extent such liabilities arise from negligent or other wrongful acts or omissions or of any such legal or contracted duties or obligations assumed by the School District, of the School District, its officers, and employees, or from the School District's material breach of, or default hereunder.

19.0 CONTROLLING LAW AND VENUE

This Agreement shall be interpreted pursuant to the laws of the State of New York, without regard to New York's conflict of laws provision. If an action is filed to enforce this Agreement, the parties agree that such action must be filed exclusively in a court of competent jurisdiction in Onondaga County, New York, and the parties expressly consent to the jurisdiction of such court.

20.0 ASSIGNMENT

This Agreement may not be assigned by either party.

21.0 ENTIRE AGREEMENT

This Agreement may not be altered except by a writing signed by both parties. Furthermore, this Agreement represents the entire agreement and understanding between the parties and supersedes all prior agreements between the parties, written or oral.

22.0 INTERPRETATION

The language of all parts of this Agreement in all cases shall be construed as a whole, according to its fair meaning, and not strictly for or against any party, regardless of who drafted it.

23.0 INSURANCES

The District agrees to obtain and continue to maintain in full force and effect its general liability insurance, public insurance, and automotive insurance relative to the SPO Services to be performed under the Agreement, with limits of not less than $500,000 per occurrence and $1,000,000 in the annual aggregate.

24.0 PROTECTION OF CONFIDENTIAL DATA.

The Town shall provide its Services in a manner which protects Student Data (as defined by 8 NYCRR 121.1(q)) and Teacher or Principal Data (as defined by 8 NYCRR 121.1(r)) (hereinafter "Confidential Data") in accordance with the requirements articulated under Federal, New York State and local laws and regulations, including but not limited to the foregoing:

24.1 The Town will adopt technologies, safeguards and practices that align with the NIST Cybersecurity Framework.

24.2 The Town will comply with the School District Data Security and Privacy Policy, Education Law § 2-d, and 8 NYCRR §121.

24.3 The Town will limit internal access to personally identifiable information to only those employees or sub-contractors that need access to provide the contracted services.

24.4 The Town will not use the personally identifiable information for any purpose not explicitly authorized in this Agreement.

24.5 The Town will not disclose any personally identifiable information to any other party without the prior written consent of the parent or eligible student, unless otherwise authorized pursuant to applicable law.

24.6 The Town will maintain reasonable administrative, technical and physical safeguards to protect the security, confidentiality and integrity of personally identifiable information in its custody.

24.7 The Town will use encryption to protect personally identifiable information in its custody while in motion or at rest.

24.8 The Town will not sell personally identifiable information nor use or disclose it for any marketing or commercial purpose or facilitate its use or disclosure by any other party for any marketing or commercial purpose or permit another party to do so.

24.9 In the event The Town engages a subcontractor to perform its contractual obligations, the data protection obligations imposed on the Town shall apply to the subcontractor.

25.0 DATA BREACH

In the event that Confidential Data is accessed or obtained by an unauthorized individual, The Town shall provide notification to the School District without unreasonable delay and not more than seven calendar days after the discovery of such breach. The Town shall follow the following process:

25.1 The security breach notification shall be titled "Notice of Data Breach," shall be clear, concise, use language that is plain and easy to understand, and to the extent available, shall include: a brief description of the breach or unauthorized release; the dates of the incident in the date of discovery; a description of the types of Confidential affected; an estimate of the number of records affected; a brief description of the Town's investigation or plan to investigate; and contact information for representatives who can assist the School District with additional questions.

25.2 The Town shall also prepare a statement for parents and eligible students which provides information under the following categories: "What Happened," "What Information Was Involved," "What We Are Doing," "What You Can Do," and "For More Information."

25.3 Where a breach or unauthorized release of Confidential Data is attributed to The Town, and/or a subcontractor or affiliate of The Town, The Town shall pay for or promptly reimburse the School District for the cost of notification to parents and eligible students of the breach.

25.4 The Town shall cooperate with the School District and law enforcement to protect the integrity of investigations into the breach or unauthorized release of Confidential Data.

25.4.1 The name and contact information of the reporting School District subject to this section.

25.4.2 A list of the types of personal information that were or are reasonably believed to have been the subject of a breach.

25.4.3 If the information is possible to determine at the time the notice is provided, then either (1) the date of the breach, (2) the estimated date of the breach, or (3) the date range within which the breach occurred. The notification shall also include the date of the notice.

25.4.4 Whether the notification was delayed as a result of a law enforcement investigation, if that information is possible to determine at the time the notice is provided.

25.4.5 A general description of the breach incident, if that information is possible to determine at the time the notice is provided.

25.4.6 Information about what the agency has done to protect individuals whose information has been breached.

25.4.7 Advice on steps that the person whose information has been breached may take to protect himself or herself.

25.5 The Town further acknowledges and agrees to have a written incident response plan that reflects best practices and is consistent with industry standards and federal and state law for responding to a data breach, breach of security, privacy incident or unauthorized acquisition or use of Protected Data or any portion thereof, and agrees to provide Client, upon request, with a copy of said written incident response plan

26.0 ADDENDUM

The following addenda attached hereto shall be incorporated into the Agreement:

Addendum A: Parents' Bill of Rights for Data Privacy and Security

Addendum B: Parents' Bill of Rights – Supplemental Information Addendum

Addendum C: The Town's Data Security and Privacy Plan

27.0 WAIVER

The failure of any party to insist on the strict performance of any provision of this Agreement or to exercise any right under this Agreement shall not constitute a waiver of such provisions or right. A waiver is effective only if in writing and signed and delivered by the waiving party.

28.0 MUTUAL COVENANTS

28.1 The undersigned representatives of the two contracting parties, in signing, hereby represent that they are authorized and empowered by their respective Boards (as applicable) to enter into this Agreement. Consent to the terms of this Agreement is signified by the signatures below.

28.2 It is agreed by and between the parties that any provision of this Agreement requiring legislative action to permit its implementation by amendment of law or by providing the additional funds therefore shall not become effective until the appropriate legislative body has given approval.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals the day and year first above written.

For the Town of Manlius:

John T Sell

8/21/23

Date

For the Fayetteville - Manlius School District:

8/15/23

Date

Special Patrol Officer Agreement Between the

Town of Manlius and the Fayetteville-Manlius Central School District
(Officer G. Hack)

This Special Patrol Officer Agreement (the "Agreement") is made as of the _____ day of _____, 2023, by and between the Town of Manlius, a municipal corporation situated in the County of Onondaga, State of New York, whose principal address is 301 Brooklea Drive, Fayetteville, New York 13066 (the "Town"); and the Fayetteville-Manlius School District of the County of Onondaga and State of New York, a municipal corporation whose principal address is, 8199 East Seneca Turnpike Manlius, New York 13104 (the "School District"). The Town of Manlius Police Department ("Manlius Police Department") is a specific department within the Town's government structure and does not constitute a separate entity or party to the Agreement. However, the Manlius Police Department will have primary responsibility for carrying out the duties and obligations set forth in this Agreement on behalf of the Town.

WHEREAS, Article 5-G of the New York State's General Municipal Law ("GML") provides the authority for "municipal corporations" to enter into agreements for the performance between themselves, or one for the other, of their respective functions, powers and duties on a cooperative contract basis; and

WHEREAS, the School District and the Town are both deemed to be "municipal corporations" as that term is defined by GML 119-n(a); and

WHEREAS, the School District and the Town have determined that it is in their mutual best interests to enter into this Agreement to provide for the assignment of dedicated officers of the Manlius Police Department to serve as Special Patrol Officer(s) in the School District.

NOW, THEREFORE, the parties hereby agree as follows:

1.0 TERM OF AGREEMENT

1.1 This Agreement is for the academic school years of 2023-24 and begins on September 1, 2023 and expires on June 30, 2024, without notice, unless terminated earlier as provided in this Agreement (the "Term").

2.0 General Terms and Conditions

2.1 The Town and School District have voluntarily chosen to enter into the Agreement in order to have Peace Officer(s) placed within the School District.

2.2 These Peace Officer(s) shall be referred to under this Agreement as Special Patrol Officers ("SPOs"). For the purposes of this Agreement, the term "SPO" shall include those officers specifically selected for (and assigned to) the Schools for a specific academic year as SPOs will be responsible to serve and perform the job duties described herein, to the extent consistent with the parties overall objectives and responsibilities described herein (collectively "SPO Services").

2.3 The SPO assignment is intended to be a daytime assignment to be performed Monday through Friday, eight (8) hours per day concurrent with the school day and the School District's academic calendar. The SPO worksite shall include the SPOs assigned School, as well as any other associated buildings and grounds on the assigned school premise. Occasionally, the SPOs may be temporarily assigned to other schools within the School District on an as-needed basis.

2.4 The Town agrees that the SPO Services rendered under this Agreement will be in compliance with applicable federal, state, or local laws, rules and regulations pertaining to the Town's provision of services under an inter-municipal agreement pursuant to GML Article 5-G.

3.0 SPO Program Objectives

The objectives of the SPO program are to:

3.1 Provide a police presence in the Schools in order to promote and provide an atmosphere of enhanced school safety for faculty, staff, students and school visitors;

3.2 Provide a law enforcement resource to students, teachers, school administrators and parents, so as to increase student awareness about crime prevention, internet safety, conflict resolution, violence prevention, restorative justice and peer mediation;

3.3 Increase school faculty and staff awareness about policies and procedures for preventing/responding to incidents of violence and other threats to school safety;

3.4 Facilitate crime prevention, law enforcement and security consultation;

3.5 Build lines of communication and promote positive attitudes between students and the Manlius Police Department;

3.6 Provide a counseling resource to students who may be experiencing a variety of school, family, or social problems;

3.7 Proactively address problems and pressures as they relate to students before such problems manifest into socially and legally unacceptable behavior (including, but not limited to, the use of alcohol, drugs, and/or tobacco, as well as issues involving peer pressure, gang activity, sexual activity, etc.);

3.8 Provide a positive role model for students; and

3.9 Provide education in law enforcement, as requested and appropriate.

4.0 Qualifications for SPO

The SPO shall:

4.1 Be, and remain at all times, properly licensed and/or credentialed as a Peace Officer in accordance with applicable law;

4.1.1 Upon request, the Town shall provide the School District with copies of any assigned SPO's license(s) and/or credentials(s);

4.1.2 If, at any time during the Agreement, the license and/or required credentials of an SPO providing SPO services are revoked, terminated, suspended or otherwise impaired, the Town shall remove the individual from performing SPO services under this Agreement, and shall promptly notify the School District.

5.0 HIRING AND IMPLEMENTATION OF THE SPO

5.1 The School District reserves the right to participate in the Town's hiring and interview process for any individual proposed to perform SPO Services at the School.

5.2 The School District also reserves the right to reject any individual assigned by the Town to perform SPO Services at the Schools for failure to properly perform the SPO services or to request a cancellation of any component of the SPO Services which the School District reasonably believes is inappropriate or inapplicable. However, no such action by the School District shall result in a reduction in the agreed upon the Contract Fees and Expenses set forth in the Agreement, nor require and SPO to conduct himself or herself in a manner contrary to, or in violation of, proper Peace Officer policies, protocols and procedures.

5.3 The Town shall notify the School District in writing within one (1) school day of the termination of the services of the SPO assigned to the School District. The parties shall meet and confer within two (2) school days of such notice to discuss the replacement of the SPO. The School District may refuse the services of a particular replacement SPO for reasonable cause and shall provide the Town with one (1) school days' notice of its intent to do so

5.4 In the event the SPO is absent from work, the SPO shall notify a Police Supervisor and the School District clerk prior to the SPO's scheduled arrival time.

6.0 Fingerprints and Criminal Clearance

6.1 To the extent necessary to obtain clearance, the Town shall be responsible for facilitating and conducting criminal background checks and criminal clearance reviews for SPOs.

6.2 The Town shall be responsible for all costs associated with the required fingerprinting and criminal background checks and clearance for SPOs under the Agreement.

7.0 SPECIFIC RESPONSIBILITIES OF THE TOWN OF MANLIUS POLICE DEPARTMENT

7.1 In addition to any other responsibilities of the Town set forth in this Agreement, the Town and the Manlius Police Department will cooperate with the School District to implement the SPO Program in the Schools with the least possible disruption to the educational process.

7.2 The Town – through the Manlius Police Department – may enlist the assistance of other law enforcement agencies with appropriate jurisdiction as circumstances warrant, under the Agreement.

7.3 The Town will be responsible for submitting requests for retirement waivers pursuant to Section 212(3) of the New York State Retirement and Social Security Law, as applicable. However, the Town is not responsible for the outcome of any such waiver request, nor can the Town guarantee that any such waiver request will be approved by New York State.

8.0 SPECIFIC RESPONSIBILITIES OF THE SCHOOL DISTRICT

In addition to any other responsibilities of the School District set forth in the Agreement, the School District will:

8.1 Designate a School Building Administrator who shall serve as the building-level School representative for the SPO program;

8.2 Provide the SPO with access to its School facilities, personnel and students as reasonably required to fulfill the SPO's duties under this Agreement;

8.3 Ensure that school personnel, School Board Members, students and parents are informed of the duties and presence of the SPO in the School;

8.4 Provide time and appropriate space for the SPO to conduct approved staff, student and parent training;

8.5 Provide space for the SPO to store instructional materials and perform necessary tasks directly related to the SPO program;

8.6 Cooperate with the Town to supply any relevant information needed for purposes of submitting retirement waivers for the SPOs; and

8.7 Cooperate with the Manlius Police Department and SPO relative to the scheduling of time off in the event of an SPO's illness or injury.

9.0 INFORMATION SHARING

9.1 The School District will share relevant information about school safety issues with the SPO including, but not limited to:

9.1.1 School District and School building safety/crisis plans, including for any other school to which the SPO may be assigned;

9.1.2 The School District's Code of Conduct;

9.1.3 Uniform violent incident reports in accordance with New York State Education Law and the Safe Schools against Violence in Education Act; and

9.1.4 Reports pertaining to alleged incidents of Child Abuse in an Educational Setting.

10.0 INFORMATION SHARING BY THE TOWN

The Town and SPO will share relevant information, to the extent permitted by law, about school safety issues with the School District including, but not limited to:

10.1.1 Any necessary interventions/referrals to service providers arising from incidents/reports received on school property, e.g., suicide prevention, drug or alcohol abuse, reports of sexual abuse.

10.1.2 Any information pertinent to school safety and/or safety of individuals on School property; and

10.1.3 Any training or educational opportunities for an SPO or School District representatives relative to school safety.

11.0 SPECIFIC DUTIES OF SPECIAL PATROL OFFICERS (SPOs)

In addition to any other duties specifically set forth in the Agreement, an SPO assigned to the School District shall provide SPO Services intended to meet the program objectives, including, but not limited to the following:

11.1 Patrol and observe all areas of the assigned School(s) and corresponding grounds;

11.2 Be visible and available to the students, faculty, and administration;

11.3 Keep the peace and help maintain a safe and orderly school community;

11.4 Develop and maintain a positive and open relationship with students, faculty and parents;

11.5 Present educational programs to students on various topics, including conflict resolution, restorative justice, crime awareness, anger management, etc.;

11.6 Present educational programs to School employees, parents and School Board Members;

11.7 Build community relationships by serving a liaison between the Town (which includes the Manlius Police Department) and the School District;

11.8 Survey the needs of the Schools and address crime and disorder problems, as well as drug activities affecting or occurring in or around the Schools;

11.9 Assist Schools with security concerns and identify physical changes in the environment that may reduce crime in or around the Schools;

11.10 Develop or expand crime prevention efforts for students;

11.11 Educate potential school-age victims in crime prevention and safety;

11.12 Assist in the development of School policies that address crime issues and recommend procedural change(s), where appropriate;

11.13 Assist Schools in meeting safety and security goals and any related requirements mandated by New York State Law;

11.14 Take appropriate law enforcement action with regard to any criminal activities that the SPO observes or that are reported directly to the SPO, including investigation of any suspected or actual criminal activity that might otherwise be investigated by a local police agency; and

11.15 Investigate other emergency situations and summon aid and assistance as needed (e.g., Fire Department, ambulance, etc.);

11.16 The SPO shall not be responsible for, or have authority to, enforce School rules. Matters of school discipline shall be referred to the appropriate School Principal or School District Administrator for further review and action;

11.17 The SPO shall not detain or question students regarding their immigration status;

11.18 In fulfilling his/her duties the SPO shall not discriminate on the basis of race, color, sex, national origin, language status, disability, religion, sexual orientation, or membership in any other protected class.

11.19 The SPO shall comply with all Federal, State and local laws as well as school District policies.

12.0 SUPERVISORY AUTHORITY

12.1 The SPOs assigned to the School District pursuant to the Agreement are under the direct and sole supervision and authority of the Town's Chief of Police and other Command Officers within the Manlius Police Department. The SPOs assigned to the School District shall comply with all general and specific SPO policies or protocol/procedure directives prepared by the Manlius Police Department.

12.3 The Manlius Police Department will share a copy of any SPO policy or protocol/procedure direction with the School District.

12.4 The Manlius Police Department will also provide a copy of all SPO policies or protocol/procedure directives to SPOs assigned to the School District.

12.5 In the performance of the duties described herein, the SPO shall regularly coordinate and communicate with the Principal or the Principals' designee of the schools to which they are assigned. The Principal or designee shall contact the SPO Supervisor assigned by the Town for such purpose in the event of any question regarding the performance of duties by an SPO. However, the SPO shall remain under the direct and exclusive control and supervision of the Town on all matters relating to the duties of the SPO under this Agreement.

12.6 The SPO shall not be an employee of the School District.

12.7 The Parties shall confer and agree regarding the SPO's attire while on duty.

13.0 PROGRAM EVALUATION

13.1 The School District will provide timely evaluations to the Manlius Police Department to enable required progress reports to be completed in an efficient and timely manner.

13.2 Any evaluation instruments for completion by selected students, school staff, school administrators, and community members will be developed collaboratively by the School District and the Manlius Police Department in order to ensure objective evaluation criteria are established and applied.

14.0 CONTRACT FEES AND ADDITIONAL COSTS

14.1 The School District agrees to pay the Town for Contract Fees and Costs associated with the placement of SPOs in the School District as set forth herein.

14.2 SPOs will be assigned to the School District for a period of approximately one hundred eighty six (186) days per academic year for a minimum of eight (8) hours each day, at a rate of pay of Forty dollars **($40.00)** per hour plus reimbursement to the Town for the Town's expenses and contributions for FICA, Medicare, Workers' Compensation, if any, and other mandated employer payments or contributions made on behalf of these employees.

To be compensated, a SPO must "clock-in" utilizing the department's payroll software from a computer or portable electronic device, which is necessary for accounting, administrative, and billing purposes and must be strictly adhered to in the following manner:

a. When scheduled, a SPO may only clock-in when they are physically present at their assigned school or when assigned to an off-site detail authorized by a supervisor or the appropriate school administrator.

b. If a SPO neglects to clock-in or out, has been assigned to an off-site detail, or any circumstances exist where manual adjustments need be made, the SPO should contact their supervisor, explain the circumstances, and request the appropriate adjustments.

c. If a SPO is required to work overtime due to an active event they are on they will need to add a note in the software stating the reason for the overtime and who approved it.

d. If a SPO is requested for a preplanned event they have been approved to work, they need to let their supervisor know they are working the event and ensure they make a note in the payroll software indicating the event worked and who approved it from the school.

14.3 SPO's shall only work school related functions and events. SPO's will not routinely be asked to work beyond their normal schedule; however, if the need exists, and falls within the below listed criteria, they may work overtime and will be compensated accordingly.

For planned/scheduled extracurricular school activities (e.g., sporting events, dances, graduations) where secondary employment requests were traditionally made, and offered to full-time PBA members, the PBA shall offer those jobs to full-time PBA members first, through regular posting. Posting shall be made well in advance to ensure the fair and equitable distribution of secondary employment opportunities. All postings shall include a deadline date/time well prior to the event, to suitably accomplish scheduling needs. Once the deadline date/time has passed, and only if openings still exist, SPO's may be offered those jobs accordingly. In a timely manner, the PBA shall communicate to the secondary employment requester the results of said postings.

School specific events, which were never traditionally offered to full-time PBA members as secondary employment opportunities; to include non-scheduled unforeseen incidents or circumstances where an SPO is needed immediately (e.g., school threats, potential for harm) may be offered to an SPO at the discretion of the appropriate school official without first posting.

14.4 The SPO's regular duty hours shall be 7:45 a.m. until 3:45 p.m. unless this schedule is modified by mutual agreement between the Town and the School District, or the Principal of the building to which the SPO is assigned on a given day.

14.5 Additional expenses (e.g., meals, tolls, travel, etc.) may be incurred, for In Service Training (48 hours annual minimum), supplemental schools, seminars or additional services, at the agreed-upon reimbursement and hourly rate, with prior authorization from the School District's Superintendent.

14.6 The Manlius Police Department will design appropriate verification forms which will be made available to authorized School District personnel for auditable proof of services performed for the School District. The School District will be invoiced three times per year – in January for services rendered from September through December, in April for services rendered from January through March and in July for services rendered from April through June – for the actual costs incurred by the Town in accordance with this Agreement. The School District agrees to make full payment to the Town within 30 business days from receipt of the invoice.

14.7 The School District further agrees to reimburse the Town for up to **$10,000** per SPO officer, per academic year, to cover the costs for uniforms, equipment and training (Additional Costs). Any applicable reimbursement for the Additional Costs will be invoiced to the School District. The equipment and uniforms purchased in the Agreement shall remain the property of the Town, except as otherwise provided herein.

14.8 The parties acknowledge, however, that the cost of living, as well as costs for uniforms, equipment and training may increase from year one to year two of this Agreement. Accordingly, the parties understand and agree that future rate increases will be mutually agreed upon in writing prior to implementation.

14.9 Except as otherwise provided herein, the Town agrees that the Contract Fees and Additional Costs set forth herein are the exclusive fees for all SPO services provided under the Agreement.

15.0 TOWN AS AN INDEPENDENT CONTRACTOR

15.1 The Town shall provide SPO Services to the School District as an independent contractor, and any and all SPO Services performed by the Town and its employees or agents under this Agreement shall be performed in such capacity.

15.2 The Town's employees, consultants, or agents shall not hold himself/herself out as, nor claim to be, an officer or employee of the School District, nor make any claim, demand, or application to or for any right or privilege applicable to an officer or employee of the

School District, including, but not limited to, Workers' Compensation coverage, unemployment Insurance benefits, Social Security coverage, Disability benefits, New York State Retirement membership or credit, etc.

15.3 The Town shall not have, nor hold itself out as having, the authority or power to bind or create liability for the School District by the Town's acts or omissions.

15.4 It is agreed by the Town and the School District that neither federal, state, or local income taxes nor payroll taxes of any kind, including, but not limited to F.I.C.A. or F.U.T.A., will be withheld or paid by the School District on behalf of any Town employee, consultant, or agent in connection with this Agreement.

15.5 Said employment withholdings and/or payments are to be made by the Town in compliance with all federal, state, and local laws, rules or regulations.

15.6 Provided the School District timely pays the Town the Fees established, the Town agrees to pay and/or withhold all applicable taxes, including income taxes, Workers' Compensation Insurance, unemployment insurance payment, disability insurance payment, and/or any other payments that may be required under the laws, rules, or regulations of any government agency having jurisdiction over the Town or its relationship with the School District, and further agrees to indemnify and hold the School District harmless against any claim, cost, penalty, damage, or expense (including reasonable attorneys' fees) related to either parties nonpayment and/or underpayment of any such taxes or payments.

15.7 The School District acknowledges that it shall have no ability to control the manner, means, details or methods by which the Town or its agents perform SPO Services under this Agreement, unless otherwise addressed in this Agreement and except as required by federal, state, or local laws, rules, and regulations.

15.8 These provisions shall survive any expiration, termination, or non-renewal of the Agreement.

16.0 TERMINATION OF THE AGREEMENT

Either party may terminate this Agreement, at any time, for any reason, by providing thirty (30) days advance notice to the other party. Such notification shall be made, in writing, and sent via a trackable overnight delivery method (e.g., FedEx, UPS, USPS Express Mail, etc.) to the other party at its principal address.

17.0 EXTENSION OR RENEWAL

17.1 Negotiations for any contract renewal will begin during the month of May 2024.

17.2 The parties will each be responsible for initiating such negotiations. The failure of a party to initiate or to be affirmatively non-receptive to such initiation by the other party shall be deemed treated as a firm intent not to renew the Agreement.

18.0 RECIPROCAL INDEMNIFICATION

18.1 The Town shall indemnify and hold harmless the School District from and against any and all losses, damages, judgments, claims, causes of action, costs, expenses, and other liabilities (collectively, "Liabilities") to the extent such liabilities arise from the negligent or other wrongful acts or omissions, or any such legal or contractual duties or obligations assumed by the School District, of the Town, its officers, and employees, (including the SPO), or from the Town or any such person's or the Town's material breach of, or default hereunder.

18.2 The School District shall indemnify and hold harmless the Town from and against any and all losses, damages, judgments, claims, causes of action, costs, expenses, and other liabilities (collectively, "liabilities") to the extent such liabilities arise from negligent or other wrongful acts or omissions or of any such legal or contracted duties or obligations assumed by the School District, of the School District, its officers, and employees, or from the School District's material breach of, or default hereunder.

19.0 CONTROLLING LAW AND VENUE

This Agreement shall be interpreted pursuant to the laws of the State of New York, without regard to New York's conflict of laws provision. If an action is filed to enforce this Agreement, the parties agree that such action must be filed exclusively in a court of competent jurisdiction in Onondaga County, New York, and the parties expressly consent to the jurisdiction of such court.

20.0 ASSIGNMENT

This Agreement may not be assigned by either party.

21.0 ENTIRE AGREEMENT

This Agreement may not be altered except by a writing signed by both parties. Furthermore, this Agreement represents the entire agreement and understanding between the parties and supersedes all prior agreements between the parties, written or oral.

22.0 INTERPRETATION

The language of all parts of this Agreement in all cases shall be construed as a whole, according to its fair meaning, and not strictly for or against any party, regardless of who drafted it.

23.0 INSURANCES

The District agrees to obtain and continue to maintain in full force and effect its general liability insurance, public insurance, and automotive insurance relative to the SPO Services to be performed under the Agreement, with limits of not less than $500,000 per occurrence and $1,000,000 in the annual aggregate.

24.0 PROTECTION OF CONFIDENTIAL DATA.

The Town shall provide its Services in a manner which protects Student Data (as defined by 8 NYCRR 121.1(q)) and Teacher or Principal Data (as defined by 8 NYCRR 121.1(r)) (hereinafter "Confidential Data") in accordance with the requirements articulated under Federal, New York State and local laws and regulations, including but not limited to the foregoing:

24.1 The Town will adopt technologies, safeguards and practices that align with the NIST Cybersecurity Framework.

24.2 The Town will comply with the School District Data Security and Privacy Policy, Education Law § 2-d, and 8 NYCRR §121.

24.3 The Town will limit internal access to personally identifiable information to only those employees or sub-contractors that need access to provide the contracted services.

24.4 The Town will not use the personally identifiable information for any purpose not explicitly authorized in this Agreement.

24.5 The Town will not disclose any personally identifiable information to any other party without the prior written consent of the parent or eligible student, unless otherwise authorized pursuant to applicable law.

24.6 The Town will maintain reasonable administrative, technical and physical safeguards to protect the security, confidentiality and integrity of personally identifiable information in its custody.

24.7 The Town will use encryption to protect personally identifiable information in its custody while in motion or at rest.

24.8 The Town will not sell personally identifiable information nor use or disclose it for any marketing or commercial purpose or facilitate its use or disclosure by any other party for any marketing or commercial purpose or permit another party to do so.

24.9 In the event The Town engages a subcontractor to perform its contractual obligations, the data protection obligations imposed on the Town shall apply to the subcontractor.

25.0 DATA BREACH

In the event that Confidential Data is accessed or obtained by an unauthorized individual, The Town shall provide notification to the School District without unreasonable delay and not more than seven calendar days after the discovery of such breach. The Town shall follow the following process:

25.1 The security breach notification shall be titled "Notice of Data Breach," shall be clear, concise, use language that is plain and easy to understand, and to the extent available, shall include: a brief description of the breach or unauthorized release; the dates of the incident in the date of discovery; a description of the types of Confidential affected; an estimate of the number of records affected; a brief description of the Town's investigation or plan to investigate; and contact information for representatives who can assist the School District with additional questions.

25.2 The Town shall also prepare a statement for parents and eligible students which provides information under the following categories: "What Happened," "What Information Was Involved," "What We Are Doing," "What You Can Do," and "For More Information."

25.3 Where a breach or unauthorized release of Confidential Data is attributed to The Town, and/or a subcontractor or affiliate of The Town, The Town shall pay for or promptly reimburse the School District for the cost of notification to parents and eligible students of the breach.

25.4 The Town shall cooperate with the School District and law enforcement to protect the integrity of investigations into the breach or unauthorized release of Confidential Data.

25.4.1 The name and contact information of the reporting School District subject to this section.

25.4.2 A list of the types of personal information that were or are reasonably believed to have been the subject of a breach.

25.4.3 If the information is possible to determine at the time the notice is provided, then either (1) the date of the breach, (2) the estimated date of the breach, or (3) the date range within which the breach occurred. The notification shall also include the date of the notice.

25.4.4 Whether the notification was delayed as a result of a law enforcement investigation, if that information is possible to determine at the time the notice is provided.

25.4.5 A general description of the breach incident, if that information is possible to determine at the time the notice is provided.

25.4.6 Information about what the agency has done to protect individuals whose information has been breached.

25.4.7 Advice on steps that the person whose information has been breached may take to protect himself or herself.

25.5 The Town further acknowledges and agrees to have a written incident response plan that reflects best practices and is consistent with industry standards and federal and state law for responding to a data breach, breach of security, privacy incident or unauthorized acquisition or use of Protected Data or any portion thereof, and agrees to provide Client, upon request, with a copy of said written incident response plan

26.0 ADDENDUM

The following addenda attached hereto shall be incorporated into the Agreement:

Addendum A: Parents' Bill of Rights for Data Privacy and Security

Addendum B: Parents' Bill of Rights – Supplemental Information Addendum

Addendum C: The Town's Data Security and Privacy Plan

27.0 WAIVER

The failure of any party to insist on the strict performance of any provision of this Agreement or to exercise any right under this Agreement shall not constitute a waiver of such provisions or right. A waiver is effective only if in writing and signed and delivered by the waiving party.

28.0 MUTUAL COVENANTS

28.1 The undersigned representatives of the two contracting parties, in signing, hereby represent that they are authorized and empowered by their respective Boards (as applicable) to enter into this Agreement. Consent to the terms of this Agreement is signified by the signatures below.

28.2 It is agreed by and between the parties that any provision of this Agreement requiring legislative action to permit its implementation by amendment of law or by providing the additional funds therefore shall not become effective until the appropriate legislative body has given approval.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals the day and year first above written.

For the Town of Manlius:

8/21/23
Date

For the Fayetteville - Manlius School District:

8/15/23
Date

Special Patrol Officer Agreement Between the

Town of Manlius and the Fayetteville-Manlius Central School District
(Officer S. Mehlek)

This Special Patrol Officer Agreement (the "Agreement") is made as of the _____ day of _____, 2023, by and between the Town of Manlius, a municipal corporation situated in the County of Onondaga, State of New York, whose principal address is 301 Brooklea Drive, Fayetteville, New York 13066 (the "Town"); and the Fayetteville-Manlius School District of the County of Onondaga and State of New York, a municipal corporation whose principal address is, 8199 East Seneca Turnpike Manlius, New York 13104 (the "School District"). The Town of Manlius Police Department ("Manlius Police Department") is a specific department within the Town's government structure and does not constitute a separate entity or party to the Agreement. However, the Manlius Police Department will have primary responsibility for carrying out the duties and obligations set forth in this Agreement on behalf of the Town.

WHEREAS, Article 5-G of the New York State's General Municipal Law ("GML") provides the authority for "municipal corporations" to enter into agreements for the performance between themselves, or one for the other, of their respective functions, powers and duties on a cooperative contract basis; and

WHEREAS, the School District and the Town are both deemed to be "municipal corporations" as that term is defined by GML 119-n(a); and

WHEREAS, the School District and the Town have determined that it is in their mutual best interests to enter into this Agreement to provide for the assignment of dedicated officers of the Manlius Police Department to serve as Special Patrol Officer(s) in the School District.

NOW, THEREFORE, the parties hereby agree as follows:

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1.1 This Agreement is for the academic school years of 2023-24 and begins on September 1, 2023 and expires on June 30, 2024, without notice, unless terminated earlier as provided in this Agreement (the "Term").

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2.1 The Town and School District have voluntarily chosen to enter into the Agreement in order to have Peace Officer(s) placed within the School District.

2.2 These Peace Officer(s) shall be referred to under this Agreement as Special Patrol Officers ("SPOs"). For the purposes of this Agreement, the term "SPO" shall include those officers specifically selected for (and assigned to) the Schools for a specific academic year as SPOs will be responsible to serve and perform the job duties described herein, to the extent consistent with the parties overall objectives and responsibilities described herein (collectively "SPO Services").

2.3 The SPO assignment is intended to be a daytime assignment to be performed Monday through Friday, eight (8) hours per day concurrent with the school day and the School District's academic calendar. The SPO worksite shall include the SPOs assigned School, as well as any other associated buildings and grounds on the assigned school premise. Occasionally, the SPOs may be temporarily assigned to other schools within the School District on an as-needed basis.

2.4 The Town agrees that the SPO Services rendered under this Agreement will be in compliance with applicable federal, state, or local laws, rules and regulations pertaining to the Town's provision of services under an inter-municipal agreement pursuant to GML Article 5-G.

3.0 SPO Program Objectives

The objectives of the SPO program are to:

3.1 Provide a police presence in the Schools in order to promote and provide an atmosphere of enhanced school safety for faculty, staff, students and school visitors;

3.2 Provide a law enforcement resource to students, teachers, school administrators and parents, so as to increase student awareness about crime prevention, internet safety, conflict resolution, violence prevention, restorative justice and peer mediation;

3.3 Increase school faculty and staff awareness about policies and procedures for preventing/responding to incidents of violence and other threats to school safety;

3.4 Facilitate crime prevention, law enforcement and security consultation;

3.5 Build lines of communication and promote positive attitudes between students and the Manlius Police Department;

3.6 Provide a counseling resource to students who may be experiencing a variety of school, family, or social problems;

3.7 Proactively address problems and pressures as they relate to students before such problems manifest into socially and legally unacceptable behavior (including, but not limited to, the use of alcohol, drugs, and/or tobacco, as well as issues involving peer pressure, gang activity, sexual activity, etc.);

3.8 Provide a positive role model for students; and

3.9 Provide education in law enforcement, as requested and appropriate.

4.0 Qualifications for SPO

The SPO shall:

4.1 Be, and remain at all times, properly licensed and/or credentialed as a Peace Officer in accordance with applicable law;

4.1.1 Upon request, the Town shall provide the School District with copies of any assigned SPO's license(s) and/or credentials(s);

4.1.2 If, at any time during the Agreement, the license and/or required credentials of an SPO providing SPO services are revoked, terminated, suspended or otherwise impaired, the Town shall remove the individual from performing SPO services under this Agreement, and shall promptly notify the School District.

5.0 HIRING AND IMPLEMENTATION OF THE SPO

5.1 The School District reserves the right to participate in the Town's hiring and interview process for any individual proposed to perform SPO Services at the School.

5.2 The School District also reserves the right to reject any individual assigned by the Town to perform SPO Services at the Schools for failure to properly perform the SPO services or to request a cancellation of any component of the SPO Services which the School District reasonably believes is inappropriate or inapplicable. However, no such action by the School District shall result in a reduction in the agreed upon the Contract Fees and Expenses set forth in the Agreement, nor require and SPO to conduct himself or herself in a manner contrary to, or in violation of, proper Peace Officer policies, protocols and procedures.

5.3 The Town shall notify the School District in writing within one (1) school day of the termination of the services of the SPO assigned to the School District. The parties shall meet and confer within two (2) school days of such notice to discuss the replacement of the SPO. The School District may refuse the services of a particular replacement SPO for reasonable cause and shall provide the Town with one (1) school days' notice of its intent to do so

5.4 In the event the SPO is absent from work, the SPO shall notify a Police Supervisor and the School District clerk prior to the SPO's scheduled arrival time.

6.0 Fingerprints and Criminal Clearance

6.1 To the extent necessary to obtain clearance, the Town shall be responsible for facilitating and conducting criminal background checks and criminal clearance reviews for SPOs.

6.2 The Town shall be responsible for all costs associated with the required fingerprinting and criminal background checks and clearance for SPOs under the Agreement.

7.0 SPECIFIC RESPONSIBILITIES OF THE TOWN OF MANLIUS POLICE DEPARTMENT

7.1 In addition to any other responsibilities of the Town set forth in this Agreement, the Town and the Manlius Police Department will cooperate with the School District to implement the SPO Program in the Schools with the least possible disruption to the educational process.

7.2 The Town – through the Manlius Police Department – may enlist the assistance of other law enforcement agencies with appropriate jurisdiction as circumstances warrant, under the Agreement.

7.3 The Town will be responsible for submitting requests for retirement waivers pursuant to Section 212(3) of the New York State Retirement and Social Security Law, as applicable. However, the Town is not responsible for the outcome of any such waiver request, nor can the Town guarantee that any such waiver request will be approved by New York State.

8.0 SPECIFIC RESPONSIBILITIES OF THE SCHOOL DISTRICT

In addition to any other responsibilities of the School District set forth in the Agreement, the School District will:

8.1 Designate a School Building Administrator who shall serve as the building-level School representative for the SPO program;

8.2 Provide the SPO with access to its School facilities, personnel and students as reasonably required to fulfill the SPO's duties under this Agreement;

8.3 Ensure that school personnel, School Board Members, students and parents are informed of the duties and presence of the SPO in the School;

8.4 Provide time and appropriate space for the SPO to conduct approved staff, student and parent training;

8.5 Provide space for the SPO to store instructional materials and perform necessary tasks directly related to the SPO program;

8.6 Cooperate with the Town to supply any relevant information needed for purposes of submitting retirement waivers for the SPOs; and

8.7 Cooperate with the Manlius Police Department and SPO relative to the scheduling of time off in the event of an SPO's illness or injury.

9.0 INFORMATION SHARING

9.1 The School District will share relevant information about school safety issues with the SPO including, but not limited to:

9.1.1 School District and School building safety/crisis plans, including for any other school to which the SPO may be assigned;

9.1.2 The School District's Code of Conduct;

9.1.3 Uniform violent incident reports in accordance with New York State Education Law and the Safe Schools against Violence in Education Act; and

9.1.4 Reports pertaining to alleged incidents of Child Abuse in an Educational Setting.

10.0 INFORMATION SHARING BY THE TOWN

The Town and SPO will share relevant information, to the extent permitted by law, about school safety issues with the School District including, but not limited to:

10.1.1 Any necessary interventions/referrals to service providers arising from incidents/reports received on school property, e.g., suicide prevention, drug or alcohol abuse, reports of sexual abuse.

10.1.2 Any information pertinent to school safety and/or safety of individuals on School property; and

10.1.3 Any training or educational opportunities for an SPO or School District representatives relative to school safety.

11.0 SPECIFIC DUTIES OF SPECIAL PATROL OFFICERS (SPOs)

In addition to any other duties specifically set forth in the Agreement, an SPO assigned to the School District shall provide SPO Services intended to meet the program objectives, including, but not limited to the following:

11.1 Patrol and observe all areas of the assigned School(s) and corresponding grounds;

11.2 Be visible and available to the students, faculty, and administration;

11.3 Keep the peace and help maintain a safe and orderly school community;

11.4 Develop and maintain a positive and open relationship with students, faculty and parents;

11.5 Present educational programs to students on various topics, including conflict resolution, restorative justice, crime awareness, anger management, etc.;

11.6 Present educational programs to School employees, parents and School Board Members;

11.7 Build community relationships by serving a liaison between the Town (which includes the Manlius Police Department) and the School District;

11.8 Survey the needs of the Schools and address crime and disorder problems, as well as drug activities affecting or occurring in or around the Schools;

11.9 Assist Schools with security concerns and identify physical changes in the environment that may reduce crime in or around the Schools;

11.10 Develop or expand crime prevention efforts for students;

11.11 Educate potential school-age victims in crime prevention and safety;

11.12 Assist in the development of School policies that address crime issues and recommend procedural change(s), where appropriate;

11.13 Assist Schools in meeting safety and security goals and any related requirements mandated by New York State Law;

11.14 Take appropriate law enforcement action with regard to any criminal activities that the SPO observes or that are reported directly to the SPO, including investigation of any suspected or actual criminal activity that might otherwise be investigated by a local police agency; and

11.15 Investigate other emergency situations and summon aid and assistance as needed (e.g., Fire Department, ambulance, etc.);

11.16 The SPO shall not be responsible for, or have authority to, enforce School rules. Matters of school discipline shall be referred to the appropriate School Principal or School District Administrator for further review and action;

11.17 The SPO shall not detain or question students regarding their immigration status;

11.18 In fulfilling his/her duties the SPO shall not discriminate on the basis of race, color, sex, national origin, language status, disability, religion, sexual orientation, or membership in any other protected class.

11.19 The SPO shall comply with all Federal, State and local laws as well as school District policies.

12.0 SUPERVISORY AUTHORITY

12.1 The SPOs assigned to the School District pursuant to the Agreement are under the direct and sole supervision and authority of the Town's Chief of Police and other Command Officers within the Manlius Police Department. The SPOs assigned to the School District shall comply with all general and specific SPO policies or protocol/procedure directives prepared by the Manlius Police Department.

12.3 The Manlius Police Department will share a copy of any SPO policy or protocol/procedure direction with the School District.

12.4 The Manlius Police Department will also provide a copy of all SPO policies or protocol/procedure directives to SPOs assigned to the School District.

12.5 In the performance of the duties described herein, the SPO shall regularly coordinate and communicate with the Principal or the Principals' designee of the schools to which they are assigned. The Principal or designee shall contact the SPO Supervisor assigned by the Town for such purpose in the event of any question regarding the performance of duties by an SPO. However, the SPO shall remain under the direct and exclusive control and supervision of the Town on all matters relating to the duties of the SPO under this Agreement.

12.6 The SPO shall not be an employee of the School District.

12.7 The Parties shall confer and agree regarding the SPO's attire while on duty.

13.0 PROGRAM EVALUATION

13.1 The School District will provide timely evaluations to the Manlius Police Department to enable required progress reports to be completed in an efficient and timely manner.

13.2 Any evaluation instruments for completion by selected students, school staff, school administrators, and community members will be developed collaboratively by the School District and the Manlius Police Department in order to ensure objective evaluation criteria are established and applied.

14.0 CONTRACT FEES AND ADDITIONAL COSTS

14.1 The School District agrees to pay the Town for Contract Fees and Costs associated with the placement of SPOs in the School District as set forth herein.

14.2 SPOs will be assigned to the School District for a period of approximately one hundred eighty six (186) days per academic year for a minimum of eight (8) hours each day, at a rate of pay of Forty dollars **($40.00)** per hour plus reimbursement to the Town for the Town's expenses and contributions for FICA, Medicare, Workers' Compensation, if any, and other mandated employer payments or contributions made on behalf of these employees.

To be compensated, a SPO must "clock-in" utilizing the department's payroll software from a computer or portable electronic device, which is necessary for accounting, administrative, and billing purposes and must be strictly adhered to in the following manner:

a. When scheduled, a SPO may only clock-in when they are physically present at their assigned school or when assigned to an off-site detail authorized by a supervisor or the appropriate school administrator.

b. If a SPO neglects to clock-in or out, has been assigned to an off-site detail, or any circumstances exist where manual adjustments need be made, the SPO should contact their supervisor, explain the circumstances, and request the appropriate adjustments.

c. If a SPO is required to work overtime due to an active event they are on they will need to add a note in the software stating the reason for the overtime and who approved it.

d. If a SPO is requested for a preplanned event they have been approved to work, they need to let their supervisor know they are working the event and ensure they make a note in the payroll software indicating the event worked and who approved it from the school.

14.3 SPO's shall only work school related functions and events. SPO's will not routinely be asked to work beyond their normal schedule; however, if the need exists, and falls within the below listed criteria, they may work overtime and will be compensated accordingly.

For planned/scheduled extracurricular school activities (e.g., sporting events, dances, graduations) where secondary employment requests were traditionally made, and offered to full-time PBA members, the PBA shall offer those jobs to full-time PBA members first, through regular posting. Posting shall be made well in advance to ensure the fair and equitable distribution of secondary employment opportunities. All postings shall include a deadline date/time well prior to the event, to suitably accomplish scheduling needs. Once the deadline date/time has passed, and only if openings still exist, SPO's may be offered those jobs accordingly. In a timely manner, the PBA shall communicate to the secondary employment requester the results of said postings.

School specific events, which were never traditionally offered to full-time PBA members as secondary employment opportunities; to include non-scheduled unforeseen incidents or circumstances where an SPO is needed immediately (e.g., school threats, potential for harm) may be offered to an SPO at the discretion of the appropriate school official without first posting.

14.4 The SPO's regular duty hours shall be 7:45 a.m. until 3:45 p.m. unless this schedule is modified by mutual agreement between the Town and the School District, or the Principal of the building to which the SPO is assigned on a given day.

14.5 Additional expenses (e.g., meals, tolls, travel, etc.) may be incurred, for In Service Training (48 hours annual minimum), supplemental schools, seminars or additional services, at the agreed-upon reimbursement and hourly rate, with prior authorization from the School District's Superintendent.

14.6 The Manlius Police Department will design appropriate verification forms which will be made available to authorized School District personnel for auditable proof of services performed for the School District. The School District will be invoiced three times per year – in January for services rendered from September through December, in April for services rendered from January through March and in July for services rendered from April through June – for the actual costs incurred by the Town in accordance with this Agreement. The School District agrees to make full payment to the Town within 30 business days from receipt of the invoice.

14.7 The School District further agrees to reimburse the Town for up to **$10,000** per SPO officer, per academic year, to cover the costs for uniforms, equipment and training (Additional Costs). Any applicable reimbursement for the Additional Costs will be invoiced to the School District. The equipment and uniforms purchased in the Agreement shall remain the property of the Town, except as otherwise provided herein.

14.8 The parties acknowledge, however, that the cost of living, as well as costs for uniforms, equipment and training may increase from year one to year two of this Agreement. Accordingly, the parties understand and agree that future rate increases will be mutually agreed upon in writing prior to implementation.

14.9 Except as otherwise provided herein, the Town agrees that the Contract Fees and Additional Costs set forth herein are the exclusive fees for all SPO services provided under the Agreement.

15.0 TOWN AS AN INDEPENDENT CONTRACTOR

15.1 The Town shall provide SPO Services to the School District as an independent contractor, and any and all SPO Services performed by the Town and its employees or agents under this Agreement shall be performed in such capacity.

15.2 The Town's employees, consultants, or agents shall not hold himself/herself out as, nor claim to be, an officer or employee of the School District, nor make any claim, demand, or application to or for any right or privilege applicable to an officer or employee of the

School District, including, but not limited to, Workers' Compensation coverage, unemployment Insurance benefits, Social Security coverage, Disability benefits, New York State Retirement membership or credit, etc.

15.3 The Town shall not have, nor hold itself out as having, the authority or power to bind or create liability for the School District by the Town's acts or omissions.

15.4 It is agreed by the Town and the School District that neither federal, state, or local income taxes nor payroll taxes of any kind, including, but not limited to F.I.C.A. or F.U.T.A., will be withheld or paid by the School District on behalf of any Town employee, consultant, or agent in connection with this Agreement.

15.5 Said employment withholdings and/or payments are to be made by the Town in compliance with all federal, state, and local laws, rules or regulations.

15.6 Provided the School District timely pays the Town the Fees established, the Town agrees to pay and/or withhold all applicable taxes, including income taxes, Workers' Compensation Insurance, unemployment insurance payment, disability insurance payment, and/or any other payments that may be required under the laws, rules, or regulations of any government agency having jurisdiction over the Town or its relationship with the School District, and further agrees to indemnify and hold the School District harmless against any claim, cost, penalty, damage, or expense (including reasonable attorneys' fees) related to either parties nonpayment and/or underpayment of any such taxes or payments.

15.7 The School District acknowledges that it shall have no ability to control the manner, means, details or methods by which the Town or its agents perform SPO Services under this Agreement, unless otherwise addressed in this Agreement and except as required by federal, state, or local laws, rules, and regulations.

15.8 These provisions shall survive any expiration, termination, or non-renewal of the Agreement.

16.0 TERMINATION OF THE AGREEMENT

Either party may terminate this Agreement, at any time, for any reason, by providing thirty (30) days advance notice to the other party. Such notification shall be made, in writing, and sent via a trackable overnight delivery method (e.g., FedEx, UPS, USPS Express Mail, etc.) to the other party at its principal address.

17.0 EXTENSION OR RENEWAL

17.1 Negotiations for any contract renewal will begin during the month of May 2024.

17.2 The parties will each be responsible for initiating such negotiations. The failure of a party to initiate or to be affirmatively non-receptive to such initiation by the other party shall be deemed treated as a firm intent not to renew the Agreement.

18.0 RECIPROCAL INDEMNIFICATION

18.1 The Town shall indemnify and hold harmless the School District from and against any and all losses, damages, judgments, claims, causes of action, costs, expenses, and other liabilities (collectively, "Liabilities") to the extent such liabilities arise from the negligent or other wrongful acts or omissions, or any such legal or contractual duties or obligations assumed by the School District, of the Town, its officers, and employees, (including the SPO), or from the Town or any such person's or the Town's material breach of, or default hereunder.

18.2 The School District shall indemnify and hold harmless the Town from and against any and all losses, damages, judgments, claims, causes of action, costs, expenses, and other liabilities (collectively, "liabilities") to the extent such liabilities arise from negligent or other wrongful acts or omissions or of any such legal or contracted duties or obligations assumed by the School District, of the School District, its officers, and employees, or from the School District's material breach of, or default hereunder.

19.0 CONTROLLING LAW AND VENUE

This Agreement shall be interpreted pursuant to the laws of the State of New York, without regard to New York's conflict of laws provision. If an action is filed to enforce this Agreement, the parties agree that such action must be filed exclusively in a court of competent jurisdiction in Onondaga County, New York, and the parties expressly consent to the jurisdiction of such court.

20.0 ASSIGNMENT

This Agreement may not be assigned by either party.

21.0 ENTIRE AGREEMENT

This Agreement may not be altered except by a writing signed by both parties. Furthermore, this Agreement represents the entire agreement and understanding between the parties and supersedes all prior agreements between the parties, written or oral.

22.0 INTERPRETATION

The language of all parts of this Agreement in all cases shall be construed as a whole, according to its fair meaning, and not strictly for or against any party, regardless of who drafted it.

23.0 INSURANCES

The District agrees to obtain and continue to maintain in full force and effect its general liability insurance, public insurance, and automotive insurance relative to the SPO Services to be performed under the Agreement, with limits of not less than $500,000 per occurrence and $1,000,000 in the annual aggregate.

24.0 PROTECTION OF CONFIDENTIAL DATA.

The Town shall provide its Services in a manner which protects Student Data (as defined by 8 NYCRR 121.1(q)) and Teacher or Principal Data (as defined by 8 NYCRR 121.1(r)) (hereinafter "Confidential Data") in accordance with the requirements articulated under Federal, New York State and local laws and regulations, including but not limited to the foregoing:

24.1 The Town will adopt technologies, safeguards and practices that align with the NIST Cybersecurity Framework.

24.2 The Town will comply with the School District Data Security and Privacy Policy, Education Law § 2-d, and 8 NYCRR §121.

24.3 The Town will limit internal access to personally identifiable information to only those employees or sub-contractors that need access to provide the contracted services.

24.4 The Town will not use the personally identifiable information for any purpose not explicitly authorized in this Agreement.

24.5 The Town will not disclose any personally identifiable information to any other party without the prior written consent of the parent or eligible student, unless otherwise authorized pursuant to applicable law.

24.6 The Town will maintain reasonable administrative, technical and physical safeguards to protect the security, confidentiality and integrity of personally identifiable information in its custody.

24.7 The Town will use encryption to protect personally identifiable information in its custody while in motion or at rest.

24.8 The Town will not sell personally identifiable information nor use or disclose it for any marketing or commercial purpose or facilitate its use or disclosure by any other party for any marketing or commercial purpose or permit another party to do so.

24.9 In the event The Town engages a subcontractor to perform its contractual obligations, the data protection obligations imposed on the Town shall apply to the subcontractor.

25.0 DATA BREACH

In the event that Confidential Data is accessed or obtained by an unauthorized individual, The Town shall provide notification to the School District without unreasonable delay and not more than seven calendar days after the discovery of such breach. The Town shall follow the following process:

25.1 The security breach notification shall be titled "Notice of Data Breach," shall be clear, concise, use language that is plain and easy to understand, and to the extent available, shall include: a brief description of the breach or unauthorized release; the dates of the incident in the date of discovery; a description of the types of Confidential affected; an estimate of the number of records affected; a brief description of the Town's investigation or plan to investigate; and contact information for representatives who can assist the School District with additional questions.

25.2 The Town shall also prepare a statement for parents and eligible students which provides information under the following categories: "What Happened," "What Information Was Involved," "What We Are Doing," "What You Can Do," and "For More Information."

25.3 Where a breach or unauthorized release of Confidential Data is attributed to The Town, and/or a subcontractor or affiliate of The Town, The Town shall pay for or promptly reimburse the School District for the cost of notification to parents and eligible students of the breach.

25.4 The Town shall cooperate with the School District and law enforcement to protect the integrity of investigations into the breach or unauthorized release of Confidential Data.

25.4.1 The name and contact information of the reporting School District subject to this section.

25.4.2 A list of the types of personal information that were or are reasonably believed to have been the subject of a breach.

25.4.3 If the information is possible to determine at the time the notice is provided, then either (1) the date of the breach, (2) the estimated date of the breach, or (3) the date range within which the breach occurred. The notification shall also include the date of the notice.

25.4.4 Whether the notification was delayed as a result of a law enforcement investigation, if that information is possible to determine at the time the notice is provided.

25.4.5 A general description of the breach incident, if that information is possible to determine at the time the notice is provided.

25.4.6 Information about what the agency has done to protect individuals whose information has been breached.

25.4.7 Advice on steps that the person whose information has been breached may take to protect himself or herself.

25.5 The Town further acknowledges and agrees to have a written incident response plan that reflects best practices and is consistent with industry standards and federal and state law for responding to a data breach, breach of security, privacy incident or unauthorized acquisition or use of Protected Data or any portion thereof, and agrees to provide Client, upon request, with a copy of said written incident response plan

26.0 ADDENDUM

The following addenda attached hereto shall be incorporated into the Agreement:

Addendum A: Parents' Bill of Rights for Data Privacy and Security

Addendum B: Parents' Bill of Rights – Supplemental Information Addendum

Addendum C: The Town's Data Security and Privacy Plan

27.0 WAIVER

The failure of any party to insist on the strict performance of any provision of this Agreement or to exercise any right under this Agreement shall not constitute a waiver of such provisions or right. A waiver is effective only if in writing and signed and delivered by the waiving party.

28.0 MUTUAL COVENANTS

28.1 The undersigned representatives of the two contracting parties, in signing, hereby represent that they are authorized and empowered by their respective Boards (as applicable) to enter into this Agreement. Consent to the terms of this Agreement is signified by the signatures below.

28.2 It is agreed by and between the parties that any provision of this Agreement requiring legislative action to permit its implementation by amendment of law or by providing the additional funds therefore shall not become effective until the appropriate legislative body has given approval.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals the day and year first above written.

For the Town of Manlius:

John T Deer

8/21/23

Date

For the Fayetteville - Manlius School District:

8/15/23

Date

Special Patrol Officer Agreement Between the

Town of Manlius and the Fayetteville-Manlius Central School District
(Officer T. Leroy)

This Special Patrol Officer Agreement (the "Agreement") is made as of the _____ day of _____, 2023, by and between the Town of Manlius, a municipal corporation situated in the County of Onondaga, State of New York, whose principal address is 301 Brooklea Drive, Fayetteville, New York 13066 (the "Town"); and the Fayetteville-Manlius School District of the County of Onondaga and State of New York, a municipal corporation whose principal address is, 8199 East Seneca Turnpike Manlius, New York 13104 (the "School District"). The Town of Manlius Police Department ("Manlius Police Department") is a specific department within the Town's government structure and does not constitute a separate entity or party to the Agreement. However, the Manlius Police Department will have primary responsibility for carrying out the duties and obligations set forth in this Agreement on behalf of the Town.

WHEREAS, Article 5-G of the New York State's General Municipal Law ("GML") provides the authority for "municipal corporations" to enter into agreements for the performance between themselves, or one for the other, of their respective functions, powers and duties on a cooperative contract basis; and

WHEREAS, the School District and the Town are both deemed to be "municipal corporations" as that term is defined by GML 119-n(a); and

WHEREAS, the School District and the Town have determined that it is in their mutual best interests to enter into this Agreement to provide for the assignment of dedicated officers of the Manlius Police Department to serve as Special Patrol Officer(s) in the School District.

NOW, THEREFORE, the parties hereby agree as follows:

1.0 TERM OF AGREEMENT

1.1 This Agreement is for the academic school years of 2023-24 and begins on September 1, 2023 and expires on June 30, 2024, without notice, unless terminated earlier as provided in this Agreement (the "Term").

2.0 General Terms and Conditions

2.1 The Town and School District have voluntarily chosen to enter into the Agreement in order to have Peace Officer(s) placed within the School District.

2.2 These Peace Officer(s) shall be referred to under this Agreement as Special Patrol Officers ("SPOs"). For the purposes of this Agreement, the term "SPO" shall include those officers specifically selected for (and assigned to) the Schools for a specific academic year as SPOs will be responsible to serve and perform the job duties described herein, to the extent consistent with the parties overall objectives and responsibilities described herein (collectively "SPO Services").

2.3 The SPO assignment is intended to be a daytime assignment to be performed Monday through Friday, eight (8) hours per day concurrent with the school day and the School District's academic calendar. The SPO worksite shall include the SPOs assigned School, as well as any other associated buildings and grounds on the assigned school premise. Occasionally, the SPOs may be temporarily assigned to other schools within the School District on an as-needed basis.

2.4 The Town agrees that the SPO Services rendered under this Agreement will be in compliance with applicable federal, state, or local laws, rules and regulations pertaining to the Town's provision of services under an inter-municipal agreement pursuant to GML Article 5-G.

3.0 SPO Program Objectives

The objectives of the SPO program are to:

3.1 Provide a police presence in the Schools in order to promote and provide an atmosphere of enhanced school safety for faculty, staff, students and school visitors;

3.2 Provide a law enforcement resource to students, teachers, school administrators and parents, so as to increase student awareness about crime prevention, internet safety, conflict resolution, violence prevention, restorative justice and peer mediation;

3.3 Increase school faculty and staff awareness about policies and procedures for preventing/responding to incidents of violence and other threats to school safety;

3.4 Facilitate crime prevention, law enforcement and security consultation;

3.5 Build lines of communication and promote positive attitudes between students and the Manlius Police Department;

3.6 Provide a counseling resource to students who may be experiencing a variety of school, family, or social problems;

3.7 Proactively address problems and pressures as they relate to students before such problems manifest into socially and legally unacceptable behavior (including, but not limited to, the use of alcohol, drugs, and/or tobacco, as well as issues involving peer pressure, gang activity, sexual activity, etc.);

3.8 Provide a positive role model for students; and

3.9 Provide education in law enforcement, as requested and appropriate.

4.0 Qualifications for SPO

The SPO shall:

4.1 Be, and remain at all times, properly licensed and/or credentialed as a Peace Officer in accordance with applicable law;

4.1.1 Upon request, the Town shall provide the School District with copies of any assigned SPO's license(s) and/or credentials(s);

4.1.2 If, at any time during the Agreement, the license and/or required credentials of an SPO providing SPO services are revoked, terminated, suspended or otherwise impaired, the Town shall remove the individual from performing SPO services under this Agreement, and shall promptly notify the School District.

5.0 HIRING AND IMPLEMENTATION OF THE SPO

5.1 The School District reserves the right to participate in the Town's hiring and interview process for any individual proposed to perform SPO Services at the School.

5.2 The School District also reserves the right to reject any individual assigned by the Town to perform SPO Services at the Schools for failure to properly perform the SPO services or to request a cancellation of any component of the SPO Services which the School District reasonably believes is inappropriate or inapplicable. However, no such action by the School District shall result in a reduction in the agreed upon the Contract Fees and Expenses set forth in the Agreement, nor require and SPO to conduct himself or herself in a manner contrary to, or in violation of, proper Peace Officer policies, protocols and procedures.

5.3 The Town shall notify the School District in writing within one (1) school day of the termination of the services of the SPO assigned to the School District. The parties shall meet and confer within two (2) school days of such notice to discuss the replacement of the SPO. The School District may refuse the services of a particular replacement SPO for reasonable cause and shall provide the Town with one (1) school days' notice of its intent to do so

5.4 In the event the SPO is absent from work, the SPO shall notify a Police Supervisor and the School District clerk prior to the SPO's scheduled arrival time.

6.0 Fingerprints and Criminal Clearance

6.1 To the extent necessary to obtain clearance, the Town shall be responsible for facilitating and conducting criminal background checks and criminal clearance reviews for SPOs.

6.2 The Town shall be responsible for all costs associated with the required fingerprinting and criminal background checks and clearance for SPOs under the Agreement.

7.0 SPECIFIC RESPONSIBILITIES OF THE TOWN OF MANLIUS POLICE DEPARTMENT

7.1 In addition to any other responsibilities of the Town set forth in this Agreement, the Town and the Manlius Police Department will cooperate with the School District to implement the SPO Program in the Schools with the least possible disruption to the educational process.

7.2 The Town – through the Manlius Police Department – may enlist the assistance of other law enforcement agencies with appropriate jurisdiction as circumstances warrant, under the Agreement.

7.3 The Town will be responsible for submitting requests for retirement waivers pursuant to Section 212(3) of the New York State Retirement and Social Security Law, as applicable. However, the Town is not responsible for the outcome of any such waiver request, nor can the Town guarantee that any such waiver request will be approved by New York State.

8.0 SPECIFIC RESPONSIBILITIES OF THE SCHOOL DISTRICT

In addition to any other responsibilities of the School District set forth in the Agreement, the School District will:

8.1 Designate a School Building Administrator who shall serve as the building-level School representative for the SPO program;

8.2 Provide the SPO with access to its School facilities, personnel and students as reasonably required to fulfill the SPO's duties under this Agreement;

8.3 Ensure that school personnel, School Board Members, students and parents are informed of the duties and presence of the SPO in the School;

8.4 Provide time and appropriate space for the SPO to conduct approved staff, student and parent training;

8.5 Provide space for the SPO to store instructional materials and perform necessary tasks directly related to the SPO program;

8.6 Cooperate with the Town to supply any relevant information needed for purposes of submitting retirement waivers for the SPOs; and

8.7 Cooperate with the Manlius Police Department and SPO relative to the scheduling of time off in the event of an SPO's illness or injury.

9.0 INFORMATION SHARING

9.1 The School District will share relevant information about school safety issues with the SPO including, but not limited to:

9.1.1 School District and School building safety/crisis plans, including for any other school to which the SPO may be assigned;

9.1.2 The School District's Code of Conduct;

9.1.3 Uniform violent incident reports in accordance with New York State Education Law and the Safe Schools against Violence in Education Act; and

9.1.4 Reports pertaining to alleged incidents of Child Abuse in an Educational Setting.

10.0 INFORMATION SHARING BY THE TOWN

The Town and SPO will share relevant information, to the extent permitted by law, about school safety issues with the School District including, but not limited to:

10.1.1 Any necessary interventions/referrals to service providers arising from incidents/reports received on school property, e.g., suicide prevention, drug or alcohol abuse, reports of sexual abuse.

10.1.2 Any information pertinent to school safety and/or safety of individuals on School property; and

10.1.3 Any training or educational opportunities for an SPO or School District representatives relative to school safety.

11.0 SPECIFIC DUTIES OF SPECIAL PATROL OFFICERS (SPOs)

In addition to any other duties specifically set forth in the Agreement, an SPO assigned to the School District shall provide SPO Services intended to meet the program objectives, including, but not limited to the following:

11.1 Patrol and observe all areas of the assigned School(s) and corresponding grounds;

11.2 Be visible and available to the students, faculty, and administration;

11.3 Keep the peace and help maintain a safe and orderly school community;

11.4 Develop and maintain a positive and open relationship with students, faculty and parents;

11.5 Present educational programs to students on various topics, including conflict resolution, restorative justice, crime awareness, anger management, etc.;

11.6 Present educational programs to School employees, parents and School Board Members;

11.7 Build community relationships by serving a liaison between the Town (which includes the Manlius Police Department) and the School District;

11.8 Survey the needs of the Schools and address crime and disorder problems, as well as drug activities affecting or occurring in or around the Schools;

11.9 Assist Schools with security concerns and identify physical changes in the environment that may reduce crime in or around the Schools;

11.10 Develop or expand crime prevention efforts for students;

11.11 Educate potential school-age victims in crime prevention and safety;

11.12 Assist in the development of School policies that address crime issues and recommend procedural change(s), where appropriate;

11.13 Assist Schools in meeting safety and security goals and any related requirements mandated by New York State Law;

11.14 Take appropriate law enforcement action with regard to any criminal activities that the SPO observes or that are reported directly to the SPO, including investigation of any suspected or actual criminal activity that might otherwise be investigated by a local police agency; and

11.15 Investigate other emergency situations and summon aid and assistance as needed (e.g., Fire Department, ambulance, etc.);

11.16 The SPO shall not be responsible for, or have authority to, enforce School rules. Matters of school discipline shall be referred to the appropriate School Principal or School District Administrator for further review and action;

11.17 The SPO shall not detain or question students regarding their immigration status;

11.18 In fulfilling his/her duties the SPO shall not discriminate on the basis of race, color, sex, national origin, language status, disability, religion, sexual orientation, or membership in any other protected class.

11.19 The SPO shall comply with all Federal, State and local laws as well as school District policies.

12.0 SUPERVISORY AUTHORITY

12.1 The SPOs assigned to the School District pursuant to the Agreement are under the direct and sole supervision and authority of the Town's Chief of Police and other Command Officers within the Manlius Police Department. The SPOs assigned to the School District shall comply with all general and specific SPO policies or protocol/procedure directives prepared by the Manlius Police Department.

12.3 The Manlius Police Department will share a copy of any SPO policy or protocol/procedure direction with the School District.

12.4 The Manlius Police Department will also provide a copy of all SPO policies or protocol/procedure directives to SPOs assigned to the School District.

12.5 In the performance of the duties described herein, the SPO shall regularly coordinate and communicate with the Principal or the Principals' designee of the schools to which they are assigned. The Principal or designee shall contact the SPO Supervisor assigned by the Town for such purpose in the event of any question regarding the performance of duties by an SPO. However, the SPO shall remain under the direct and exclusive control and supervision of the Town on all matters relating to the duties of the SPO under this Agreement.

12.6 The SPO shall not be an employee of the School District.

12.7 The Parties shall confer and agree regarding the SPO's attire while on duty.

13.0 PROGRAM EVALUATION

13.1 The School District will provide timely evaluations to the Manlius Police Department to enable required progress reports to be completed in an efficient and timely manner.

13.2 Any evaluation instruments for completion by selected students, school staff, school administrators, and community members will be developed collaboratively by the School District and the Manlius Police Department in order to ensure objective evaluation criteria are established and applied.

14.0 CONTRACT FEES AND ADDITIONAL COSTS

14.1 The School District agrees to pay the Town for Contract Fees and Costs associated with the placement of SPOs in the School District as set forth herein.

14.2 SPOs will be assigned to the School District for a period of approximately one hundred eighty six (186) days per academic year for a minimum of eight (8) hours each day, at a rate of pay of Forty dollars **($40.00)** per hour plus reimbursement to the Town for the Town's expenses and contributions for FICA, Medicare, Workers' Compensation, if any, and other mandated employer payments or contributions made on behalf of these employees.

To be compensated, a SPO must "clock-in" utilizing the department's payroll software from a computer or portable electronic device, which is necessary for accounting, administrative, and billing purposes and must be strictly adhered to in the following manner:

a. When scheduled, a SPO may only clock-in when they are physically present at their assigned school or when assigned to an off-site detail authorized by a supervisor or the appropriate school administrator.

b. If a SPO neglects to clock-in or out, has been assigned to an off-site detail, or any circumstances exist where manual adjustments need be made, the SPO should contact their supervisor, explain the circumstances, and request the appropriate adjustments.

c. If a SPO is required to work overtime due to an active event they are on they will need to add a note in the software stating the reason for the overtime and who approved it.

d. If a SPO is requested for a preplanned event they have been approved to work, they need to let their supervisor know they are working the event and ensure they make a note in the payroll software indicating the event worked and who approved it from the school.

14.3 SPO's shall only work school related functions and events. SPO's will not routinely be asked to work beyond their normal schedule; however, if the need exists, and falls within the below listed criteria, they may work overtime and will be compensated accordingly.

For planned/scheduled extracurricular school activities (e.g., sporting events, dances, graduations) where secondary employment requests were traditionally made, and offered to full-time PBA members, the PBA shall offer those jobs to full-time PBA members first, through regular posting. Posting shall be made well in advance to ensure the fair and equitable distribution of secondary employment opportunities. All postings shall include a deadline date/time well prior to the event, to suitably accomplish scheduling needs. Once the deadline date/time has passed, and only if openings still exist, SPO's may be offered those jobs accordingly. In a timely manner, the PBA shall communicate to the secondary employment requester the results of said postings.

School specific events, which were never traditionally offered to full-time PBA members as secondary employment opportunities; to include non-scheduled unforeseen incidents or circumstances where an SPO is needed immediately (e.g., school threats, potential for harm) may be offered to an SPO at the discretion of the appropriate school official without first posting.

14.4 The SPO's regular duty hours shall be 7:45 a.m. until 3:45 p.m. unless this schedule is modified by mutual agreement between the Town and the School District, or the Principal of the building to which the SPO is assigned on a given day.

14.5 Additional expenses (e.g., meals, tolls, travel, etc.) may be incurred, for In Service Training (48 hours annual minimum), supplemental schools, seminars or additional services, at the agreed-upon reimbursement and hourly rate, with prior authorization from the School District's Superintendent.

14.6 The Manlius Police Department will design appropriate verification forms which will be made available to authorized School District personnel for auditable proof of services performed for the School District. The School District will be invoiced three times per year – in January for services rendered from September through December, in April for services rendered from January through March and in July for services rendered from April through June – for the actual costs incurred by the Town in accordance with this Agreement. The School District agrees to make full payment to the Town within 30 business days from receipt of the invoice.

14.7 The School District further agrees to reimburse the Town for up to **$10,000** per SPO officer, per academic year, to cover the costs for uniforms, equipment and training (Additional Costs). Any applicable reimbursement for the Additional Costs will be invoiced to the School District. The equipment and uniforms purchased in the Agreement shall remain the property of the Town, except as otherwise provided herein.

14.8 The parties acknowledge, however, that the cost of living, as well as costs for uniforms, equipment and training may increase from year one to year two of this Agreement. Accordingly, the parties understand and agree that future rate increases will be mutually agreed upon in writing prior to implementation.

14.9 Except as otherwise provided herein, the Town agrees that the Contract Fees and Additional Costs set forth herein are the exclusive fees for all SPO services provided under the Agreement.

15.0 TOWN AS AN INDEPENDENT CONTRACTOR

15.1 The Town shall provide SPO Services to the School District as an independent contractor, and any and all SPO Services performed by the Town and its employees or agents under this Agreement shall be performed in such capacity.

15.2 The Town's employees, consultants, or agents shall not hold himself/herself out as, nor claim to be, an officer or employee of the School District, nor make any claim, demand, or application to or for any right or privilege applicable to an officer or employee of the

School District, including, but not limited to, Workers' Compensation coverage, unemployment Insurance benefits, Social Security coverage, Disability benefits, New York State Retirement membership or credit, etc.

15.3 The Town shall not have, nor hold itself out as having, the authority or power to bind or create liability for the School District by the Town's acts or omissions.

15.4 It is agreed by the Town and the School District that neither federal, state, or local income taxes nor payroll taxes of any kind, including, but not limited to F.I.C.A. or F.U.T.A., will be withheld or paid by the School District on behalf of any Town employee, consultant, or agent in connection with this Agreement.

15.5 Said employment withholdings and/or payments are to be made by the Town in compliance with all federal, state, and local laws, rules or regulations.

15.6 Provided the School District timely pays the Town the Fees established, the Town agrees to pay and/or withhold all applicable taxes, including income taxes, Workers' Compensation Insurance, unemployment insurance payment, disability insurance payment, and/or any other payments that may be required under the laws, rules, or regulations of any government agency having jurisdiction over the Town or its relationship with the School District, and further agrees to indemnify and hold the School District harmless against any claim, cost, penalty, damage, or expense (including reasonable attorneys' fees) related to either parties nonpayment and/or underpayment of any such taxes or payments.

15.7 The School District acknowledges that it shall have no ability to control the manner, means, details or methods by which the Town or its agents perform SPO Services under this Agreement, unless otherwise addressed in this Agreement and except as required by federal, state, or local laws, rules, and regulations.

15.8 These provisions shall survive any expiration, termination, or non-renewal of the Agreement.

16.0 TERMINATION OF THE AGREEMENT

Either party may terminate this Agreement, at any time, for any reason, by providing thirty (30) days advance notice to the other party. Such notification shall be made, in writing, and sent via a trackable overnight delivery method (e.g., FedEx, UPS, USPS Express Mail, etc.) to the other party at its principal address.

17.0 EXTENSION OR RENEWAL

17.1 Negotiations for any contract renewal will begin during the month of May 2024.

17.2 The parties will each be responsible for initiating such negotiations. The failure of a party to initiate or to be affirmatively non-receptive to such initiation by the other party shall be deemed treated as a firm intent not to renew the Agreement.

18.0 RECIPROCAL INDEMNIFICATION

18.1 The Town shall indemnify and hold harmless the School District from and against any and all losses, damages, judgments, claims, causes of action, costs, expenses, and other liabilities (collectively, "Liabilities") to the extent such liabilities arise from the negligent or other wrongful acts or omissions, or any such legal or contractual duties or obligations assumed by the School District, of the Town, its officers, and employees, (including the SPO), or from the Town or any such person's or the Town's material breach of, or default hereunder.

18.2 The School District shall indemnify and hold harmless the Town from and against any and all losses, damages, judgments, claims, causes of action, costs, expenses, and other liabilities (collectively, "liabilities") to the extent such liabilities arise from negligent or other wrongful acts or omissions or of any such legal or contracted duties or obligations assumed by the School District, of the School District, its officers, and employees, or from the School District's material breach of, or default hereunder.

19.0 CONTROLLING LAW AND VENUE

This Agreement shall be interpreted pursuant to the laws of the State of New York, without regard to New York's conflict of laws provision. If an action is filed to enforce this Agreement, the parties agree that such action must be filed exclusively in a court of competent jurisdiction in Onondaga County, New York, and the parties expressly consent to the jurisdiction of such court.

20.0 ASSIGNMENT

This Agreement may not be assigned by either party.

21.0 ENTIRE AGREEMENT

This Agreement may not be altered except by a writing signed by both parties. Furthermore, this Agreement represents the entire agreement and understanding between the parties and supersedes all prior agreements between the parties, written or oral.

22.0 INTERPRETATION

The language of all parts of this Agreement in all cases shall be construed as a whole, according to its fair meaning, and not strictly for or against any party, regardless of who drafted it.

23.0 INSURANCES

The District agrees to obtain and continue to maintain in full force and effect its general liability insurance, public insurance, and automotive insurance relative to the SPO Services to be performed under the Agreement, with limits of not less than $500,000 per occurrence and $1,000,000 in the annual aggregate.

24.0 PROTECTION OF CONFIDENTIAL DATA.

The Town shall provide its Services in a manner which protects Student Data (as defined by 8 NYCRR 121.1(q)) and Teacher or Principal Data (as defined by 8 NYCRR 121.1(r)) (hereinafter "Confidential Data") in accordance with the requirements articulated under Federal, New York State and local laws and regulations, including but not limited to the foregoing:

24.1 The Town will adopt technologies, safeguards and practices that align with the NIST Cybersecurity Framework.

24.2 The Town will comply with the School District Data Security and Privacy Policy, Education Law § 2-d, and 8 NYCRR §121.

24.3 The Town will limit internal access to personally identifiable information to only those employees or sub-contractors that need access to provide the contracted services.

24.4 The Town will not use the personally identifiable information for any purpose not explicitly authorized in this Agreement.

24.5 The Town will not disclose any personally identifiable information to any other party without the prior written consent of the parent or eligible student, unless otherwise authorized pursuant to applicable law.

24.6 The Town will maintain reasonable administrative, technical and physical safeguards to protect the security, confidentiality and integrity of personally identifiable information in its custody.

24.7 The Town will use encryption to protect personally identifiable information in its custody while in motion or at rest.

24.8 The Town will not sell personally identifiable information nor use or disclose it for any marketing or commercial purpose or facilitate its use or disclosure by any other party for any marketing or commercial purpose or permit another party to do so.

24.9 In the event The Town engages a subcontractor to perform its contractual obligations, the data protection obligations imposed on the Town shall apply to the subcontractor.

25.0 DATA BREACH

In the event that Confidential Data is accessed or obtained by an unauthorized individual, The Town shall provide notification to the School District without unreasonable delay and not more than seven calendar days after the discovery of such breach. The Town shall follow the following process:

25.1 The security breach notification shall be titled "Notice of Data Breach," shall be clear, concise, use language that is plain and easy to understand, and to the extent available, shall include: a brief description of the breach or unauthorized release; the dates of the incident in the date of discovery; a description of the types of Confidential affected; an estimate of the number of records affected; a brief description of the Town's investigation or plan to investigate; and contact information for representatives who can assist the School District with additional questions.

25.2 The Town shall also prepare a statement for parents and eligible students which provides information under the following categories: "What Happened," "What Information Was Involved," "What We Are Doing," "What You Can Do," and "For More Information."

25.3 Where a breach or unauthorized release of Confidential Data is attributed to The Town, and/or a subcontractor or affiliate of The Town, The Town shall pay for or promptly reimburse the School District for the cost of notification to parents and eligible students of the breach.

25.4 The Town shall cooperate with the School District and law enforcement to protect the integrity of investigations into the breach or unauthorized release of Confidential Data.

25.4.1 The name and contact information of the reporting School District subject to this section.

25.4.2 A list of the types of personal information that were or are reasonably believed to have been the subject of a breach.

25.4.3 If the information is possible to determine at the time the notice is provided, then either (1) the date of the breach, (2) the estimated date of the breach, or (3) the date range within which the breach occurred. The notification shall also include the date of the notice.

25.4.4 Whether the notification was delayed as a result of a law enforcement investigation, if that information is possible to determine at the time the notice is provided.

25.4.5 A general description of the breach incident, if that information is possible to determine at the time the notice is provided.

25.4.6 Information about what the agency has done to protect individuals whose information has been breached.

25.4.7 Advice on steps that the person whose information has been breached may take to protect himself or herself.

25.5 The Town further acknowledges and agrees to have a written incident response plan that reflects best practices and is consistent with industry standards and federal and state law for responding to a data breach, breach of security, privacy incident or unauthorized acquisition or use of Protected Data or any portion thereof, and agrees to provide Client, upon request, with a copy of said written incident response plan

26.0 ADDENDUM

The following addenda attached hereto shall be incorporated into the Agreement:

Addendum A: Parents' Bill of Rights for Data Privacy and Security

Addendum B: Parents' Bill of Rights – Supplemental Information Addendum

Addendum C: The Town's Data Security and Privacy Plan

27.0 WAIVER

The failure of any party to insist on the strict performance of any provision of this Agreement or to exercise any right under this Agreement shall not constitute a waiver of such provisions or right. A waiver is effective only if in writing and signed and delivered by the waiving party.

28.0 MUTUAL COVENANTS

28.1 The undersigned representatives of the two contracting parties, in signing, hereby represent that they are authorized and empowered by their respective Boards (as applicable) to enter into this Agreement. Consent to the terms of this Agreement is signified by the signatures below.

28.2 It is agreed by and between the parties that any provision of this Agreement requiring legislative action to permit its implementation by amendment of law or by providing the additional funds therefore shall not become effective until the appropriate legislative body has given approval.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals the day and year first above written.

For the Town of Manlius:

John T Deer

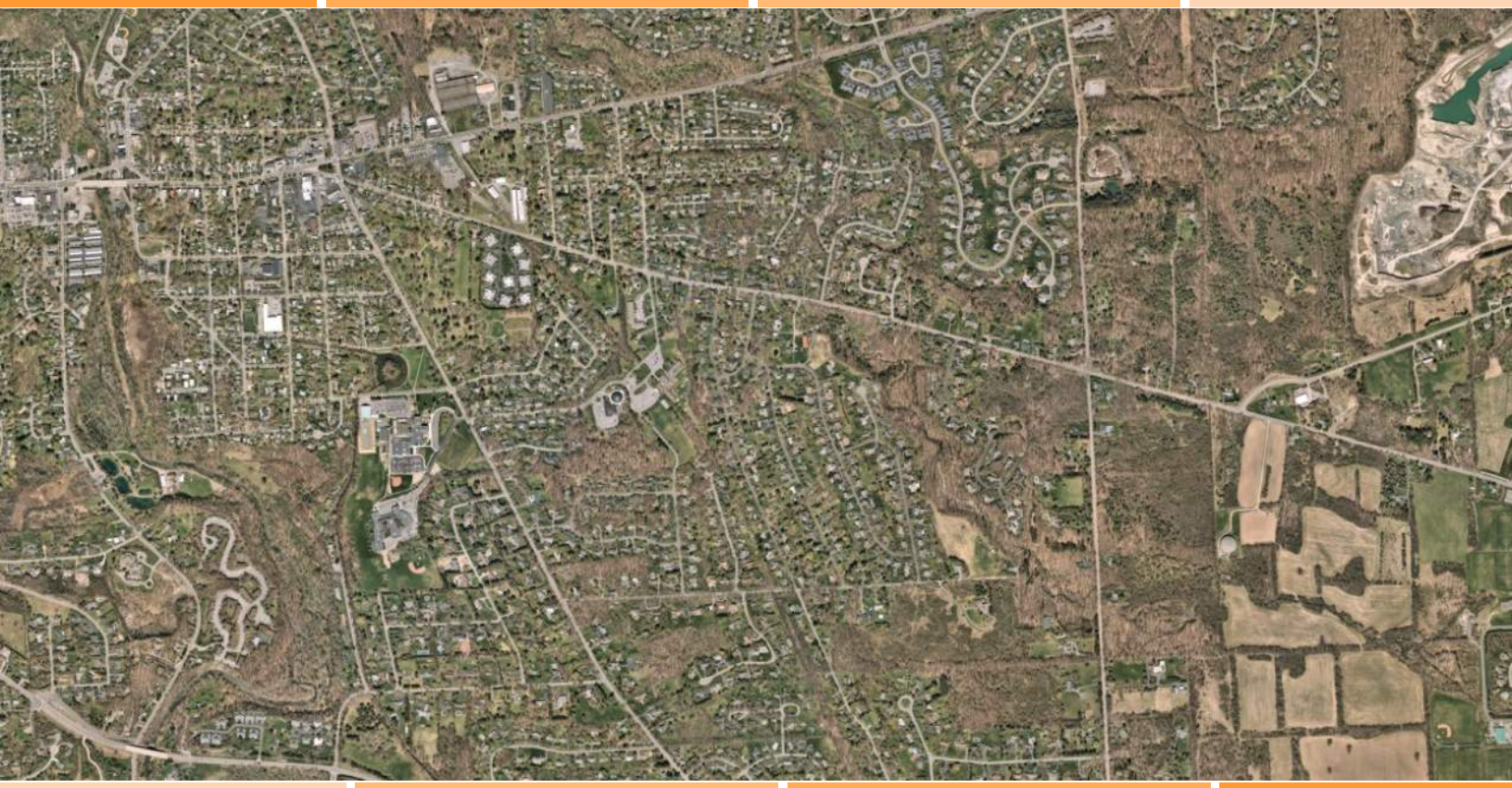
8/21/23
Date

For the Fayetteville - Manlius School District:

8/15/23
Date

MUIRFIELD DRIVE DRAINAGE IMPROVEMENTS ASSESSMENT

Town of Manlius, New York



Prepared For:

Town of MANLIUS New York

Town of Manlius, NY
301 Brooklea Drive
Fayetteville, NY 13066

Prepared By:

Engineering and Land Surveying, P.C.
1533 Crescent Road, Clifton Park, NY 12065

DRAFT – March 16, 2023

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1.0 PROJECT BACKGROUND AND STUDY GOALS

The Muirfield Retention System is located at the northern end of Muirfield Drive within the Town of Manlius. It was reportedly constructed concurrently with the Muirfield Subdivision in 1982. The system includes a graded above grade depression and underground storage vault. The vault is reportedly constructed of gabion baskets walls, segmented concrete plank covers and an open bottom that lies on rock. The overall system relies upon infiltration to manage stormwater runoff with the vault placed upon rock that is reportedly karst geology.

Figure 1-1
Project Location

The retention system services an overall watershed that is approximately 56.77 acres in size. Properties located along Muirfield Drive are located within the Muirfield Drive Drainage District with all other properties within the watershed outside a Town drainage district.

The last time the Town performed maintenance and repair on the retention system was in 2013 which reportedly included addressing deterioration in the concrete plank covers, reconstruction of walls and removal of silt from the bottom of the vault. The Town has reported no additional maintenance occurring since 2013.

The Manlius Town Board authorized the completed of a drainage study that was performed by Miller Engineering in 2020. The purpose of the Miller Drainage Study was to determine drainage problems or concerns within the watershed which included the Muirfield Retention System, evaluate the capacity of existing stormwater facilities, develop calculations for projected stormwater runoff flows for a variety of rainfall events and provide recommendations for improvements within the watershed. The Miller Drainage Study recommended numerous drainage improvements that included the following:

- Increasing the storage capacity of the Muirfield Retention System.
- Replacement of the existing storm sewer along Muirfield Drive to meet the 2-year design storm with all pipes being perforated to promote infiltration,
- Replacement of all storm pipes that are less than 12-inch diameter to a minimum of 12-inch diameter with all new pipes to be perforated to promote infiltration,
- Assess the feasibility of improving the designated overland flood routing within a reported existing drainage easement to the rear of lots on the east side of Muirfield Drive.
- Clean all catch basins and Muirfield Drive Retention system annually.
- Installation of an underground infiltration system on the paper street along Muirfield Drive

The Miller Drainage Study indicated that the above improvements would solve potential future flooding issues throughout the Muirfield Drive Retention Area Watershed. The budgetary estimate for the above work was $400,000 in 2020 dollars. The Town did not advance any of the noted improvements outlined in the Miller Drainage Study.

Since the completion of the Miller Drainage Study, the Town was planning to initiate a clean out of the concrete vault within the Muirfield Retention System in 2022. The Town requested MJ to visually assess the concrete vault to determine whether it would be feasible to perform the planned cleaning. Based upon limited visual observations conducted in July of 2022, MJ believed removal of the concrete plank covers could result in the covers breaking as they were in an observed progressed state of deterioration. There were no lifting hooks and therefore, the planks would need to be lifted from one end or the other using an excavator. This method of removing the planks had a potential of damaging the covers. Further, there appeared evidence of advanced failure of a portion of the gabion basket walls due to observed settlement of the covers at the southern end of the vault. Based upon these limited observations, MJ did not believe maintenance could be performed on the vault without causing substantial damage to the plank covers or walls.

To address the noted deterioration of the vault and to be capable of performing ongoing maintenance of the system, the Town is assessing the potential phases rehabilitation of the Muirfield Retention System. The initial phase of work would be limited to replace or enlarge the existing concrete vault and reconfigure the inlet to the open basin such that is discharges to the ground surface and into a forebay. An alternate assessment of enlarging the graded basin and providing a dedicated outlet was also considered. This report presents the analysis completed that assesses the rehabilitation options summarized above.

2.0 STUDY AREA CHARACTERISTICS

2.1 WATERSHED AREA AND BOUNDARIES

Land use and Topography: Land use within the watershed is primarily residential. It is moderately to steeply sloped with areas ranging from 0% inclined to 35% inclined. There is a high point located on Hoag Lane to the southeast of the watershed and a low point to the northwest at the Muirfield Drive retention system. The watershed is located within an area where karst is expected to be present; karst geology is formed from the dissolution of soluble rock or rock containing minerals that are easily dissolved which forms highly permeable bedrock. Karst landscape is most notably characterized by sinkholes, caves, springs, and underground drainage systems. In areas where karst is present, loss of surface runoff into bedrock underlain by limestone geologic formations may occur; such occurrences are referred to as karst loss. Refer to Appendix K for a Statewide Assessment of Karst Aquifers in New York performed by the U.S. Department of the Interior and the U.S. Geological Survey (USGS) in cooperation with the New York State Department of Environmental Conservation (NYSDEC) in 2020.

Soils and Groundwater: Review of the National Resources Conservation Service (NRCS) Soil Survey indicates that the watershed is predominately comprised of Benson silt loam with a hydrologic rating of D, Cazenovia silt loam with a hydrologic rating of C, and Wassaic silt loam with a hydrologic rating of C; Refer to Appendix A. The Soil Conservation Service defines hydrologic soil groups C and D as follows:

> Type C Soils: Soils having a slow infiltration rate when thoroughly wet. This hydrologic soil group consists of soils having a layer that impedes the downward movement of water and/or soils of moderately fine texture to fine texture. These soils have a slow rate of water transmission.
>
> Type D Soils: Soils having a very slow infiltration rate, and high runoff potential, when thoroughly wet. This hydrologic soil group consists 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/or soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Receiving Water Bodies: Runoff within the watershed converges at the Muirfield Drive retention system; stormwater infiltrates through karst which ultimately reaches Limestone Creek. Limestone Creek is classified as a Class C(T) River by NYSDEC. Class C waters support fisheries and are suitable for non-contact activities; “(T)” indicates that Limestone Creek may support the trout population. Class C(T) rivers can be referred to as "protected streams" and are subject to the stream protection provisions of the Protection of Waters regulations.

Wetlands

> State Jurisdictional Wetlands: The NYSDEC Environmental Resources Mapper (ERM) indicates that State Regulated Freshwater Wetlands and their buffer zones are not located within or adjacent to the watershed. Refer to Appendix C.
>
> Federal Jurisdictional Wetlands: The online Wetlands Mapper provided by the U.S. Department of Interior, Fish, and Wildlife Service (USFWS) indicates that federal jurisdictional wetlands and their 100-foot buffer zones are not located within or adjacent to the watershed. Refer to Appendix C.

Flood Plains: Review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel 36067C0263F, dated November 4, 2016, shows that the watershed is not located within a floodplain. Refer to Appendix D.

2.2 HYDRAULIC AND HYDROLIGIC MODELING

This study presents the pre-development and post-development features and conditions associated with the rate of surface water runoff within the watershed. For both cases, the drainage patterns, soil types, and ground cover types are considered.

A hydrologic and hydraulic analysis of the pre-development and post-development conditions was performed using the Natural Resources Conservation Service Technical Release 20 (TR-20) and Technical Release 55 (TR-55) methodologies. HydroCAD, developed by HydroCAD Software Solutions LLC of Tamworth, New Hampshire, is a Computer-Aided-Design (CAD) program for analyzing the hydrologic and hydraulic characteristics of a given watershed and its associated stormwater management facilities. HydroCAD uses the TR-20 algorithms and TR-55 methods to create and route runoff hydrographs.

HydroCAD has the capability of computing hydrographs (which represent discharge rates characteristic of specified watershed conditions, precipitation, and geologic factors), combining hydrographs, and routing flows though pipes, streams and ponds. HydroCAD can also calculate the center of mass detention time for various hydraulic features. Documentation for HydroCAD can be found on their website: http://www.hydrocad.net/. For this analysis, the watershed was broken down into a network consisting of two (2) types of components as described below:

- Sub-catchment: A relatively homogeneous area of land, which produces a volume and rate of runoff unique to that area. Sub-catchments are represented by hexagons on the watershed routing diagrams.

- Pond: Natural or man-made impoundment, which temporarily stores stormwater runoff and empties it in a manner determined by its geometry and the hydraulic structure located at its outlets. Catch basins and manholes are also modeled as ponds, but do not have associated storage volumes. Ponds are represented by triangles on the watershed routing diagrams.

The analysis of hydrologic and hydraulic conditions of the pre-development and post-development of the watershed was performed by dividing it into relatively homogeneous sub-catchments. The separation of the area into sub-catchments was dictated by watershed conditions, methods of collection, conveyance, points of discharge and topography. Watershed characteristics for each sub-catchment were then assessed from USGS 7.5-minute topographic maps, aerial photographs, a topographical survey, soil surveys, site investigations, and land use maps. Proposed stormwater management facilities were designed and evaluated in accordance with applicable State and local regulatory requirements. The hydrologic and hydraulic analysis considered the SCS Type II 24-hour storm events for the 1, 2, 10, 100, and 90% storm.

Rainfall data utilized in modeling and analysis was obtained from the Northeast Regional Climate Center's (NRCC) Extreme Precipitation in New York and New England interactive web tool for extreme precipitation analysis (precip.eas.cornell.edu). Rainfall data for various 24-hour storm events are presented below in Table 2-1 and in Appendix E.

Table 2-1 Extreme Precipitation Table	
Storm Event	Depth (inches)
1 Year, 24 Hour	2.05
10 Year, 24 Hour	3.44
100 Year, 24 Hour	5.80
90%	1.00

These values were used to evaluate the pre-development and post-development stormwater runoff characteristics.

3.0 EXISTING WATERSHED ANALYSIS

3.1 DESCRIPTION OF FACILITIES AND OPERATIONAL PERFORMANCE

The watershed consists of residential housing, paved roadways, driveways, grassed areas, and wooded areas. Stormwater runoff within the watershed is currently conveyed through a series of closed drainage infrastructure, swales, and along roadways. Runoff converges at the Muirfield Retention System where it infiltrates into the ground with any discharge from the retention system being routed overland.

There are enclosed drainage systems located along several of the roadways within the watershed with sizes ranging from 6-inch diameter to 48-inch diameter. The location and size of the existing piping network is based upon record information and has not been field verified. The Muirfield Retention System includes the underground vault with a reported capacity of 12,000 c.f. and above grade open basin with a reported capacity of 8,900 c.f. This system relies upon infiltration through karst geology, however field testing to establish in-situ infiltration rates have not been performed. Refer to Figure 3-1 for the general arrangement of the Muirfield Retention System.

The Muirfield Retention System previously had a designated overflow with runoff being directed overland to the northeast and along the former railroad to the Village of Fayetteville. This overflow was filled to install a turnaround Muirfield Drive. Under current operations, runoff would have to overtop the embankments where it would drain northwest towards the Village of Fayetteville.

Figure 3-1
Existing Site Features

Discussions with the Town indicate that depth of runoff within the Muirfield Retention System rarely extends beyond the property boundaries of the retention system and no buildings have been adversely impacted by rain events because of discharges from the retention system. The reported localized drainage problems as summarized from the Miller Drainage Study are generally attributed to undersized storm sewer pipes at the intersections of Muirfield Drive and Hoag Lane. The Miller Drainage Study does identify the potential for flooding of basements of specific homes should any of the stormwater infrastructure become compromised or if precipitation events exceed more common rainfall intensities.

3.2 HYDROLOGIC AND HYDRAULIC ANALYSIS

To assess the potential of expanding the capacity of the retention system, it is necessary to develop a hydraulic and hydrologic model of the existing watershed and stormwater systems. Based on existing stormwater infrastructure and topography, the Muirfield Drive retention system watershed can be divided into 4 sub-catchments,

- 3S: which encompasses Hoag Lane E
- 4S: which encompasses Hoag Lane W, Muirfield Drive S, and Thornwood Lane
- 5S: which encompasses Dawley Road, Jackson Road, and Churchill Lane N
- 6S: which encompasses Muirfield Drive

Each sub-catchment contains both pervious and impervious areas and is made up of various types of soil, at various inclines, with hydrologic ratings of C and D. See Table 3-1 for sub-catchment characteristics. Refer to Appendix F for watershed mapping.

Table 3-1 Muirfield Drive Retention System Sub-catchments			
Sub-catchment	Area (Ac)	Runoff Curve No, Cn	Time of Concentration, Tc (Min.)
3S	11.19	80	22.5
4S	12.07	81	24
5S	21.59	79	13.3
6S	11.92	82	29.4

A summary of the pre-development watershed runoff rates at each sub-catchment is presented in Table 3-2.

Table 3-2 Muirfield Drive Retention System Runoff Rates (c.f.s.)					
Sub-catchment	1-Yr Storm	2-Yr Storm	10-Yr Storm	100-Yr Storm	90%
3S	6.34	9.02	18.32	41.80	0.39
4S	7.16	10.03	19.91	44.49	0.57
5S	15.27	21.84	44.83	103.13	0.70
6S	6.71	9.29	18.09	39.72	0.66

The overall pre-development runoff rates for the watershed are presented in Table 3-3.

Table 3-3 Overall Muirfield Drive Retention System Runoff Rates (c.f.s.)					
Design Point	1-Yr Storm	2-Yr Storm	10-Yr Storm	100-Yr Storm	90%
DP-1 (Overall System)	0.00	0.00	42.28	180.28	0.00

Although the watershed is located within an area that is predominantly characterized as having slow infiltration, (i.e. soils with hydrologic ratings of C and D), which attribute to higher runoff coefficients and lower time of concentrations, karst geology is known to underlay the watershed based upon the Statewide Assessment of Karst Aquifers in New York; Refer to Appendix J. To account for the karst geology, a higher infiltration rate has been assumed at the vault and adjacent properties when modeling stormwater runoff. To determine actual infiltration rates and the amount of karst within the watershed, soil testing must be performed. Refer to Appendix G for the results of the computer aided modeling used to analyze the overall watershed under pre-development conditions.

4.0 ALTERNATIVES ASSESSMENT / RECOMMENDED IMPROVEMENTS

4.1 OPTIONS

Four options to rehabilitate and/or expand the Muirfield Retention System have been considered. There is an added benefit to each option which scales with cost to complete the work. It should be noted that none of the improvements presented would provide any benefit to flooding that may occur in the upland watershed areas. To provide benefit to the upland watershed area, implementation of the improvements outlined in the Miller Drainage Study or other rehabilitation options within the upland drainage systems would be necessary.

4.1.1 Option 1: In-kind Replacement of Vault

Option 1 is for the in-kind replacement of the existing vault. The new vault would be constructed of precast or cast-in-place concrete walls that would be laid on the subgrade rock. Pre-cast concrete covers with access ways for maintenance would be provided. Internal steps would be provided for ease of access. These access ways would avoid the need to remove the covers for maintenance, as is the current method.

This option is an in-kind replacement of an existing functioning system and does not warrant a hydraulic analysis.

4.1.2 Option 2: Replace and Enlarge Vault

Option 2 is for the removal of the existing vault and providing one that is approximately 30% larger, increasing the storage volume from 12,000 c.f to 15,600 c.f. .The enlarged vault would include the same components as Option 1.

As illustrated in Table 4-1, implementing Option2 would reduce the outflow from the retention system at the 100-year storm event. This is accomplished by increasing the storage capacity below grade by expanding the size of the vault.

Table 4-1

Option 2 - Muirfield Drive Retention System Runoff Rates (c.f.s.)

Development	1-Yr Storm	2-Yr Storm	10-Yr Storm	100-Yr Storm	90%
Pre-Development	0.00	0.00	42.28	180.28	0.00
Post-development	0.00	0.00	39.47	159.41	0.00

By enlarging the vault, there is an 8.1% and 11.6% decrease in outflow from the retention system for the 10-year and 100-year storm events, respectively. Refer to Appendix G for the results of the computer aided modeling used to analyze the overall watershed under post-development conditions for Options 2.

4.1.3 Option 3: Redirect Inflow Pipe and Provide Stilling Basin

Runoff reportedly enters the basin through a culvert that discharges directly to the vault. Option 3 would reconfigure this to have a surface discharge into the open basin. At the realigned end section, a graded depression would be provided. The depression would provide opportunity for sediment to be removed from runoff rather than it being deposited directly to the vault. This arrangement could potentially extend the period between sediment removal in the vault. As part of this option, the vault would be provided with several grated openings to allow runoff to enter through the top and infiltrate into the subgrade.

This option would not substantially change the hydraulics of the system and does not warrant a hydraulic analysis.

4.1.4 Option 4: Expansion of Vault and Open Basin and Provide Outfall

Option 4 would include the expansion of the vault (Option 2), installation of the stilling basin at the reconfigured inlet (Option 3), expansion of the open graded surface basin, and providing a formal emergency outflow. There is space on the lot to expand the open basin further south. This option would excavate and expand the open surface basin to the south. An emergency overflow would be provided that directs flow to the northeast and across Muirfield Drive towards the original outlet that was in place prior to the construction of the turnaround at the end of Muirfield Drive.

As illustrated in Table 4-2, implementing Option 4 would reduce the outflow from the retention system at the 100-year storm event. This is accomplished by increasing the storage capacity both below grade by expanding the size of the vault and above grade by expanding the open detention basin to the south.

Table 4-2

Option 4 - Muirfield Drive Retention System Runoff Rates (c.f.s.)

Development	1-Yr Storm	2-Yr Storm	10-Yr Storm	100-Yr Storm	90%
Pre-Development	0.00	0.00	42.28	180.28	0.00
Post-development	0.00	0.00	0.00	101.63	0.00

By enlarging the vault and surface basin and providing a still basin, there is a 100% and 43.6% decrease in outflow from the retention system for the 10-year and 100-year storm events, respectively. Refer to Appendix G for the results of the computer aided modeling used to analyze the overall watershed under post-development conditions for Option 4.

4.2 PROJECT BUDGET

An order of magnitude estimate has been developed which is summarized below with a detailed estimate provided in Appendix J. Please note the project estimate is conceptual in nature and subject to change based on subsequent detailed engineering and design.

Table 4-3
Project Estimate

Description	Option 1	Option 2	Option 3*	Option 4
Construction Costs	$81,050	$135,500	$29,550	$187,575
General Conditions (10%)	$8,105	$13,550	$2,955	$18,758
Overhead & Profit (10%)	$8,916	$14,905	$3,251	$20,633
Design Contingencies (20%)	$19,614	$32,791	$7,151	$45,393
Bid Contingency (5%)	$5,884	$9,837	$2,145	$13,618
Escalation (3.5%)	$4,325	$7,230	$1,577	$10,009
Design Services (12%)	$15,347	$25,658	$1,632	$35,518
Total Project Cost	**$143,241**	**$239,471**	**$48,261**	**$331,504**

**Option 3 includes redirection of the inflow pipe and installation of a stilling basin only and would need to be selected in conjunction with Option 1 or 2.*

The above estimates are valid for 2023 and are subject to the bidding environment. Advancing the project in later years will be subject to escalation.

4.3 APPLICABLE CODES AND REGULATORY REQUIREMENTS

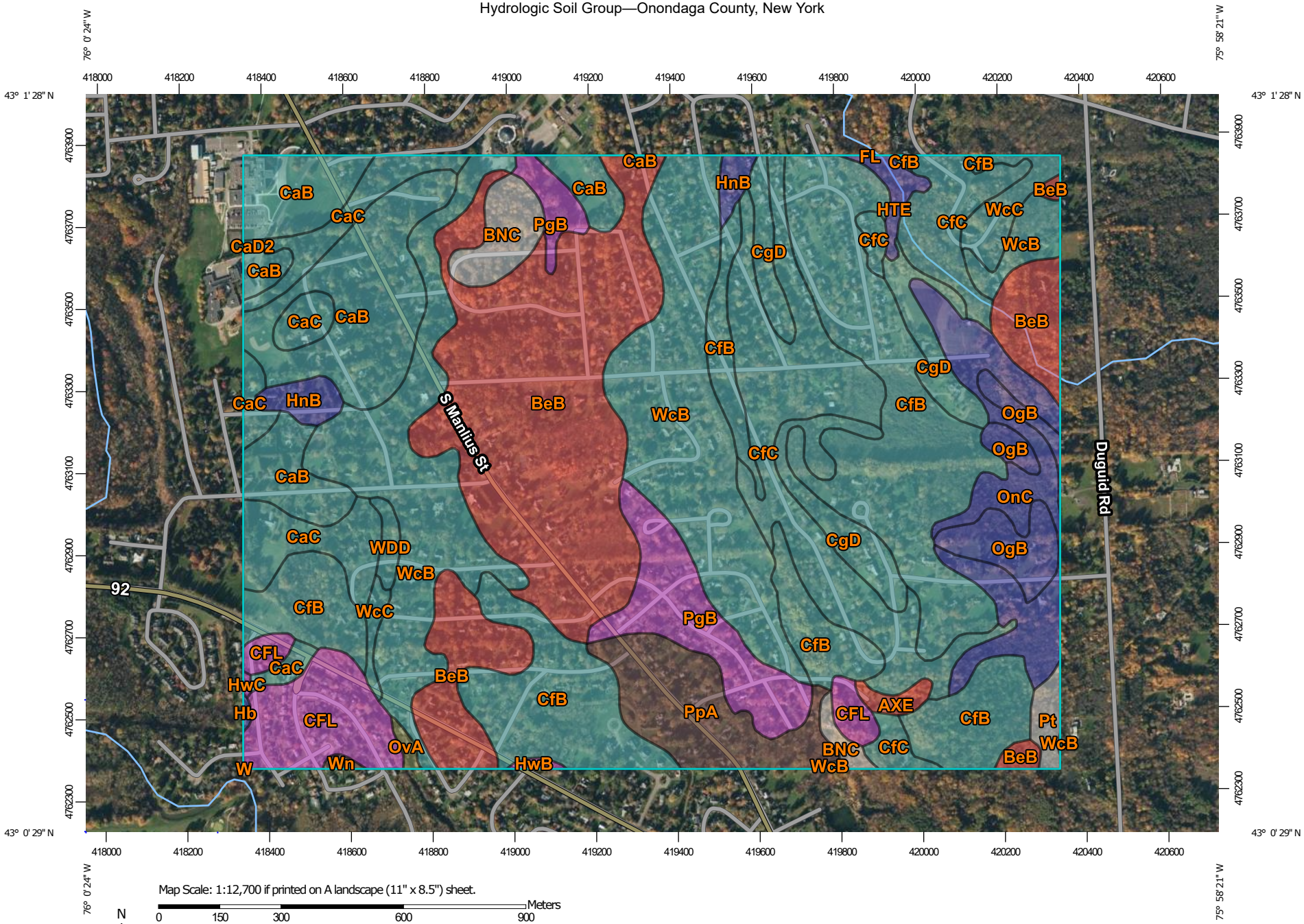
The following codes and regulations would apply to the recommended improvements presented:

- State Environmental Quality Review Act (SEQRA): The project (or action) is to be classified as an Unlisted SEQRA action as the project scope exceeds the thresholds of a Type II defined in Part 617.5. For an Unlisted Action, Parts 1 through 3 of a short environmental assessment must be completed Under ECL Part 617. Coordinated reviews for Unlisted actions are optional.

Appendix A

Soil Survey Data Map

Hydrologic Soil Group—Onondaga County, New York



Map Scale: 1:12,700 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N 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 1:20,000.

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: Onondaga County, New York
Survey Area Data: Version 17, Sep 10, 2022

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

Date(s) aerial images were photographed: Aug 3, 2021—Nov 7, 2021

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AXE	Aurora-Farmington-Rock outcrop association, steep	D	2.4	0.3%
BeB	Benson silt loam, undulating	D	129.1	17.4%
BNC	Benson-Wassaic-Rock outcrop association, sloping		11.2	1.5%
CaB	Camillus silt loam, 2 to 6 percent slopes	C	65.1	8.8%
CaC	Camillus silt loam, 6 to 12 percent slopes	C	30.6	4.1%
CaD2	Camillus silt loam, 12 to 18 percent slopes eroded	C	0.3	0.0%
CfB	Cazenovia silt loam, 2 to 8 percent slopes	C	140.7	19.0%
CfC	Cazenovia silt loam, 8 to 15 percent slopes	C	69.5	9.4%
CFL	Cut and fill land	A	25.4	3.4%
CgD	Cazenovia soils, 15 to 25 percent slopes	C	25.4	3.4%
FL	Fluvaquents, frequently flooded	A/D	0.0	0.0%
Hb	Hamlin silt loam	B	0.3	0.0%
HnB	Honeoye silt loam, 3 to 8 percent slopes	B	6.6	0.9%
HTE	Honeoye, Lansing, and Ontario soils, 25 to 35 percent slopes	B	3.6	0.5%
HwB	Howard gravelly fine sandy loam, 3 to 8 percent slopes	A	0.7	0.1%
HwC	Howard gravelly fine sandy loam, rolling	A	0.2	0.0%
OgB	Ontario loam, 3 to 8 percent slopes	B	14.4	1.9%
OnC	Ontario gravelly loam, 8 to 15 percent slopes	B	29.6	4.0%
OvA	Ovid silt loam, 0 to 3 percent slopes	C/D	1.0	0.1%
PgB	Palmyra gravelly loam, 3 to 8 percent slopes	A	28.8	3.9%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
PpA	Phelps gravelly loam, 0 to 3 percent slopes	B/D	25.5	3.4%
Pt	Quarries		3.5	0.5%
W	Water		0.0	0.0%
WcB	Wassaic silt loam, 0 to 8 percent slopes	C	116.0	15.6%
WcC	Wassaic silt loam, 8 to 15 percent slopes	C	8.6	1.2%
WDD	Wassaic-Benson silt loams, moderately steep	C	2.4	0.3%
Wn	Wayland soils complex, 0 to 3 percent slopes, frequently flooded	B/D	0.6	0.1%
Totals for Area of Interest			**741.6**	**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

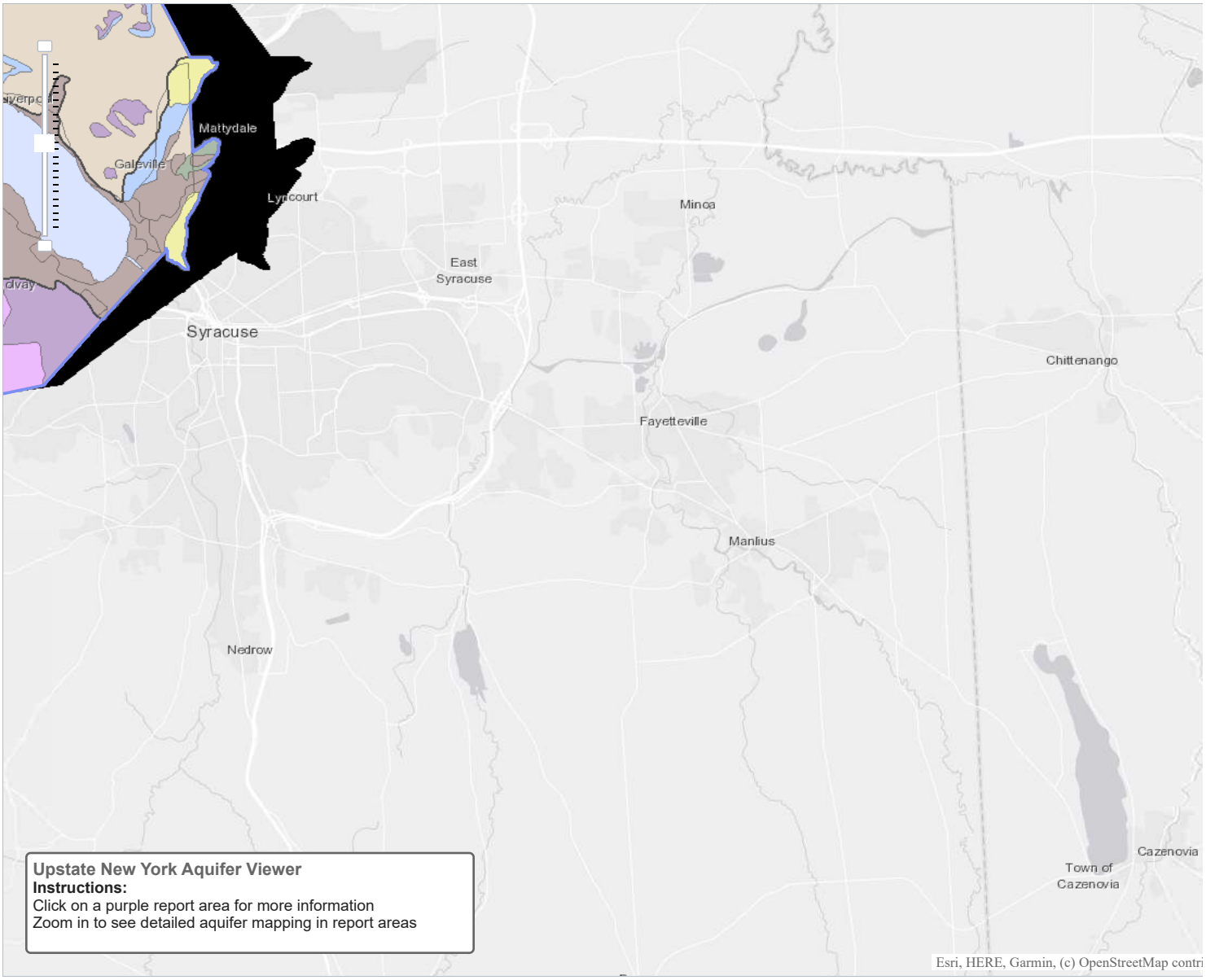
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix B

State and Federal Aquafer Map(s)



Legend

Stratified-drift aquifers mapped at 1:24,000

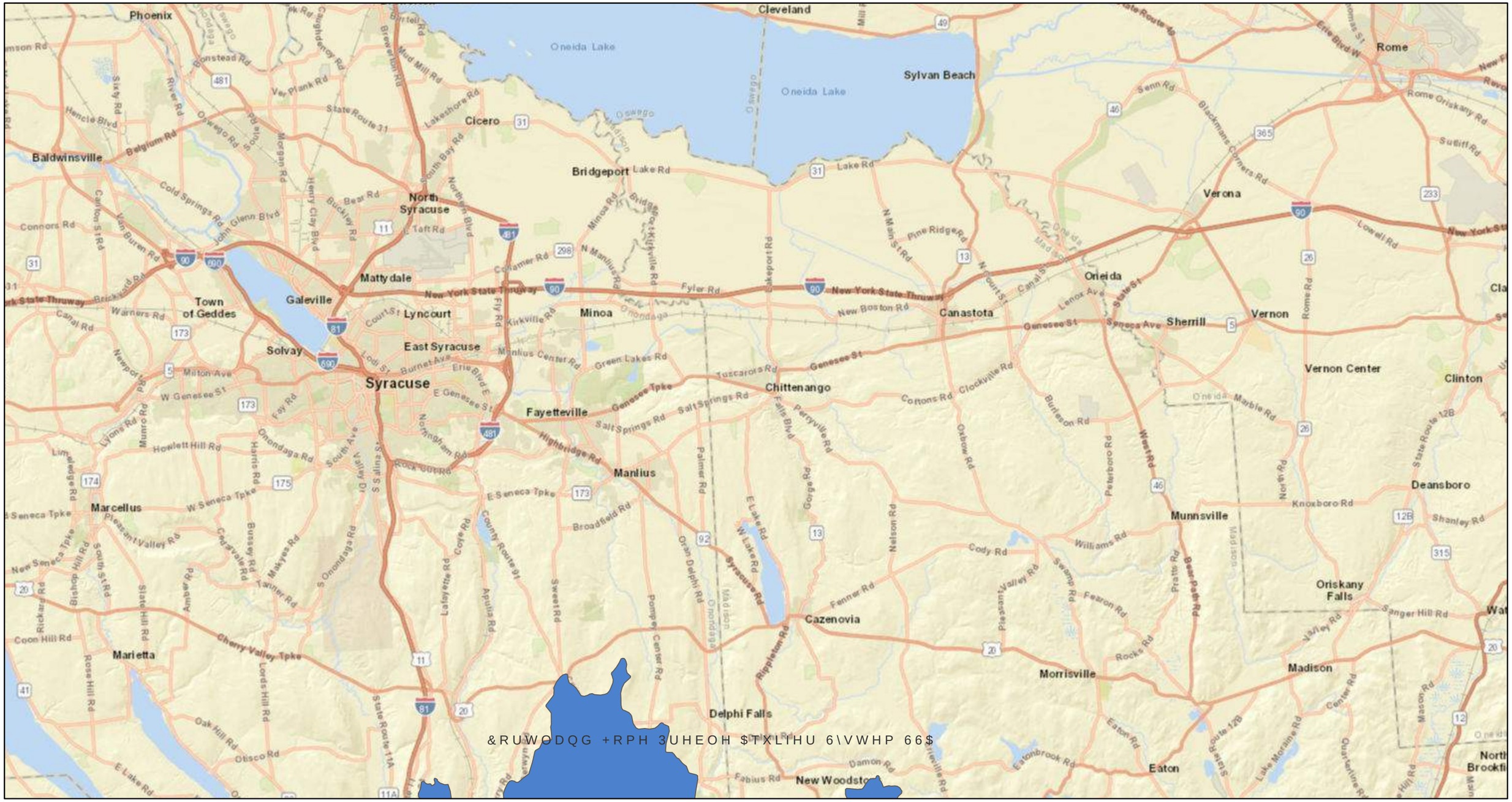
Stratified-drift aquifer boundary lines

- Closed Aquifer Boundary
- New Aquifer Boundary
- New Inferred Aquifer Boundary

Surficial Geology

- alluvial fan
- alluvium
- artificial fill
- beach
- bedrock outcrop
- colluvium
- fluvial
- kame
- kame moraine
- lacustrine sand
- lacustrine silt
- outwash
- peat and muck
- sand
- till
- till moraine
- unknown
- urban land
- water

6ROH 6RXUFH $TXLIHUV



30

6ROHB6RXUFHB$TXLIHUV

PL

NP

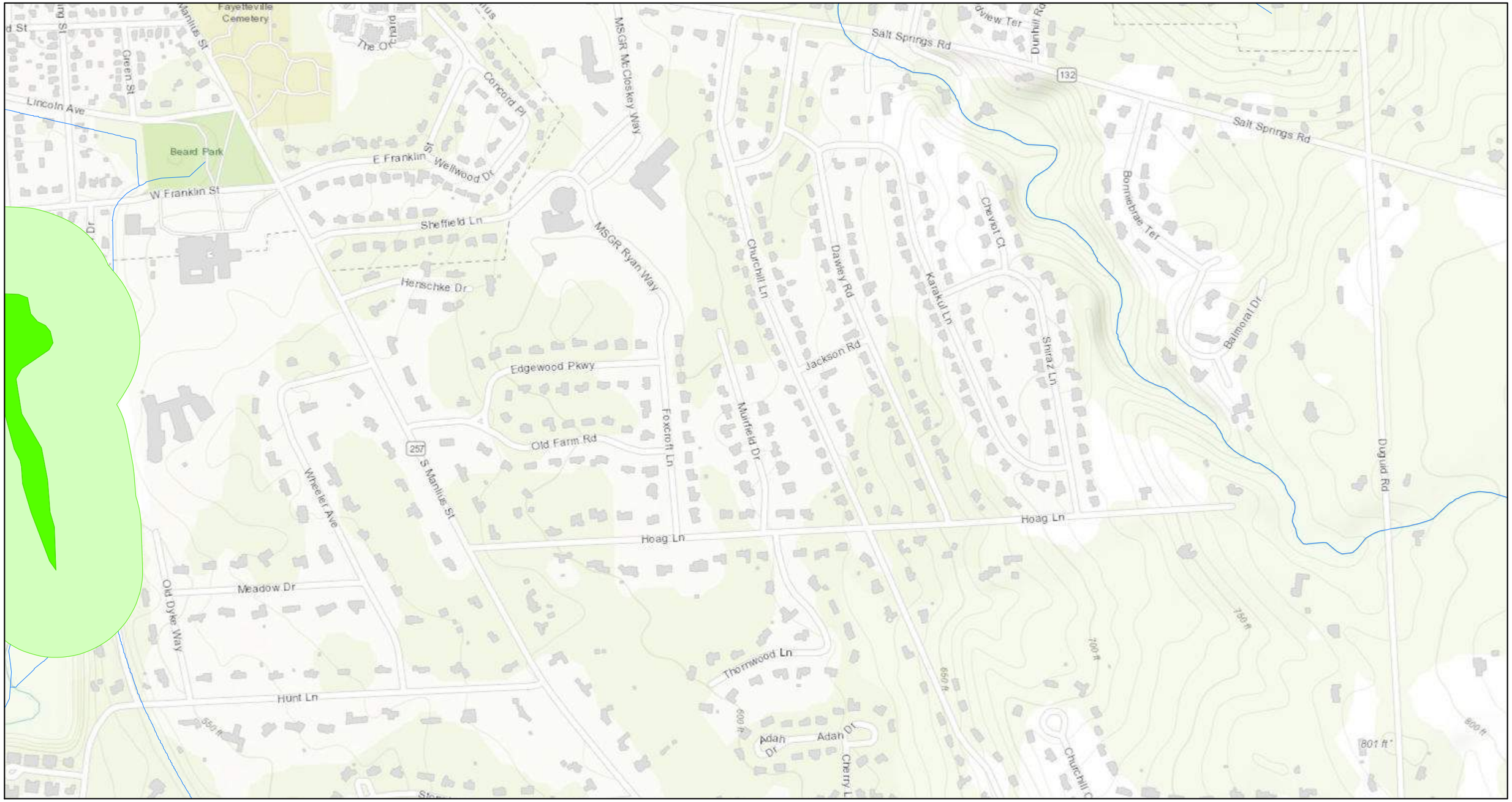
(VUL +(5(*DUPLQ 1*$ 86*6 136

8 6 (QYLURQPHQWDO 3URWH

Appendix C

State and Federal Jurisdictional Wetland Map(s)

NYSDEC REGULATED WETLANDS



January 31, 2023

1:9,028

- Unique Geological Features
- Waterbody Classifications for Rivers/Streams
- Waterbody Classifications for Lakes
- State Regulated Freshwater Wetlands (Outside of the Adirondack Park)
- State Regulated Wetland Checkzone

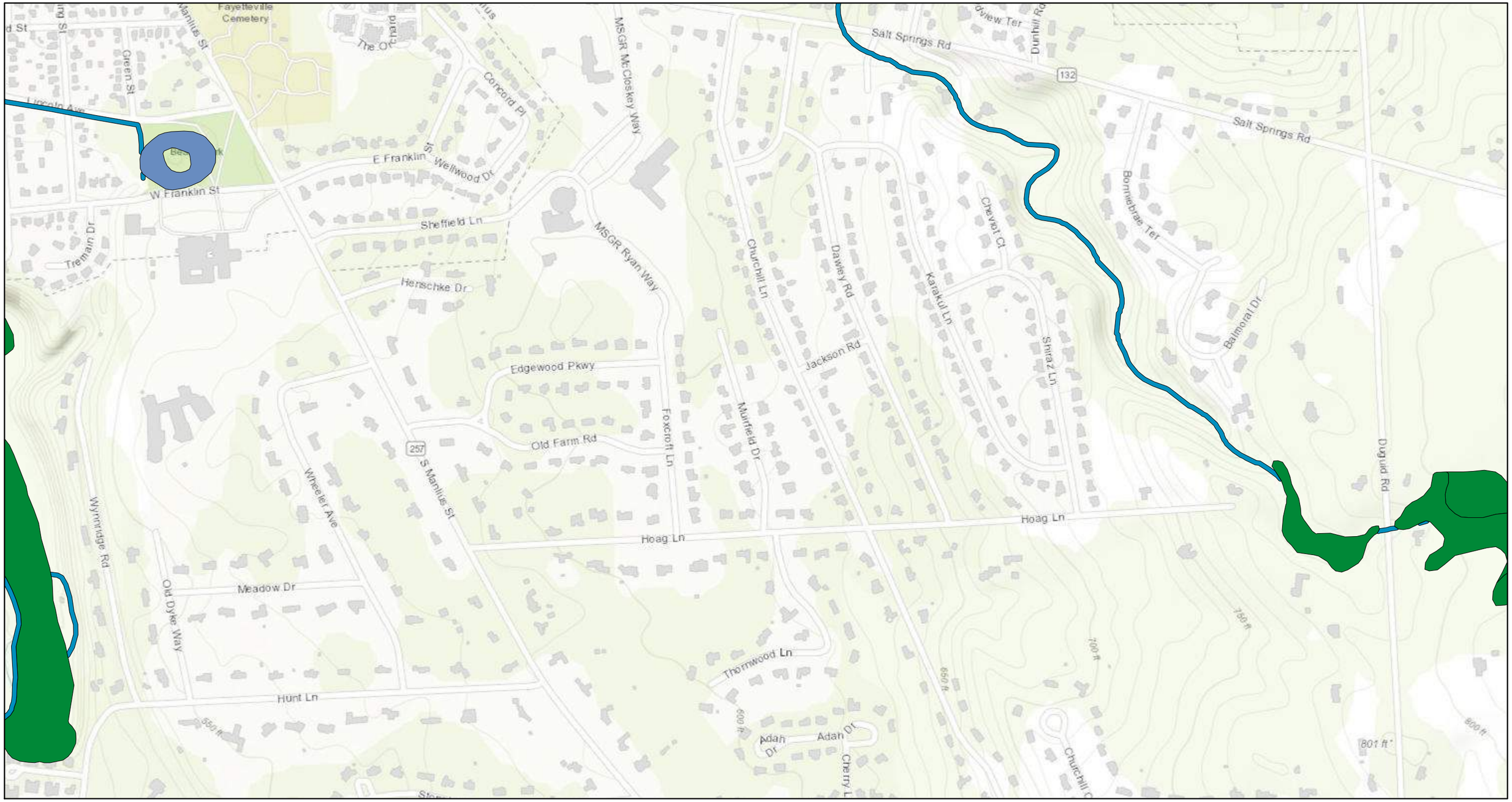
0 0.07 0.15 0.3 mi

0 0.13 0.25 0.5 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

NYS Department of Environmental Conservation
Not a legal document

NATIONAL WETLAND INVENTORY



January 31, 2023

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

1:9,028

0 0.07 0.15 0.3 mi

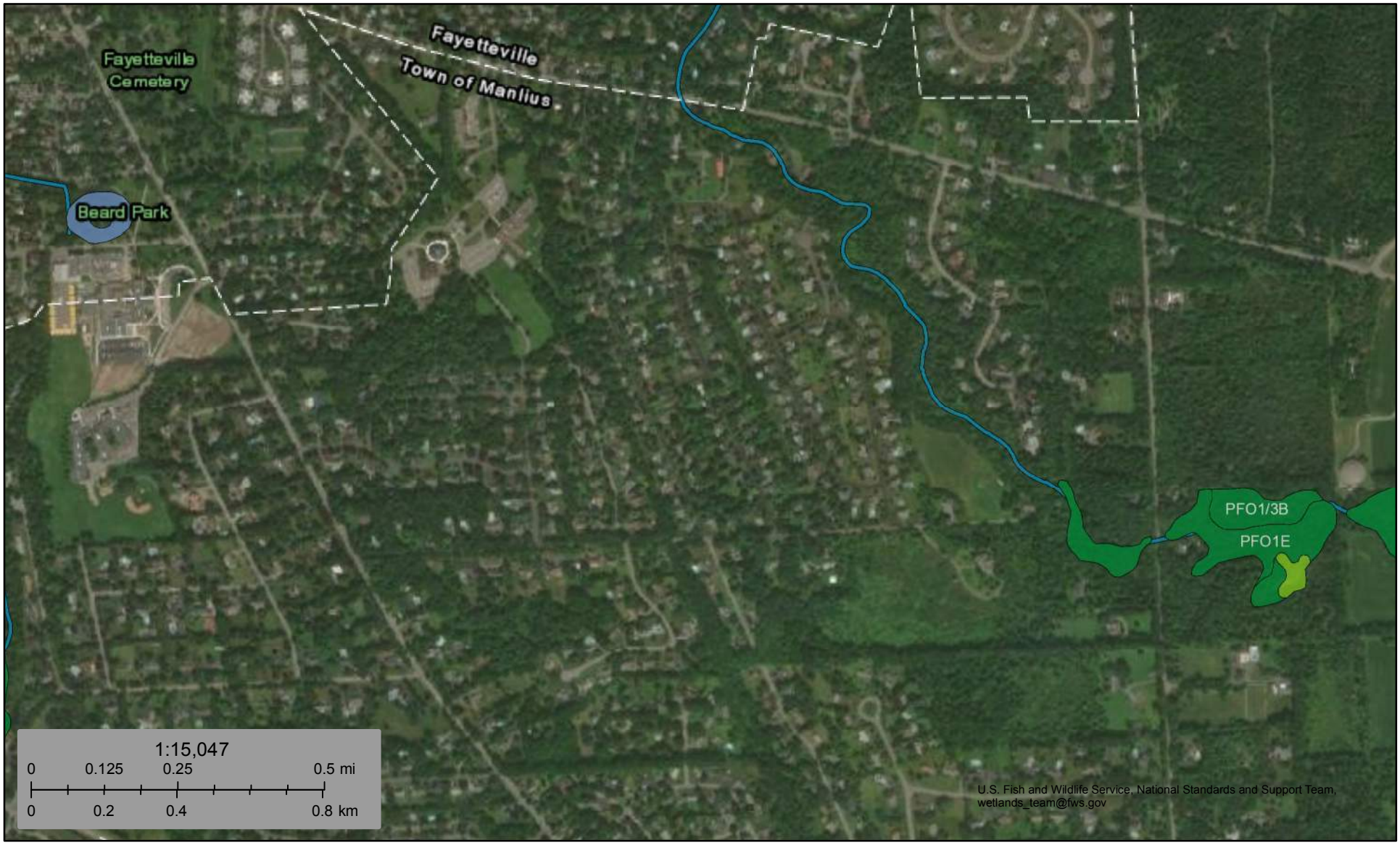
0 0.13 0.25 0.5 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

NYS Department of Environmental Conservation
Not a legal document

U.S. Fish and Wildlife Service

National Wetlands Inventory



February 1, 2023

Wetlands

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

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

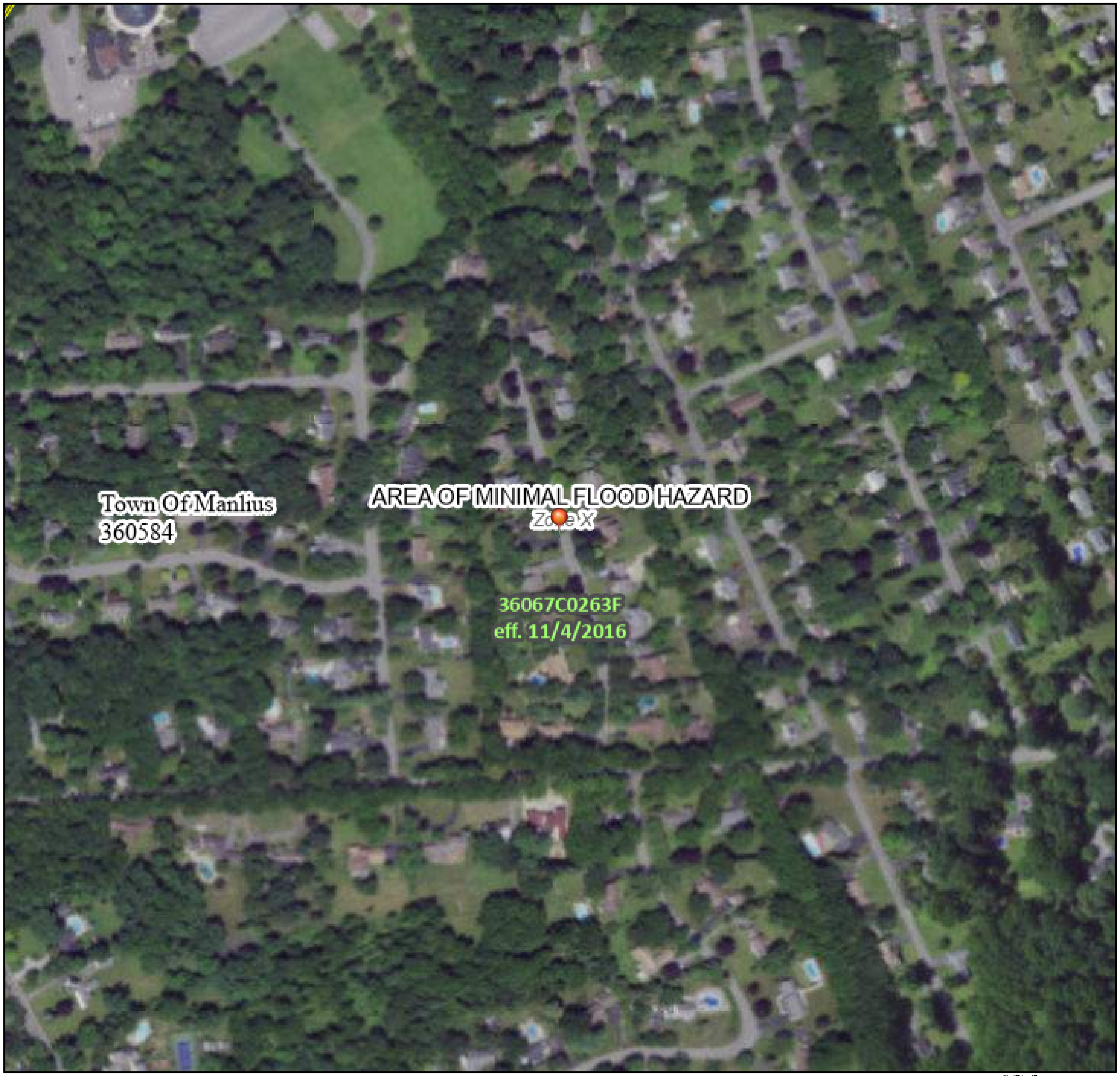
National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

Appendix D

Floodplain Map

National Flood Hazard Layer FIRMette

FEMA



Feet

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee. See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER AREAS

- NO SCREEN Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood Hazard Zone D

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS

- Digital Data Available
- No Digital Data Available
- Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Basemap: USGS National Map: Orthoimagery: Data refreshed October,

Appendix F

Rainfall Data

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New York
Location	
Longitude	75.990 degrees West
Latitude	43.020 degrees North
Elevation	0 feet
Date/Time	Fri, 27 Jan 2023 11:51:14 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.43	0.53	0.69	0.86	1.06	**1yr**	0.75	0.96	1.21	1.45	1.73	2.05	2.30	**1yr**	1.82	2.21	2.64	3.18	3.69	**1yr**
2yr	0.33	0.50	0.63	0.82	1.04	1.28	**2yr**	0.89	1.16	1.44	1.73	2.04	2.39	2.69	**2yr**	2.12	2.59	3.03	3.65	4.21	**2yr**
5yr	0.39	0.61	0.76	1.02	1.30	1.61	**5yr**	1.12	1.43	1.83	2.17	2.54	2.94	3.32	**5yr**	2.60	3.19	3.72	4.39	5.01	**5yr**
10yr	0.44	0.69	0.88	1.19	1.55	1.93	**10yr**	1.34	1.69	2.18	2.59	3.00	3.44	3.89	**10yr**	3.04	3.74	4.34	5.05	5.71	**10yr**
25yr	0.53	0.84	1.07	1.48	1.96	2.44	**25yr**	1.69	2.10	2.76	3.25	3.74	4.23	4.81	**25yr**	3.74	4.62	5.34	6.08	6.79	**25yr**
50yr	0.60	0.96	1.24	1.73	2.34	2.93	**50yr**	2.02	2.48	3.31	3.87	4.42	4.95	5.65	**50yr**	4.38	5.43	6.24	7.00	7.75	**50yr**
100yr	0.70	1.12	1.45	2.05	2.79	3.50	**100yr**	2.41	2.93	3.95	4.60	5.21	5.80	6.64	**100yr**	5.13	6.38	7.30	8.06	8.84	**100yr**
200yr	0.80	1.30	1.69	2.42	3.34	4.19	**200yr**	2.88	3.46	4.73	5.47	6.16	6.79	7.80	**200yr**	6.01	7.50	8.55	9.29	10.09	**200yr**
500yr	0.97	1.60	2.08	3.02	4.23	5.31	**500yr**	3.65	4.34	5.98	6.87	7.66	8.37	9.67	**500yr**	7.41	9.30	10.53	11.21	12.02	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.25	0.38	0.46	0.62	0.76	0.87	**1yr**	0.66	0.85	0.92	1.10	1.40	1.65	2.02	**1yr**	1.46	1.94	2.38	2.78	3.34	**1yr**
2yr	0.32	0.49	0.61	0.82	1.01	1.14	**2yr**	0.87	1.11	1.26	1.56	1.90	2.33	2.61	**2yr**	2.06	2.51	2.94	3.55	4.11	**2yr**
5yr	0.35	0.55	0.68	0.93	1.19	1.34	**5yr**	1.02	1.31	1.48	1.86	2.27	2.73	3.09	**5yr**	2.41	2.97	3.48	4.11	4.71	**5yr**
10yr	0.39	0.60	0.74	1.04	1.34	1.49	**10yr**	1.16	1.46	1.67	2.07	2.54	3.08	3.48	**10yr**	2.73	3.35	3.93	4.56	5.22	**10yr**
25yr	0.44	0.66	0.83	1.18	1.55	1.71	**25yr**	1.34	1.68	1.96	2.40	2.92	3.58	4.06	**25yr**	3.16	3.91	4.61	5.24	5.97	**25yr**
50yr	0.46	0.71	0.88	1.27	1.70	1.89	**50yr**	1.47	1.85	2.19	2.65	3.24	4.00	4.54	**50yr**	3.54	4.36	5.20	5.82	6.59	**50yr**
100yr	0.50	0.76	0.95	1.38	1.89	2.33	**100yr**	1.63	2.27	2.46	2.94	3.59	4.44	5.06	**100yr**	3.93	4.87	5.86	6.43	7.29	**100yr**
200yr	0.55	0.82	1.04	1.50	2.10	2.65	**200yr**	1.81	2.59	2.74	3.24	3.97	4.95	5.66	**200yr**	4.38	5.44	6.59	7.11	8.05	**200yr**
500yr	0.86	1.29	1.66	2.41	3.42	3.17	**500yr**	2.95	3.10	3.15	3.69	4.53	5.68	6.52	**500yr**	5.03	6.27	7.69	8.08	9.18	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.30	0.46	0.56	0.76	0.93	1.07	**1yr**	0.81	1.05	1.20	1.55	1.84	2.22	2.61	**1yr**	1.97	2.51	2.84	3.40	3.98	**1yr**
2yr	0.35	0.54	0.66	0.89	1.10	1.23	**2yr**	0.95	1.21	1.37	1.72	2.07	2.50	2.80	**2yr**	2.21	2.69	3.13	3.76	4.34	**2yr**
5yr	0.42	0.65	0.81	1.11	1.42	1.61	**5yr**	1.22	1.57	1.76	2.18	2.62	3.12	3.53	**5yr**	2.76	3.40	3.98	4.67	5.32	**5yr**
10yr	0.50	0.76	0.95	1.32	1.71	1.99	**10yr**	1.47	1.95	2.16	2.67	3.21	3.83	4.25	**10yr**	3.39	4.09	4.79	5.52	6.23	**10yr**
25yr	0.62	0.95	1.18	1.69	2.22	2.65	**25yr**	1.92	2.60	2.83	3.52	4.19	4.73	5.46	**25yr**	4.19	5.25	6.15	6.89	7.68	**25yr**
50yr	0.74	1.13	1.40	2.02	2.72	3.31	**50yr**	2.35	3.23	3.48	4.31	5.11	5.68	6.60	**50yr**	5.03	6.35	7.45	8.17	8.99	**50yr**
100yr	0.89	1.34	1.68	2.43	3.34	3.96	**100yr**	2.88	3.87	4.29	5.32	6.27	6.83	8.00	**100yr**	6.04	7.69	9.02	9.69	10.55	**100yr**
200yr	1.06	1.60	2.03	2.94	4.10	4.89	**200yr**	3.54	4.78	5.29	6.57	7.68	8.20	9.69	**200yr**	7.25	9.32	10.94	11.52	12.38	**200yr**
500yr	1.26	1.87	2.41	3.50	4.98	6.47	**500yr**	4.30	6.32	6.99	8.70	10.07	10.47	12.53	**500yr**	9.26	12.05	14.15	14.46	15.32	**500yr**

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Northeast Regional Climate Center

Appendix G

Watershed Map

LEGEND:

PROPOSED SUBCATCHMENT BOUNDARY

STORMWATER TIME OF CONCENTRATION (TC) FLOW PATH

OS
1.0 98

SUBCATCHMENT I.D.

WEIGHTED CURVE NUMBER

AREA (ACRES)

DESIGN POINT

SUBMITTAL / REVISIONS

No.	DATE	DESCRIPTION	BY	REVIEWED BY:	DATE

PROJ. MANAGER:	TS
CHIEF DESIGNER:	TS
DESIGNED BY:	AB
DRAWN BY:	AB
CHECKED BY:	TS

DATE

THE ALTERATION OF THIS MATERIAL IN ANY WAY, UNLESS DONE UNDER THE DIRECTION OF A COMPARABLE PROFESSIONAL, (I.E.) ARCHITECT FOR AN ARCHITECT, ENGINEER FOR AN ENGINEER OR LANDSCAPE ARCHITECT FOR A LANDSCAPE ARCHITECT, IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW AND/OR REGULATIONS AND IS A CLASS "A" MISDEMEANOR.

Engineering and Land Surveying, P.C.
1533 Crescent Road - Clifton Park, NY 12065

MUIRFIELD DRIVE DRAINAGE STUDY

MUIRFIELD DRIVE RETENTION SYSTEM WATERSHED

TOWN OF MANLIUS NEW YORK

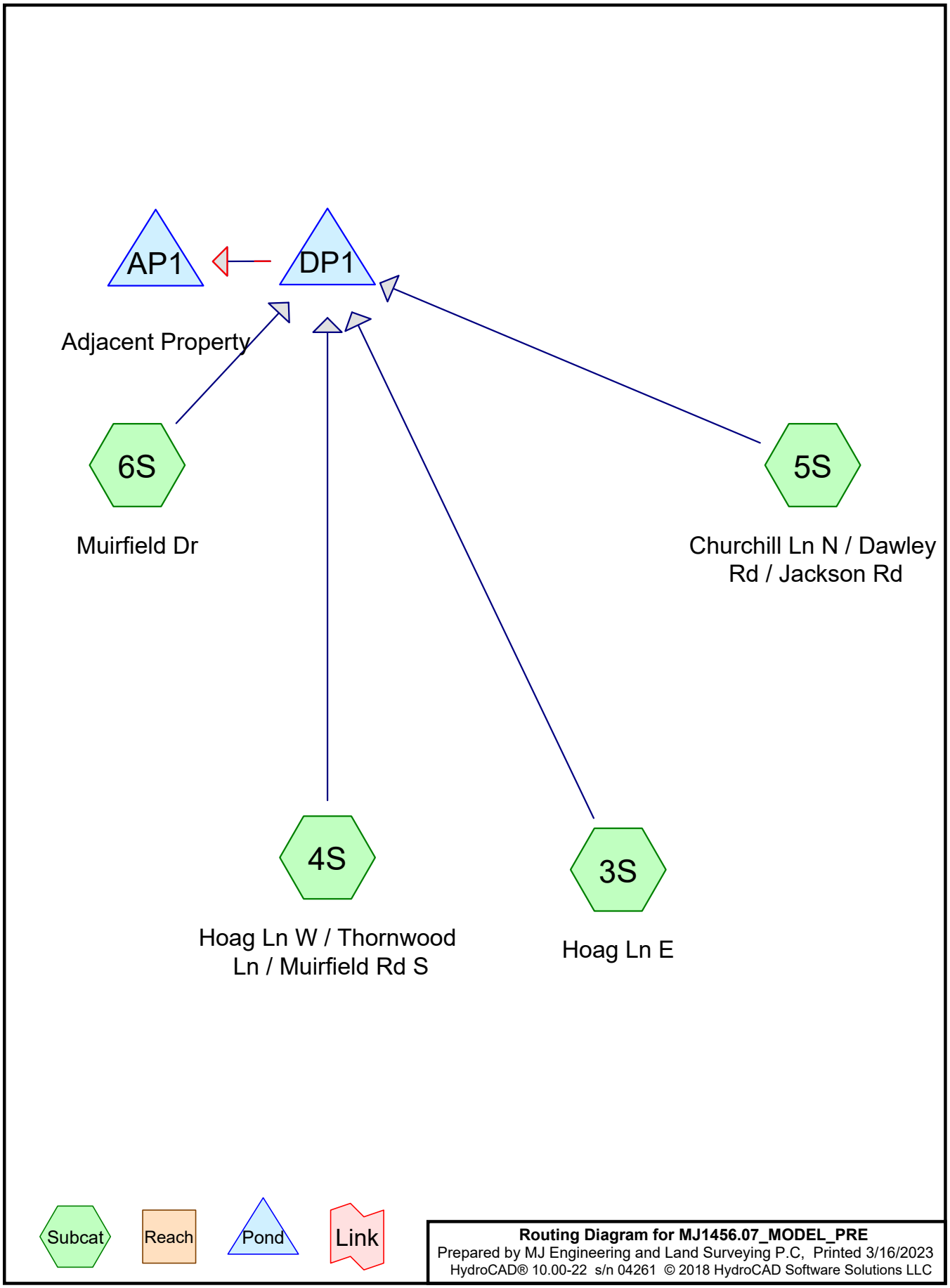
SCALE: AS SHOWN
CONTRACT No.: N.A.
MJ PROJ. No.: 1456.07
DATE: FEB. 3, 2023

FIG 1

File Name: F:\MJ1456 - Town of Manlius TDE\1456.07 - Muirfield Drive Drainage Study\MJ1456.07_XENG.dwg (Layout: FIG 1)
Date: Fri, Feb 10, 2023 - 9:51 AM (Name: aborza)

Appendix H

HydroCad Report(s)



Routing Diagram for MJ1456.07_MODEL_PRE
Prepared by MJ Engineering and Land Surveying P.C, Printed 3/16/2023
HydroCAD® 10.00-22 s/n 04261 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
38.885	74	>75% Grass cover, Good, HSG C (3S, 4S, 5S, 6S)
3.904	80	>75% Grass cover, Good, HSG D (6S)
12.210	98	Paved parking/Roofs, HSG C (3S, 4S, 5S, 6S)
1.770	98	Paved parking/Roofs, HSG D (6S)
56.769	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
51.096	HSG C	3S, 4S, 5S, 6S
5.674	HSG D	6S
0.000	Other	
56.769		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	38.885	3.904	0.000	42.789	>75% Grass cover, Good	3S, 4S, 5S, 6S
0.000	0.000	12.210	1.770	0.000	13.980	Paved parking/Roofs	3S, 4S, 5S, 6S
0.000	**0.000**	**51.096**	**5.674**	**0.000**	**56.769**	**TOTAL AREA**	

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.59"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=6.34 cfs 0.553 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.64"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=7.16 cfs 0.640 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.55"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=15.27 cfs 0.993 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.68"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=6.71 cfs 0.677 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=594.04' Storage=12,727 cf Inflow=30.89 cfs 2.864 af
Discarded=23.32 cfs 2.864 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=23.32 cfs 2.864 af

Total Runoff Area = 56.769 ac Runoff Volume = 2.864 af Average Runoff Depth = 0.61"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 6.34 cfs @ 12.17 hrs, Volume= 0.553 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 7.16 cfs @ 12.19 hrs, Volume= 0.640 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 15.27 cfs @ 12.07 hrs, Volume= 0.993 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 6.71 cfs @ 12.25 hrs, Volume= 0.677 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 1 YR event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.61" for 1 YR event				
Inflow =	30.89 cfs @	12.12 hrs,	Volume=	2.864 af	
Outflow =	23.32 cfs @	12.29 hrs,	Volume=	2.864 af,	Atten= 25%, Lag= 10.0 min
Discarded =	23.32 cfs @	12.29 hrs,	Volume=	2.864 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 594.04' @ 12.29 hrs Surf.Area= 3,277 sf Storage= 12,727 cf
Flood Elev= 596.00' Surf.Area= 7,601 sf Storage= 23,177 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.0 min (882.4 - 878.4)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,177 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,221	209.0	26	12,626	3,593
595.00	5,259	320.0	4,157	16,783	8,273
596.00	7,601	340.0	6,394	23,177	9,374

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=23.31 cfs @ 12.29 hrs HW=594.04' (Free Discharge)
└─**1=Exfiltration** (Controls 23.31 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.81"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=9.02 cfs 0.759 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.86"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=10.03 cfs 0.870 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.76"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=21.84 cfs 1.375 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.92"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=9.29 cfs 0.912 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=594.94' Storage=16,470 cf Inflow=43.98 cfs 3.916 af
Discarded=36.27 cfs 3.916 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=36.27 cfs 3.916 af

Total Runoff Area = 56.769 ac Runoff Volume = 3.916 af Average Runoff Depth = 0.83"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 9.02 cfs @ 12.17 hrs, Volume= 0.759 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 10.03 cfs @ 12.19 hrs, Volume= 0.870 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 21.84 cfs @ 12.06 hrs, Volume= 1.375 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 9.29 cfs @ 12.25 hrs, Volume= 0.912 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 2 YR event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.83" for 2 YR event				
Inflow =	43.98 cfs @	12.11 hrs,	Volume=	3.916 af	
Outflow =	36.27 cfs @	12.24 hrs,	Volume=	3.916 af,	Atten= 18%, Lag= 7.6 min
Discarded =	36.27 cfs @	12.24 hrs,	Volume=	3.916 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 594.94' @ 12.24 hrs Surf.Area= 5,121 sf Storage= 16,470 cf
Flood Elev= 596.00' Surf.Area= 7,601 sf Storage= 23,177 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.2 min (872.7 - 868.5)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,177 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,221	209.0	26	12,626	3,593
595.00	5,259	320.0	4,157	16,783	8,273
596.00	7,601	340.0	6,394	23,177	9,374

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=36.27 cfs @ 12.24 hrs HW=594.94' (Free Discharge)
└─**1=Exfiltration** (Controls 36.27 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=1.59"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=18.32 cfs 1.482 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=1.66"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=19.91 cfs 1.670 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=1.52"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=44.83 cfs 2.733 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=1.73"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=18.09 cfs 1.722 af

Pond AP1: Adjacent Property Peak Elev=593.80' Storage=2,061 cf Inflow=43.15 cfs 0.779 af
Discarded=42.28 cfs 0.779 af Secondary=0.00 cfs 0.000 af Outflow=42.28 cfs 0.779 af

Pond DP1: Peak Elev=595.58' Storage=20,216 cf Inflow=89.68 cfs 7.607 af
Discarded=46.49 cfs 6.830 af Primary=2.31 cfs 0.037 af Secondary=40.84 cfs 0.742 af Outflow=89.64 cfs 7.609 af

Total Runoff Area = 56.769 ac Runoff Volume = 7.607 af Average Runoff Depth = 1.61"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 18.32 cfs @ 12.17 hrs, Volume= 1.482 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 19.91 cfs @ 12.18 hrs, Volume= 1.670 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 44.83 cfs @ 12.06 hrs, Volume= 2.733 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 18.09 cfs @ 12.25 hrs, Volume= 1.722 af, Depth= 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.16" for 10 YR event
Inflow = 43.15 cfs @ 12.11 hrs, Volume= 0.779 af
Outflow = 42.28 cfs @ 12.13 hrs, Volume= 0.779 af, Atten= 2%, Lag= 1.3 min
Discarded = 42.28 cfs @ 12.13 hrs, Volume= 0.779 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.80' @ 12.13 hrs Surf.Area= 6,076 sf Storage= 2,061 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.7 min (730.5 - 729.8)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=42.25 cfs @ 12.13 hrs HW=593.80' (Free Discharge)
└─**1=Exfiltration** (Controls 42.25 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 1.61" for 10 YR event				
Inflow =	89.68 cfs @	12.10 hrs,	Volume=	7.607 af	
Outflow =	89.64 cfs @	12.11 hrs,	Volume=	7.609 af,	Atten= 0%, Lag= 0.2 min
Discarded =	46.49 cfs @	12.11 hrs,	Volume=	6.830 af	
Primary =	2.31 cfs @	12.11 hrs,	Volume=	0.037 af	
Secondary =	40.84 cfs @	12.11 hrs,	Volume=	0.742 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.58' @ 12.11 hrs Surf.Area= 6,569 sf Storage= 20,216 cf
Flood Elev= 596.00' Surf.Area= 7,601 sf Storage= 23,177 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.0 min (852.8 - 848.9)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,177 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,221	209.0	26	12,626	3,593
595.00	5,259	320.0	4,157	16,783	8,273
596.00	7,601	340.0	6,394	23,177	9,374

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=46.49 cfs @ 12.11 hrs HW=595.58' (Free Discharge)
└─**1=Exfiltration** (Controls 46.49 cfs)

Primary OutFlow Max=2.31 cfs @ 12.11 hrs HW=595.58' TW=593.78' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 2.31 cfs @ 0.92 fps)

Secondary OutFlow Max=40.80 cfs @ 12.11 hrs HW=595.58' TW=593.78' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 40.80 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.08"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=0.39 cfs 0.078 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.10"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=0.57 cfs 0.099 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.07"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=0.70 cfs 0.126 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.11"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=0.66 cfs 0.113 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=588.00' Storage=0 cf Inflow=2.07 cfs 0.416 af
Discarded=2.07 cfs 0.416 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=2.07 cfs 0.416 af

Total Runoff Area = 56.769 ac Runoff Volume = 0.416 af Average Runoff Depth = 0.09"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 0.39 cfs @ 12.27 hrs, Volume= 0.078 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 0.57 cfs @ 12.27 hrs, Volume= 0.099 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 0.70 cfs @ 12.13 hrs, Volume= 0.126 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 0.66 cfs @ 12.32 hrs, Volume= 0.113 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 90% event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.09" for 90% event				
Inflow =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af	
Outflow =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af,	Atten= 0%, Lag= 0.0 min
Discarded =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 588.00' @ 0.01 hrs Surf.Area= 2,100 sf Storage= 0 cf
Flood Elev= 596.00' Surf.Area= 7,601 sf Storage= 23,177 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (961.0 - 961.0)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,177 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,221	209.0	26	12,626	3,593
595.00	5,259	320.0	4,157	16,783	8,273
596.00	7,601	340.0	6,394	23,177	9,374

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 12.26 hrs HW=588.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 14.58 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=3.60"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=41.80 cfs 3.359 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=3.70"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=44.49 cfs 3.723 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=3.50"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=103.13 cfs 6.299 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=3.80"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=39.72 cfs 3.779 af

Pond AP1: Adjacent Property Peak Elev=595.15' Storage=15,287 cf Inflow=155.14 cfs 4.830 af
Discarded=105.02 cfs 4.277 af Secondary=75.27 cfs 0.553 af Outflow=180.28 cfs 4.830 af

Pond DP1: Peak Elev=595.78' Storage=21,568 cf Inflow=205.09 cfs 17.160 af
Discarded=49.88 cfs 12.330 af Primary=14.99 cfs 0.388 af Secondary=140.15 cfs 4.441 af Outflow=205.03 cfs 17.160 af

Total Runoff Area = 56.769 ac Runoff Volume = 17.160 af Average Runoff Depth = 3.63"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 41.80 cfs @ 12.15 hrs, Volume= 3.359 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 44.49 cfs @ 12.17 hrs, Volume= 3.723 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 103.13 cfs @ 12.05 hrs, Volume= 6.299 af, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 39.72 cfs @ 12.24 hrs, Volume= 3.779 af, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 1.02" for 100 YR event
Inflow = 155.14 cfs @ 12.10 hrs, Volume= 4.830 af
Outflow = 180.28 cfs @ 12.10 hrs, Volume= 4.830 af, Atten= 0%, Lag= 0.2 min
Discarded = 105.02 cfs @ 12.10 hrs, Volume= 4.277 af
Secondary = 75.27 cfs @ 12.10 hrs, Volume= 0.553 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.15' @ 12.10 hrs Surf.Area= 15,016 sf Storage= 15,287 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.7 min (731.7 - 730.0)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=105.02 cfs @ 12.10 hrs HW=595.15' (Free Discharge)
└─**1=Exfiltration** (Controls 105.02 cfs)

Secondary OutFlow Max=75.14 cfs @ 12.10 hrs HW=595.15' (Free Discharge)
└─**2=Special & User-Defined** (Custom Controls 75.14 cfs)

Summary for Pond DP1:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 3.63" for 100 YR event
Inflow = 205.09 cfs @ 12.10 hrs, Volume= 17.160 af
Outflow = 205.03 cfs @ 12.10 hrs, Volume= 17.160 af, Atten= 0%, Lag= 0.1 min
Discarded = 49.88 cfs @ 12.10 hrs, Volume= 12.330 af
Primary = 14.99 cfs @ 12.10 hrs, Volume= 0.388 af
Secondary = 140.15 cfs @ 12.10 hrs, Volume= 4.441 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.78' @ 12.10 hrs Surf.Area= 7,050 sf Storage= 21,568 cf
Flood Elev= 596.00' Surf.Area= 7,601 sf Storage= 23,177 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 3.3 min (828.8 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,177 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

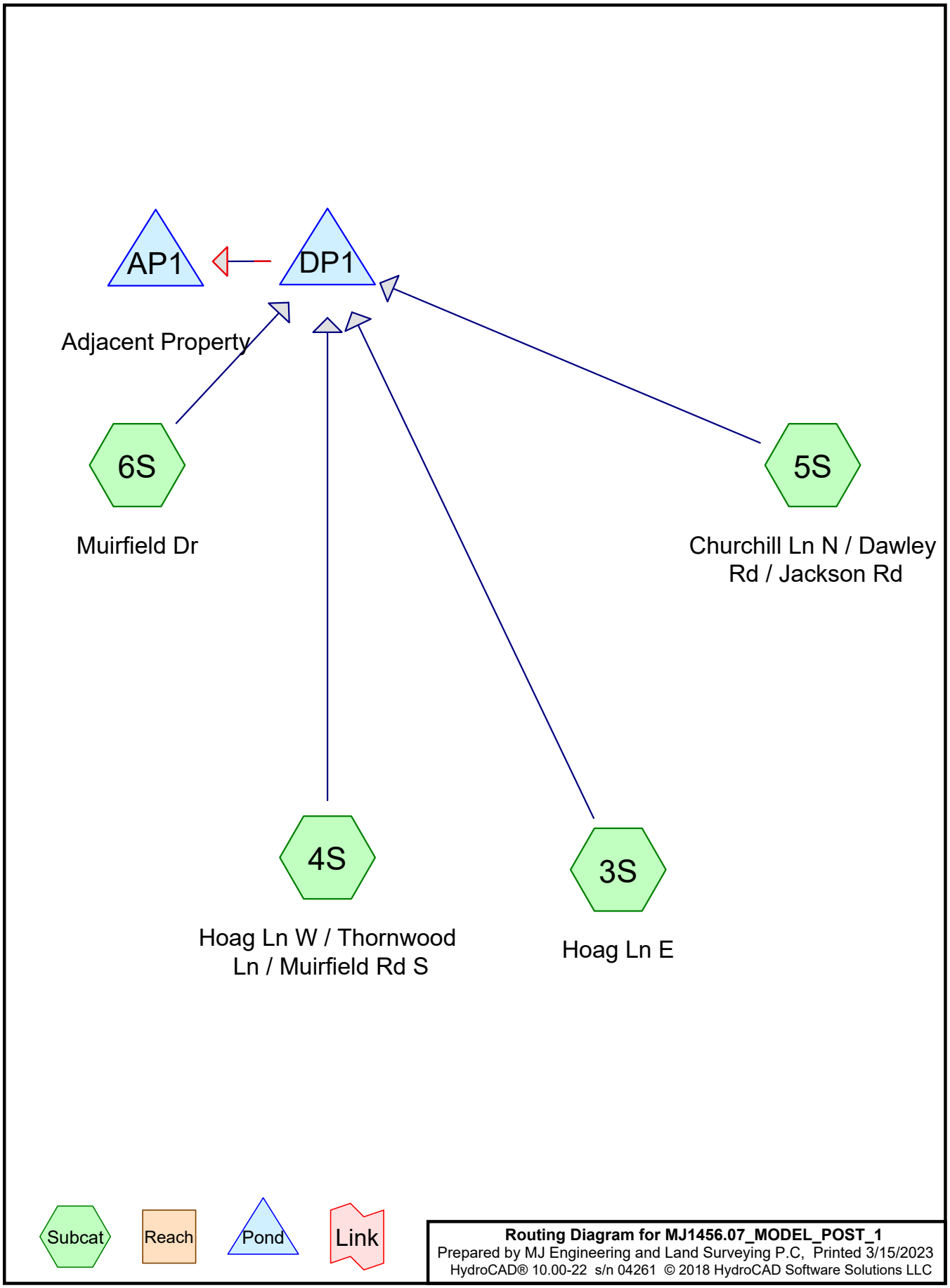
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,221	209.0	26	12,626	3,593
595.00	5,259	320.0	4,157	16,783	8,273
596.00	7,601	340.0	6,394	23,177	9,374

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=49.88 cfs @ 12.10 hrs HW=595.78' (Free Discharge)
└─**1=Exfiltration** (Controls 49.88 cfs)

Primary OutFlow Max=14.98 cfs @ 12.10 hrs HW=595.78' TW=595.12' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 14.98 cfs @ 1.66 fps)

Secondary OutFlow Max=140.08 cfs @ 12.10 hrs HW=595.78' TW=595.12' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 140.08 cfs)



Routing Diagram for MJ1456.07_MODEL_POST_1
Prepared by MJ Engineering and Land Surveying P.C, Printed 3/15/2023
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
38.885	74	>75% Grass cover, Good, HSG C (3S, 4S, 5S, 6S)
3.904	80	>75% Grass cover, Good, HSG D (6S)
12.210	98	Paved parking/Roofs, HSG C (3S, 4S, 5S, 6S)
1.770	98	Paved parking/Roofs, HSG D (6S)
56.769	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
51.096	HSG C	3S, 4S, 5S, 6S
5.674	HSG D	6S
0.000	Other	
56.769		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	38.885	3.904	0.000	42.789	>75% Grass cover, Good	3S, 4S, 5S, 6S
0.000	0.000	12.210	1.770	0.000	13.980	Paved parking/Roofs	3S, 4S, 5S, 6S
0.000	**0.000**	**51.096**	**5.674**	**0.000**	**56.769**	**TOTAL AREA**	

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.59"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=6.34 cfs 0.553 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.64"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=7.16 cfs 0.640 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.55"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=15.27 cfs 0.993 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.68"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=6.71 cfs 0.677 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=594.01' Storage=12,623 cf Inflow=30.89 cfs 2.864 af
Discarded=25.73 cfs 2.864 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=25.73 cfs 2.864 af

Total Runoff Area = 56.769 ac Runoff Volume = 2.864 af Average Runoff Depth = 0.61"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 6.34 cfs @ 12.17 hrs, Volume= 0.553 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 7.16 cfs @ 12.19 hrs, Volume= 0.640 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 15.27 cfs @ 12.07 hrs, Volume= 0.993 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 6.71 cfs @ 12.25 hrs, Volume= 0.677 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 1 YR event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.61" for 1 YR event				
Inflow =	30.89 cfs @	12.12 hrs,	Volume=	2.864 af	
Outflow =	25.73 cfs @	12.26 hrs,	Volume=	2.864 af,	Atten= 17%, Lag= 8.8 min
Discarded =	25.73 cfs @	12.26 hrs,	Volume=	2.864 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 594.01' @ 12.26 hrs Surf.Area= 3,467 sf Storage= 12,623 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 23,996 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.0 min (882.4 - 878.4)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,996 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,776	235.0	29	12,629	4,512
595.00	5,647	338.0	4,633	17,262	9,217
596.00	7,883	350.0	6,734	23,996	9,958

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=24.52 cfs @ 12.26 hrs HW=594.01' (Free Discharge)
└─**1=Exfiltration** (Controls 24.52 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.81"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=9.02 cfs 0.759 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.86"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=10.03 cfs 0.870 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.76"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=21.84 cfs 1.375 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.92"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=9.29 cfs 0.912 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=594.76' Storage=15,963 cf Inflow=43.98 cfs 3.916 af
Discarded=36.51 cfs 3.916 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=36.51 cfs 3.916 af

Total Runoff Area = 56.769 ac Runoff Volume = 3.916 af Average Runoff Depth = 0.83"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 9.02 cfs @ 12.17 hrs, Volume= 0.759 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 10.03 cfs @ 12.19 hrs, Volume= 0.870 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 21.84 cfs @ 12.06 hrs, Volume= 1.375 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 9.29 cfs @ 12.25 hrs, Volume= 0.912 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 2 YR event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.83" for 2 YR event				
Inflow =	43.98 cfs @	12.11 hrs,	Volume=	3.916 af	
Outflow =	36.51 cfs @	12.24 hrs,	Volume=	3.916 af,	Atten= 17%, Lag= 7.4 min
Discarded =	36.51 cfs @	12.24 hrs,	Volume=	3.916 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 594.76' @ 12.24 hrs Surf.Area= 5,158 sf Storage= 15,963 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 23,996 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.1 min (872.7 - 868.5)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,996 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,776	235.0	29	12,629	4,512
595.00	5,647	338.0	4,633	17,262	9,217
596.00	7,883	350.0	6,734	23,996	9,958

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=36.50 cfs @ 12.24 hrs HW=594.76' (Free Discharge)
└─**1=Exfiltration** (Controls 36.50 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=1.59"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=18.32 cfs 1.482 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=1.66"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=19.91 cfs 1.670 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=1.52"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=44.83 cfs 2.733 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=1.73"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=18.09 cfs 1.722 af

Pond AP1: Adjacent Property Peak Elev=593.77' Storage=1,894 cf Inflow=40.87 cfs 0.694 af
Discarded=40.00 cfs 0.694 af Secondary=0.00 cfs 0.000 af Outflow=40.00 cfs 0.694 af

Pond DP1: Peak Elev=595.58' Storage=20,877 cf Inflow=89.68 cfs 7.607 af
Discarded=48.77 cfs 6.915 af Primary=2.13 cfs 0.032 af Secondary=38.74 cfs 0.662 af Outflow=89.64 cfs 7.609 af

Total Runoff Area = 56.769 ac Runoff Volume = 7.607 af Average Runoff Depth = 1.61"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 18.32 cfs @ 12.17 hrs, Volume= 1.482 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 19.91 cfs @ 12.18 hrs, Volume= 1.670 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 44.83 cfs @ 12.06 hrs, Volume= 2.733 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 18.09 cfs @ 12.25 hrs, Volume= 1.722 af, Depth= 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.15" for 10 YR event
Inflow = 40.87 cfs @ 12.11 hrs, Volume= 0.694 af
Outflow = 40.00 cfs @ 12.13 hrs, Volume= 0.694 af, Atten= 2%, Lag= 1.4 min
Discarded = 40.00 cfs @ 12.13 hrs, Volume= 0.694 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.77' @ 12.13 hrs Surf.Area= 5,748 sf Storage= 1,894 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.7 min (730.5 - 729.8)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=39.97 cfs @ 12.13 hrs HW=593.77' (Free Discharge)
└─**1=Exfiltration** (Controls 39.97 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 1.61" for 10 YR event				
Inflow =	89.68 cfs @	12.10 hrs,	Volume=	7.607 af	
Outflow =	89.64 cfs @	12.11 hrs,	Volume=	7.609 af,	Atten= 0%, Lag= 0.2 min
Discarded =	48.77 cfs @	12.11 hrs,	Volume=	6.915 af	
Primary =	2.13 cfs @	12.11 hrs,	Volume=	0.032 af	
Secondary =	38.74 cfs @	12.11 hrs,	Volume=	0.662 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.58' @ 12.11 hrs Surf.Area= 6,893 sf Storage= 20,877 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 23,996 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.0 min (852.8 - 848.9)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,996 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,776	235.0	29	12,629	4,512
595.00	5,647	338.0	4,633	17,262	9,217
596.00	7,883	350.0	6,734	23,996	9,958

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=48.76 cfs @ 12.11 hrs HW=595.58' (Free Discharge)
└─**1=Exfiltration** (Controls 48.76 cfs)

Primary OutFlow Max=2.13 cfs @ 12.11 hrs HW=595.58' TW=593.75' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 2.13 cfs @ 0.90 fps)

Secondary OutFlow Max=38.69 cfs @ 12.11 hrs HW=595.58' TW=593.75' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 38.69 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.08"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=0.39 cfs 0.078 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.10"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=0.57 cfs 0.099 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.07"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=0.70 cfs 0.126 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.11"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=0.66 cfs 0.113 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=588.00' Storage=0 cf Inflow=2.07 cfs 0.416 af
Discarded=2.07 cfs 0.416 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=2.07 cfs 0.416 af

Total Runoff Area = 56.769 ac Runoff Volume = 0.416 af Average Runoff Depth = 0.09"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 0.39 cfs @ 12.27 hrs, Volume= 0.078 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 0.57 cfs @ 12.27 hrs, Volume= 0.099 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 0.70 cfs @ 12.13 hrs, Volume= 0.126 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 0.66 cfs @ 12.32 hrs, Volume= 0.113 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 90% event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.09" for 90% event				
Inflow =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af	
Outflow =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af,	Atten= 0%, Lag= 0.0 min
Discarded =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 588.00' @ 0.01 hrs Surf.Area= 2,100 sf Storage= 0 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 23,996 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (961.0 - 961.0)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,996 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,776	235.0	29	12,629	4,512
595.00	5,647	338.0	4,633	17,262	9,217
596.00	7,883	350.0	6,734	23,996	9,958

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 12.26 hrs HW=588.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 14.58 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=3.60"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=41.80 cfs 3.359 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=3.70"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=44.49 cfs 3.723 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=3.50"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=103.13 cfs 6.299 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=3.80"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=39.72 cfs 3.779 af

Pond AP1: Adjacent Property Peak Elev=595.10' Storage=15,287 cf Inflow=153.01 cfs 4.670 af
Discarded=104.98 cfs 4.166 af Secondary=50.89 cfs 0.504 af Outflow=155.88 cfs 4.670 af

Pond DP1: Peak Elev=595.78' Storage=22,295 cf Inflow=205.09 cfs 17.160 af
Discarded=52.01 cfs 12.490 af Primary=14.69 cfs 0.375 af Secondary=138.32 cfs 4.295 af Outflow=205.02 cfs 17.160 af

Total Runoff Area = 56.769 ac Runoff Volume = 17.160 af Average Runoff Depth = 3.63"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 41.80 cfs @ 12.15 hrs, Volume= 3.359 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 44.49 cfs @ 12.17 hrs, Volume= 3.723 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 103.13 cfs @ 12.05 hrs, Volume= 6.299 af, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 39.72 cfs @ 12.24 hrs, Volume= 3.779 af, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.99" for 100 YR event
Inflow = 153.01 cfs @ 12.10 hrs, Volume= 4.670 af
Outflow = 155.88 cfs @ 12.09 hrs, Volume= 4.670 af, Atten= 0%, Lag= 0.0 min
Discarded = 104.98 cfs @ 12.09 hrs, Volume= 4.166 af
Secondary = 50.89 cfs @ 12.09 hrs, Volume= 0.504 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.10' @ 12.09 hrs Surf.Area= 15,016 sf Storage= 15,287 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.8 min (731.6 - 729.9)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=104.98 cfs @ 12.09 hrs HW=595.10' (Free Discharge)
└─**1=Exfiltration** (Controls 104.98 cfs)

Secondary OutFlow Max=50.63 cfs @ 12.09 hrs HW=595.10' (Free Discharge)
└─**2=Special & User-Defined** (Custom Controls 50.63 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 3.63" for 100 YR event				
Inflow =	205.09 cfs @	12.10 hrs,	Volume=	17.160 af	
Outflow =	205.02 cfs @	12.10 hrs,	Volume=	17.160 af,	Atten= 0%, Lag= 0.1 min
Discarded =	52.01 cfs @	12.10 hrs,	Volume=	12.490 af	
Primary =	14.69 cfs @	12.10 hrs,	Volume=	0.375 af	
Secondary =	138.32 cfs @	12.10 hrs,	Volume=	4.295 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.78' @ 12.10 hrs Surf.Area= 7,351 sf Storage= 22,295 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 23,996 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 3.3 min (828.8 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,996 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

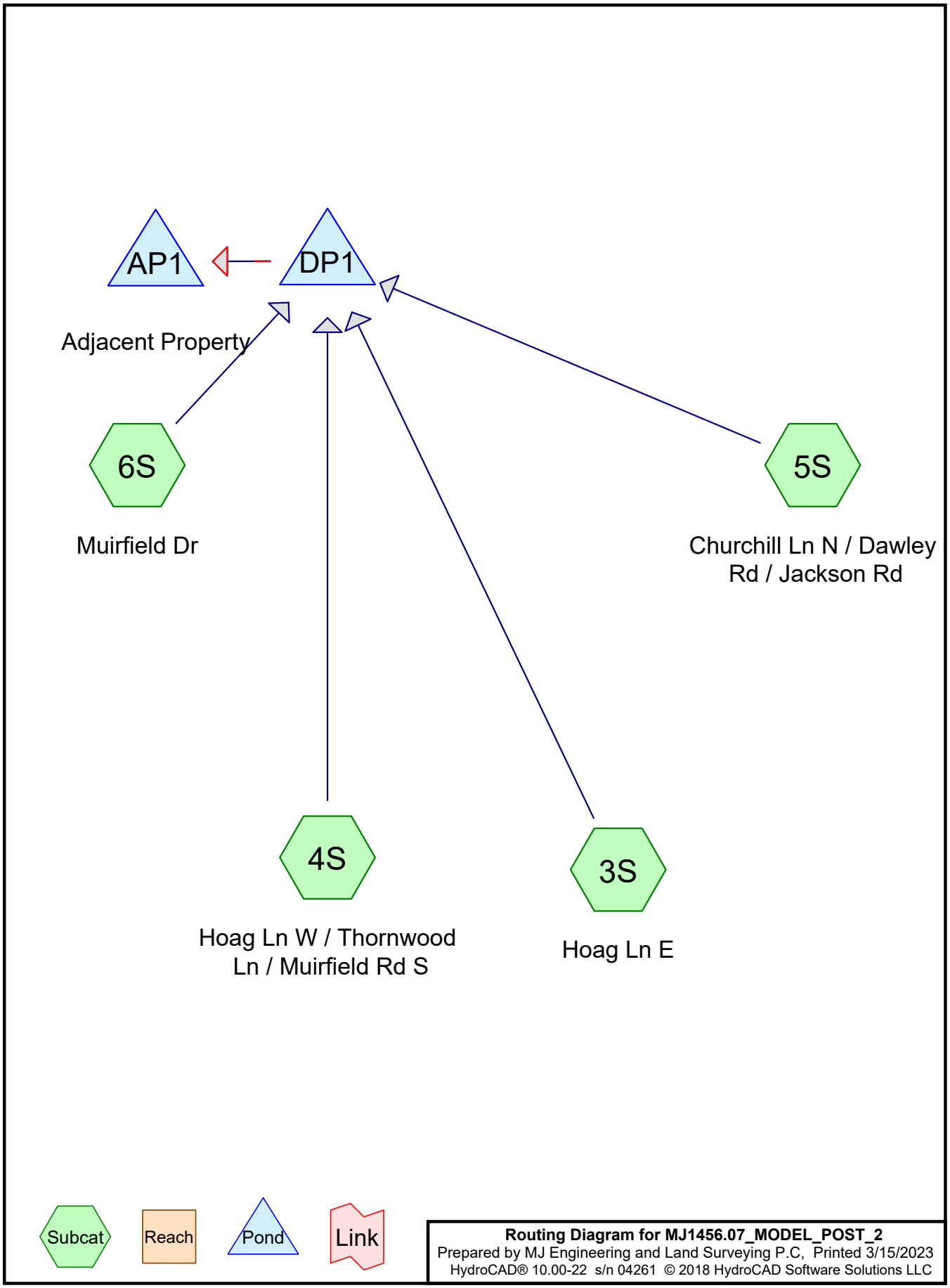
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,776	235.0	29	12,629	4,512
595.00	5,647	338.0	4,633	17,262	9,217
596.00	7,883	350.0	6,734	23,996	9,958

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=52.01 cfs @ 12.10 hrs HW=595.78' (Free Discharge)
└─**1=Exfiltration** (Controls 52.01 cfs)

Primary OutFlow Max=14.68 cfs @ 12.10 hrs HW=595.78' TW=595.09' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 14.68 cfs @ 1.65 fps)

Secondary OutFlow Max=138.25 cfs @ 12.10 hrs HW=595.78' TW=595.09' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 138.25 cfs)



Routing Diagram for MJ1456.07_MODEL_POST_2
Prepared by MJ Engineering and Land Surveying P.C, Printed 3/15/2023
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
38.885	74	>75% Grass cover, Good, HSG C (3S, 4S, 5S, 6S)
3.904	80	>75% Grass cover, Good, HSG D (6S)
12.210	98	Paved parking/Roofs, HSG C (3S, 4S, 5S, 6S)
1.770	98	Paved parking/Roofs, HSG D (6S)
56.769	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
51.096	HSG C	3S, 4S, 5S, 6S
5.674	HSG D	6S
0.000	Other	
56.769		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	38.885	3.904	0.000	42.789	>75% Grass cover, Good	3S, 4S, 5S, 6S
0.000	0.000	12.210	1.770	0.000	13.980	Paved parking/Roofs	3S, 4S, 5S, 6S
0.000	**0.000**	**51.096**	**5.674**	**0.000**	**56.769**	**TOTAL AREA**	

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.59"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=6.34 cfs 0.553 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.64"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=7.16 cfs 0.640 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.55"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=15.27 cfs 0.993 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.68"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=6.71 cfs 0.677 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=592.01' Storage=10,429 cf Inflow=30.89 cfs 2.864 af
Discarded=18.53 cfs 2.864 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=18.53 cfs 2.864 af

Total Runoff Area = 56.769 ac Runoff Volume = 2.864 af Average Runoff Depth = 0.61"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 6.34 cfs @ 12.17 hrs, Volume= 0.553 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 7.16 cfs @ 12.19 hrs, Volume= 0.640 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 15.27 cfs @ 12.07 hrs, Volume= 0.993 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 6.71 cfs @ 12.25 hrs, Volume= 0.677 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 1 YR event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.61" for 1 YR event
Inflow = 30.89 cfs @ 12.12 hrs, Volume= 2.864 af
Outflow = 18.53 cfs @ 12.37 hrs, Volume= 2.864 af, Atten= 40%, Lag= 14.9 min
Discarded = 18.53 cfs @ 12.37 hrs, Volume= 2.864 af
Primary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 592.01' @ 12.37 hrs Surf.Area= 2,602 sf Storage= 10,429 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 27,011 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.4 min (880.9 - 878.4)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	27,011 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,602	214.0	0	0	2,602
594.00	2,602	214.0	15,612	15,612	3,886
594.01	3,776	235.0	32	15,644	4,636
595.00	5,647	338.0	4,633	20,277	9,341
596.00	7,883	350.0	6,734	27,011	10,083

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=18.53 cfs @ 12.37 hrs HW=592.01' (Free Discharge)
└─**1=Exfiltration** (Controls 18.53 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.81"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=9.02 cfs 0.759 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.86"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=10.03 cfs 0.870 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.76"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=21.84 cfs 1.375 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.92"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=9.29 cfs 0.912 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=594.52' Storage=17,795 cf Inflow=43.98 cfs 3.916 af
Discarded=33.35 cfs 3.919 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=33.35 cfs 3.919 af

Total Runoff Area = 56.769 ac Runoff Volume = 3.916 af Average Runoff Depth = 0.83"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 9.02 cfs @ 12.17 hrs, Volume= 0.759 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 10.03 cfs @ 12.19 hrs, Volume= 0.870 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 21.84 cfs @ 12.06 hrs, Volume= 1.375 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 9.29 cfs @ 12.25 hrs, Volume= 0.912 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 2 YR event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.83" for 2 YR event				
Inflow =	43.98 cfs @	12.11 hrs,	Volume=	3.916 af	
Outflow =	33.35 cfs @	12.27 hrs,	Volume=	3.919 af,	Atten= 24%, Lag= 9.7 min
Discarded =	33.35 cfs @	12.27 hrs,	Volume=	3.919 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 594.52' @ 12.27 hrs Surf.Area= 4,691 sf Storage= 17,795 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 27,011 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.2 min (872.7 - 868.5)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	27,011 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,602	214.0	0	0	2,602
594.00	2,602	214.0	15,612	15,612	3,886
594.01	3,776	235.0	32	15,644	4,636
595.00	5,647	338.0	4,633	20,277	9,341
596.00	7,883	350.0	6,734	27,011	10,083

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=33.35 cfs @ 12.27 hrs HW=594.52' (Free Discharge)
└─**1=Exfiltration** (Controls 33.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=1.59"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=18.32 cfs 1.482 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=1.66"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=19.91 cfs 1.670 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=1.52"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=44.83 cfs 2.733 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=1.73"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=18.09 cfs 1.722 af

Pond AP1: Adjacent Property Peak Elev=593.76' Storage=1,856 cf Inflow=40.74 cfs 0.632 af
Discarded=39.47 cfs 0.632 af Secondary=0.00 cfs 0.000 af Outflow=39.47 cfs 0.632 af

Pond DP1: Peak Elev=595.58' Storage=23,890 cf Inflow=89.68 cfs 7.607 af
Discarded=48.90 cfs 6.978 af Primary=2.12 cfs 0.029 af Secondary=38.62 cfs 0.603 af Outflow=89.64 cfs 7.610 af

Total Runoff Area = 56.769 ac Runoff Volume = 7.607 af Average Runoff Depth = 1.61"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 18.32 cfs @ 12.17 hrs, Volume= 1.482 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 19.91 cfs @ 12.18 hrs, Volume= 1.670 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 44.83 cfs @ 12.06 hrs, Volume= 2.733 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 18.09 cfs @ 12.25 hrs, Volume= 1.722 af, Depth= 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.13" for 10 YR event
Inflow = 40.74 cfs @ 12.11 hrs, Volume= 0.632 af
Outflow = 39.47 cfs @ 12.13 hrs, Volume= 0.632 af, Atten= 3%, Lag= 1.7 min
Discarded = 39.47 cfs @ 12.13 hrs, Volume= 0.632 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.76' @ 12.13 hrs Surf.Area= 5,672 sf Storage= 1,856 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.7 min (731.0 - 730.4)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=39.42 cfs @ 12.13 hrs HW=593.76' (Free Discharge)
└─**1=Exfiltration** (Controls 39.42 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 1.61" for 10 YR event				
Inflow =	89.68 cfs @	12.10 hrs,	Volume=	7.607 af	
Outflow =	89.64 cfs @	12.11 hrs,	Volume=	7.610 af,	Atten= 0%, Lag= 0.2 min
Discarded =	48.90 cfs @	12.11 hrs,	Volume=	6.978 af	
Primary =	2.12 cfs @	12.11 hrs,	Volume=	0.029 af	
Secondary =	38.62 cfs @	12.11 hrs,	Volume=	0.603 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.58' @ 12.11 hrs Surf.Area= 6,892 sf Storage= 23,890 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 27,011 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.1 min (853.0 - 848.9)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	27,011 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,602	214.0	0	0	2,602
594.00	2,602	214.0	15,612	15,612	3,886
594.01	3,776	235.0	32	15,644	4,636
595.00	5,647	338.0	4,633	20,277	9,341
596.00	7,883	350.0	6,734	27,011	10,083

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=48.90 cfs @ 12.11 hrs HW=595.58' (Free Discharge)
└─**1=Exfiltration** (Controls 48.90 cfs)

Primary OutFlow Max=2.12 cfs @ 12.11 hrs HW=595.58' TW=593.73' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 2.12 cfs @ 0.90 fps)

Secondary OutFlow Max=38.57 cfs @ 12.11 hrs HW=595.58' TW=593.73' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 38.57 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.08"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=0.39 cfs 0.078 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.10"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=0.57 cfs 0.099 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.07"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=0.70 cfs 0.126 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.11"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=0.66 cfs 0.113 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=588.00' Storage=0 cf Inflow=2.07 cfs 0.416 af
Discarded=2.07 cfs 0.416 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=2.07 cfs 0.416 af

Total Runoff Area = 56.769 ac Runoff Volume = 0.416 af Average Runoff Depth = 0.09"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 0.39 cfs @ 12.27 hrs, Volume= 0.078 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 0.57 cfs @ 12.27 hrs, Volume= 0.099 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 0.70 cfs @ 12.13 hrs, Volume= 0.126 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 0.66 cfs @ 12.32 hrs, Volume= 0.113 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 90% event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.09" for 90% event				
Inflow =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af	
Outflow =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af,	Atten= 0%, Lag= 0.0 min
Discarded =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 588.00' @ 0.01 hrs Surf.Area= 2,602 sf Storage= 0 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 27,011 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (961.0 - 961.0)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	27,011 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,602	214.0	0	0	2,602
594.00	2,602	214.0	15,612	15,612	3,886
594.01	3,776	235.0	32	15,644	4,636
595.00	5,647	338.0	4,633	20,277	9,341
596.00	7,883	350.0	6,734	27,011	10,083

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 12.26 hrs HW=588.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 18.07 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=3.60"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=41.80 cfs 3.359 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=3.70"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=44.49 cfs 3.723 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=3.50"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=103.13 cfs 6.299 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=3.80"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=39.72 cfs 3.779 af

Pond AP1: Adjacent Property Peak Elev=595.11' Storage=15,287 cf Inflow=152.88 cfs 4.599 af
Discarded=104.99 cfs 4.097 af Secondary=54.43 cfs 0.503 af Outflow=159.41 cfs 4.599 af

Pond DP1: Peak Elev=595.78' Storage=25,308 cf Inflow=205.09 cfs 17.160 af
Discarded=52.14 cfs 12.561 af Primary=14.68 cfs 0.371 af Secondary=138.21 cfs 4.228 af Outflow=205.02 cfs 17.160 af

Total Runoff Area = 56.769 ac Runoff Volume = 17.160 af Average Runoff Depth = 3.63"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 41.80 cfs @ 12.15 hrs, Volume= 3.359 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 44.49 cfs @ 12.17 hrs, Volume= 3.723 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 103.13 cfs @ 12.05 hrs, Volume= 6.299 af, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 39.72 cfs @ 12.24 hrs, Volume= 3.779 af, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.97" for 100 YR event
Inflow = 152.88 cfs @ 12.10 hrs, Volume= 4.599 af
Outflow = 159.41 cfs @ 12.09 hrs, Volume= 4.599 af, Atten= 0%, Lag= 0.0 min
Discarded = 104.99 cfs @ 12.09 hrs, Volume= 4.097 af
Secondary = 54.43 cfs @ 12.09 hrs, Volume= 0.503 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.11' @ 12.09 hrs Surf.Area= 15,016 sf Storage= 15,287 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.8 min (731.8 - 730.1)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=104.99 cfs @ 12.09 hrs HW=595.11' (Free Discharge)
└─**1=Exfiltration** (Controls 104.99 cfs)

Secondary OutFlow Max=54.16 cfs @ 12.09 hrs HW=595.11' (Free Discharge)
└─**2=Special & User-Defined** (Custom Controls 54.16 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 3.63" for 100 YR event				
Inflow =	205.09 cfs @	12.10 hrs,	Volume=	17.160 af	
Outflow =	205.02 cfs @	12.10 hrs,	Volume=	17.160 af,	Atten= 0%, Lag= 0.1 min
Discarded =	52.14 cfs @	12.10 hrs,	Volume=	12.561 af	
Primary =	14.68 cfs @	12.10 hrs,	Volume=	0.371 af	
Secondary =	138.21 cfs @	12.10 hrs,	Volume=	4.228 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.78' @ 12.10 hrs Surf.Area= 7,351 sf Storage= 25,308 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 27,011 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 3.3 min (828.9 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	27,011 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

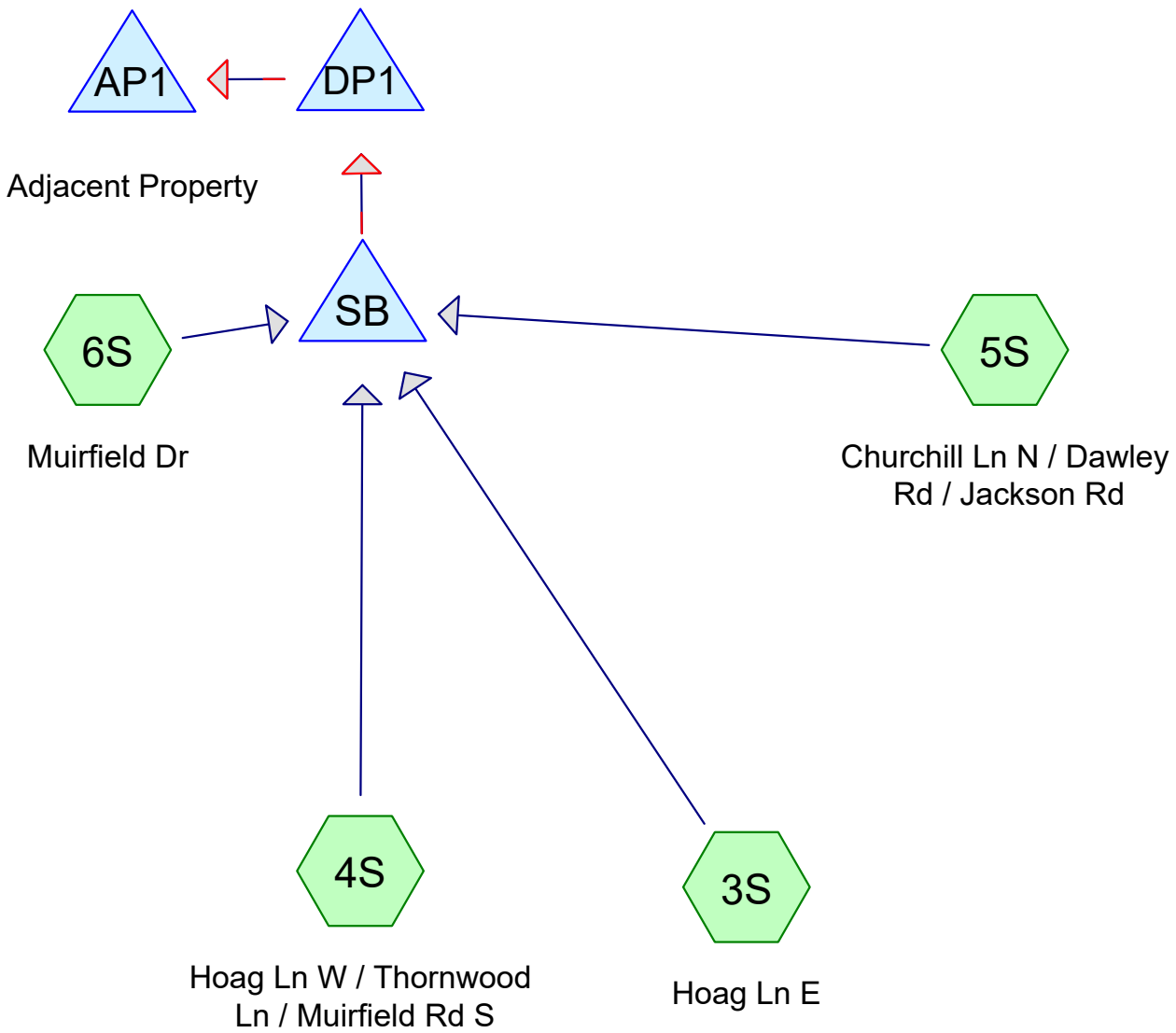
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,602	214.0	0	0	2,602
594.00	2,602	214.0	15,612	15,612	3,886
594.01	3,776	235.0	32	15,644	4,636
595.00	5,647	338.0	4,633	20,277	9,341
596.00	7,883	350.0	6,734	27,011	10,083

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=52.14 cfs @ 12.10 hrs HW=595.78' (Free Discharge)
└─**1=Exfiltration** (Controls 52.14 cfs)

Primary OutFlow Max=14.66 cfs @ 12.10 hrs HW=595.78' TW=595.09' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 14.66 cfs @ 1.65 fps)

Secondary OutFlow Max=138.13 cfs @ 12.10 hrs HW=595.78' TW=595.09' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 138.13 cfs)



Subcat Reach Pond Link

Routing Diagram for MJ1456.07_MODEL_POST_3
Prepared by MJ Engineering and Land Surveying P.C, Printed 3/15/2023
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
38.885	74	>75% Grass cover, Good, HSG C (3S, 4S, 5S, 6S)
3.904	80	>75% Grass cover, Good, HSG D (6S)
12.210	98	Paved parking/Roofs, HSG C (3S, 4S, 5S, 6S)
1.770	98	Paved parking/Roofs, HSG D (6S)
56.769	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
51.096	HSG C	3S, 4S, 5S, 6S
5.674	HSG D	6S
0.000	Other	
56.769		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	38.885	3.904	0.000	42.789	>75% Grass cover, Good	3S, 4S, 5S, 6S
0.000	0.000	12.210	1.770	0.000	13.980	Paved parking/Roofs	3S, 4S, 5S, 6S
0.000	**0.000**	**51.096**	**5.674**	**0.000**	**56.769**	**TOTAL AREA**	

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.59"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=6.34 cfs 0.553 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.64"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=7.16 cfs 0.640 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.55"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=15.27 cfs 0.993 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.68"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=6.71 cfs 0.677 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=588.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond SB: Peak Elev=597.40' Storage=6,465 cf Inflow=30.89 cfs 2.864 af
Discarded=25.75 cfs 2.865 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=25.75 cfs 2.865 af

Total Runoff Area = 56.769 ac Runoff Volume = 2.864 af Average Runoff Depth = 0.61"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 6.34 cfs @ 12.17 hrs, Volume= 0.553 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 7.16 cfs @ 12.19 hrs, Volume= 0.640 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 15.27 cfs @ 12.07 hrs, Volume= 0.993 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 6.71 cfs @ 12.25 hrs, Volume= 0.677 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 1 YR event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 1 YR event				
Inflow =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Outflow =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af,	Atten= 0%, Lag= 0.0 min
Discarded =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 588.00' @ 0.01 hrs Surf.Area= 2,100 sf Storage= 0 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 23,996 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,996 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,776	235.0	29	12,629	4,512
595.00	5,647	338.0	4,633	17,262	9,217
596.00	7,883	350.0	6,734	23,996	9,958

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 14.58 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond SB:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.61" for 1 YR event				
Inflow =	30.89 cfs @	12.12 hrs,	Volume=	2.864 af	
Outflow =	25.75 cfs @	12.24 hrs,	Volume=	2.865 af,	Atten= 17%, Lag= 7.5 min
Discarded =	25.75 cfs @	12.24 hrs,	Volume=	2.865 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 597.40' @ 12.24 hrs Surf.Area= 3,669 sf Storage= 6,465 cf
Flood Elev= 598.50' Surf.Area= 4,655 sf Storage= 11,027 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.3 min (879.7 - 878.4)

Volume	Invert	Avail.Storage	Storage Description
#1	595.00'	11,027 cf	**Stilling Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
595.00	1,783	231.0	0	0	1,783
596.00	2,519	254.0	2,140	2,140	2,703
597.00	3,332	280.0	2,916	5,056	3,840
598.00	4,200	299.0	3,758	8,814	4,762
598.50	4,655	308.0	2,213	11,027	5,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	595.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	597.50'	**Asymmetrical Weir, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	598.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=25.75 cfs @ 12.24 hrs HW=597.40' (Free Discharge)
└─**1=Exfiltration** (Controls 25.75 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=595.00' TW=588.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=595.00' TW=588.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.81"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=9.02 cfs 0.759 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.86"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=10.03 cfs 0.870 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.76"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=21.84 cfs 1.375 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.92"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=9.29 cfs 0.912 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=588.00' Storage=0 cf Inflow=12.73 cfs 0.187 af
Discarded=12.73 cfs 0.187 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=12.73 cfs 0.187 af

Pond SB: Peak Elev=597.99' Storage=8,792 cf Inflow=43.98 cfs 3.916 af
Discarded=29.50 cfs 3.729 af Primary=12.73 cfs 0.187 af Secondary=0.00 cfs 0.000 af Outflow=42.23 cfs 3.917 af

Total Runoff Area = 56.769 ac Runoff Volume = 3.916 af Average Runoff Depth = 0.83"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 9.02 cfs @ 12.17 hrs, Volume= 0.759 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 10.03 cfs @ 12.19 hrs, Volume= 0.870 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 21.84 cfs @ 12.06 hrs, Volume= 1.375 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 9.29 cfs @ 12.25 hrs, Volume= 0.912 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 2 YR event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.04" for 2 YR event
Inflow = 12.73 cfs @ 12.16 hrs, Volume= 0.187 af
Outflow = 12.73 cfs @ 12.16 hrs, Volume= 0.187 af, Atten= 0%, Lag= 0.0 min
Discarded = 12.73 cfs @ 12.16 hrs, Volume= 0.187 af
Primary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 588.00' @ 12.16 hrs Surf.Area= 2,100 sf Storage= 0 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 23,996 cf

Plug-Flow detention time= 0.0 min calculated for 0.187 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (732.2 - 732.2)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,996 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,776	235.0	29	12,629	4,512
595.00	5,647	338.0	4,633	17,262	9,217
596.00	7,883	350.0	6,734	23,996	9,958

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=14.58 cfs @ 12.16 hrs HW=588.00' (Free Discharge)
└─**1=Exfiltration** (Controls 14.58 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond SB:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.83" for 2 YR event
Inflow = 43.98 cfs @ 12.11 hrs, Volume= 3.916 af
Outflow = 42.23 cfs @ 12.16 hrs, Volume= 3.917 af, Atten= 4%, Lag= 3.0 min
Discarded = 29.50 cfs @ 12.16 hrs, Volume= 3.729 af
Primary = 12.73 cfs @ 12.16 hrs, Volume= 0.187 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 597.99' @ 12.16 hrs Surf.Area= 4,195 sf Storage= 8,792 cf
Flood Elev= 598.50' Surf.Area= 4,655 sf Storage= 11,027 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.6 min (870.1 - 868.5)

Volume	Invert	Avail.Storage	Storage Description
#1	595.00'	11,027 cf	**Stilling Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
595.00	1,783	231.0	0	0	1,783
596.00	2,519	254.0	2,140	2,140	2,703
597.00	3,332	280.0	2,916	5,056	3,840
598.00	4,200	299.0	3,758	8,814	4,762
598.50	4,655	308.0	2,213	11,027	5,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	595.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	597.50'	**Asymmetrical Weir, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	598.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=29.50 cfs @ 12.16 hrs HW=597.99' (Free Discharge)
└─**1=Exfiltration** (Controls 29.50 cfs)

Primary OutFlow Max=12.72 cfs @ 12.16 hrs HW=597.99' TW=588.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 12.72 cfs @ 1.98 fps)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=595.00' TW=588.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=1.59"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=18.32 cfs 1.482 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=1.66"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=19.91 cfs 1.670 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=1.52"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=44.83 cfs 2.733 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=1.73"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=18.09 cfs 1.722 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=595.37' Storage=19,471 cf Inflow=59.57 cfs 1.574 af
Discarded=45.44 cfs 1.574 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=45.44 cfs 1.574 af

Pond SB: Peak Elev=598.09' Storage=9,177 cf Inflow=89.68 cfs 7.607 af
Discarded=30.08 cfs 6.033 af Primary=16.72 cfs 0.654 af Secondary=42.86 cfs 0.920 af Outflow=89.65 cfs 7.607 af

Total Runoff Area = 56.769 ac Runoff Volume = 7.607 af Average Runoff Depth = 1.61"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 18.32 cfs @ 12.17 hrs, Volume= 1.482 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 19.91 cfs @ 12.18 hrs, Volume= 1.670 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 44.83 cfs @ 12.06 hrs, Volume= 2.733 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 18.09 cfs @ 12.25 hrs, Volume= 1.722 af, Depth= 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 10 YR event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.33" for 10 YR event				
Inflow =	59.57 cfs @	12.10 hrs,	Volume=	1.574 af	
Outflow =	45.44 cfs @	12.22 hrs,	Volume=	1.574 af,	Atten= 24%, Lag= 6.7 min
Discarded =	45.44 cfs @	12.22 hrs,	Volume=	1.574 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.37' @ 12.22 hrs Surf.Area= 6,423 sf Storage= 19,471 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 23,996 cf

Plug-Flow detention time= 7.4 min calculated for 1.574 af (100% of inflow)
Center-of-Mass det. time= 7.4 min (738.2 - 730.9)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,996 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,776	235.0	29	12,629	4,512
595.00	5,647	338.0	4,633	17,262	9,217
596.00	7,883	350.0	6,734	23,996	9,958

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=45.42 cfs @ 12.22 hrs HW=595.37' (Free Discharge)
└─**1=Exfiltration** (Controls 45.42 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond SB:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 1.61" for 10 YR event				
Inflow =	89.68 cfs @	12.10 hrs,	Volume=	7.607 af	
Outflow =	89.65 cfs @	12.10 hrs,	Volume=	7.607 af,	Atten= 0%, Lag= 0.1 min
Discarded =	30.08 cfs @	12.10 hrs,	Volume=	6.033 af	
Primary =	16.72 cfs @	12.10 hrs,	Volume=	0.654 af	
Secondary =	42.86 cfs @	12.10 hrs,	Volume=	0.920 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 598.09' @ 12.10 hrs Surf.Area= 4,276 sf Storage= 9,177 cf
Flood Elev= 598.50' Surf.Area= 4,655 sf Storage= 11,027 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.4 min (850.3 - 848.9)

Volume	Invert	Avail.Storage	Storage Description
#1	595.00'	11,027 cf	**Stilling Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
595.00	1,783	231.0	0	0	1,783
596.00	2,519	254.0	2,140	2,140	2,703
597.00	3,332	280.0	2,916	5,056	3,840
598.00	4,200	299.0	3,758	8,814	4,762
598.50	4,655	308.0	2,213	11,027	5,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	595.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	597.50'	**Asymmetrical Weir, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	598.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=30.08 cfs @ 12.10 hrs HW=598.09' (Free Discharge)
└─**1=Exfiltration** (Controls 30.08 cfs)

Primary OutFlow Max=16.71 cfs @ 12.10 hrs HW=598.09' TW=594.41' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 16.71 cfs @ 2.11 fps)

Secondary OutFlow Max=42.81 cfs @ 12.10 hrs HW=598.09' TW=594.41' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 42.81 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.08"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=0.39 cfs 0.078 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.10"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=0.57 cfs 0.099 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.07"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=0.70 cfs 0.126 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.11"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=0.66 cfs 0.113 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=588.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond SB: Peak Elev=595.00' Storage=0 cf Inflow=2.07 cfs 0.416 af
Discarded=2.07 cfs 0.416 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=2.07 cfs 0.416 af

Total Runoff Area = 56.769 ac Runoff Volume = 0.416 af Average Runoff Depth = 0.09"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 0.39 cfs @ 12.27 hrs, Volume= 0.078 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 0.57 cfs @ 12.27 hrs, Volume= 0.099 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 0.70 cfs @ 12.13 hrs, Volume= 0.126 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 0.66 cfs @ 12.32 hrs, Volume= 0.113 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 90% event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 90% event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 588.00' @ 0.01 hrs Surf.Area= 2,100 sf Storage= 0 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 23,996 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,996 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,776	235.0	29	12,629	4,512
595.00	5,647	338.0	4,633	17,262	9,217
596.00	7,883	350.0	6,734	23,996	9,958

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 14.58 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond SB:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.09" for 90% event				
Inflow =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af	
Outflow =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af,	Atten= 0%, Lag= 0.0 min
Discarded =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.00' @ 0.01 hrs Surf.Area= 1,783 sf Storage= 0 cf
Flood Elev= 598.50' Surf.Area= 4,655 sf Storage= 11,027 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (961.0 - 961.0)

Volume	Invert	Avail.Storage	Storage Description
#1	595.00'	11,027 cf	**Stilling Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
595.00	1,783	231.0	0	0	1,783
596.00	2,519	254.0	2,140	2,140	2,703
597.00	3,332	280.0	2,916	5,056	3,840
598.00	4,200	299.0	3,758	8,814	4,762
598.50	4,655	308.0	2,213	11,027	5,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	595.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	597.50'	**Asymmetrical Weir, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	598.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 12.26 hrs HW=595.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 12.38 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=595.00' TW=588.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=595.00' TW=588.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=3.60"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=41.80 cfs 3.359 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=3.70"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=44.49 cfs 3.723 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=3.50"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=103.13 cfs 6.299 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=3.80"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=39.72 cfs 3.779 af

Pond AP1: Adjacent Property Peak Elev=595.03' Storage=15,287 cf Inflow=122.44 cfs 2.896 af
Discarded=104.94 cfs 2.865 af Secondary=15.59 cfs 0.032 af Outflow=120.53 cfs 2.896 af

Pond DP1: Peak Elev=595.72' Storage=21,909 cf Inflow=173.64 cfs 6.270 af
Discarded=51.14 cfs 3.376 af Primary=10.62 cfs 0.218 af Secondary=111.82 cfs 2.678 af Outflow=173.58 cfs 6.272 af

Pond SB: Peak Elev=598.29' Storage=10,080 cf Inflow=205.09 cfs 17.160 af
Discarded=31.42 cfs 10.890 af Primary=27.45 cfs 1.514 af Secondary=146.19 cfs 4.755 af Outflow=205.05 cfs 17.160 af

Total Runoff Area = 56.769 ac Runoff Volume = 17.160 af Average Runoff Depth = 3.63"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 41.80 cfs @ 12.15 hrs, Volume= 3.359 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 44.49 cfs @ 12.17 hrs, Volume= 3.723 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 103.13 cfs @ 12.05 hrs, Volume= 6.299 af, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 39.72 cfs @ 12.24 hrs, Volume= 3.779 af, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.61" for 100 YR event
Inflow = 122.44 cfs @ 12.10 hrs, Volume= 2.896 af
Outflow = 120.53 cfs @ 12.14 hrs, Volume= 2.896 af, Atten= 2%, Lag= 2.4 min
Discarded = 104.94 cfs @ 12.14 hrs, Volume= 2.865 af
Secondary = 15.59 cfs @ 12.14 hrs, Volume= 0.032 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.03' @ 12.14 hrs Surf.Area= 15,016 sf Storage= 15,287 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.9 min (731.1 - 729.2)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=104.94 cfs @ 12.14 hrs HW=595.03' (Free Discharge)
└─**1=Exfiltration** (Controls 104.94 cfs)

Secondary OutFlow Max=14.43 cfs @ 12.14 hrs HW=595.03' (Free Discharge)
└─**2=Special & User-Defined** (Custom Controls 14.43 cfs)

Summary for Pond DP1:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 1.33" for 100 YR event
Inflow = 173.64 cfs @ 12.10 hrs, Volume= 6.270 af
Outflow = 173.58 cfs @ 12.10 hrs, Volume= 6.272 af, Atten= 0%, Lag= 0.2 min
Discarded = 51.14 cfs @ 12.10 hrs, Volume= 3.376 af
Primary = 10.62 cfs @ 12.10 hrs, Volume= 0.218 af
Secondary = 111.82 cfs @ 12.10 hrs, Volume= 2.678 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.72' @ 12.10 hrs Surf.Area= 7,228 sf Storage= 21,909 cf
Flood Elev= 596.00' Surf.Area= 7,883 sf Storage= 23,996 cf

Plug-Flow detention time= 3.9 min calculated for 6.269 af (100% of inflow)
Center-of-Mass det. time= 3.9 min (735.2 - 731.3)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	23,996 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,100	200.0	0	0	2,100
594.00	2,100	200.0	12,600	12,600	3,300
594.01	3,776	235.0	29	12,629	4,512
595.00	5,647	338.0	4,633	17,262	9,217
596.00	7,883	350.0	6,734	23,996	9,958

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 1.00 16.00 17.00 Height (feet) 0.50 0.00 0.00 0.50
#3	Secondary	595.50'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=51.13 cfs @ 12.10 hrs HW=595.72' (Free Discharge)
└─**1=Exfiltration** (Controls 51.13 cfs)

Primary OutFlow Max=10.62 cfs @ 12.10 hrs HW=595.72' TW=594.87' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 10.62 cfs @ 1.49 fps)

Secondary OutFlow Max=111.79 cfs @ 12.10 hrs HW=595.72' TW=594.87' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 111.79 cfs)

Summary for Pond SB:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 3.63" for 100 YR event
Inflow = 205.09 cfs @ 12.10 hrs, Volume= 17.160 af
Outflow = 205.05 cfs @ 12.10 hrs, Volume= 17.160 af, Atten= 0%, Lag= 0.1 min
Discarded = 31.42 cfs @ 12.10 hrs, Volume= 10.890 af
Primary = 27.45 cfs @ 12.10 hrs, Volume= 1.514 af
Secondary = 146.19 cfs @ 12.10 hrs, Volume= 4.755 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 598.29' @ 12.10 hrs Surf.Area= 4,463 sf Storage= 10,080 cf
Flood Elev= 598.50' Surf.Area= 4,655 sf Storage= 11,027 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.1 min (826.7 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	595.00'	11,027 cf	**Stilling Basin (Irregular)**Listed below (Recalc)

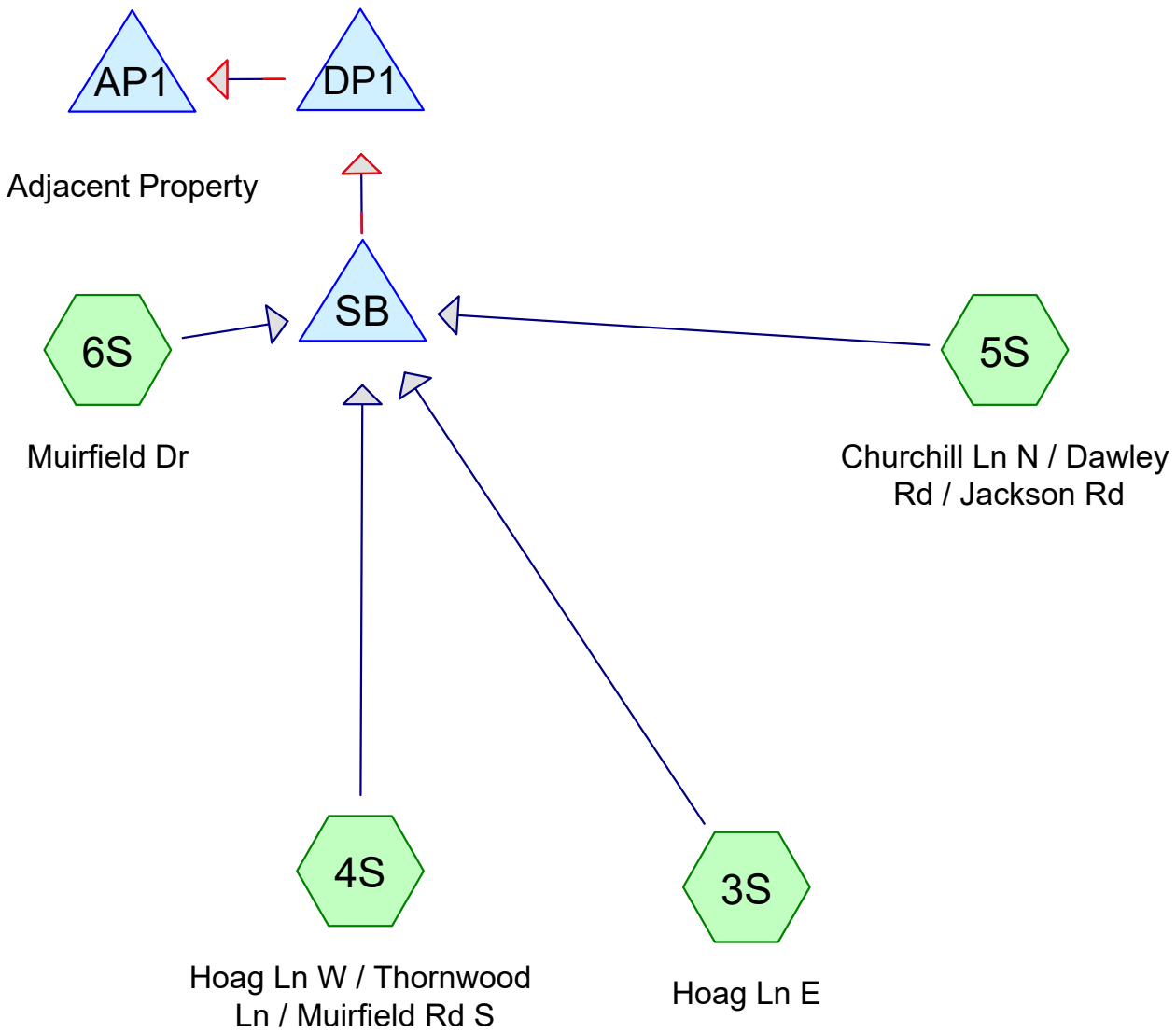
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
595.00	1,783	231.0	0	0	1,783
596.00	2,519	254.0	2,140	2,140	2,703
597.00	3,332	280.0	2,916	5,056	3,840
598.00	4,200	299.0	3,758	8,814	4,762
598.50	4,655	308.0	2,213	11,027	5,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	595.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	597.50'	**Asymmetrical Weir, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	598.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=31.41 cfs @ 12.10 hrs HW=598.29' (Free Discharge)
└─**1=Exfiltration** (Controls 31.41 cfs)

Primary OutFlow Max=27.44 cfs @ 12.10 hrs HW=598.29' TW=595.72' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 27.44 cfs @ 2.35 fps)

Secondary OutFlow Max=146.09 cfs @ 12.10 hrs HW=598.29' TW=595.72' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 146.09 cfs)



Subcat Reach Pond Link

Routing Diagram for MJ1456.07_MODEL_POST_4
Prepared by MJ Engineering and Land Surveying P.C, Printed 3/15/2023
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
38.885	74	>75% Grass cover, Good, HSG C (3S, 4S, 5S, 6S)
3.904	80	>75% Grass cover, Good, HSG D (6S)
12.210	98	Paved parking/Roofs, HSG C (3S, 4S, 5S, 6S)
1.770	98	Paved parking/Roofs, HSG D (6S)
56.769	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
51.096	HSG C	3S, 4S, 5S, 6S
5.674	HSG D	6S
0.000	Other	
56.769		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	38.885	3.904	0.000	42.789	>75% Grass cover, Good	3S, 4S, 5S, 6S
0.000	0.000	12.210	1.770	0.000	13.980	Paved parking/Roofs	3S, 4S, 5S, 6S
0.000	**0.000**	**51.096**	**5.674**	**0.000**	**56.769**	**TOTAL AREA**	

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.59"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=6.34 cfs 0.553 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.64"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=7.16 cfs 0.640 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.55"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=15.27 cfs 0.993 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.68"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=6.71 cfs 0.677 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=588.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond SB: Peak Elev=597.40' Storage=6,465 cf Inflow=30.89 cfs 2.864 af
Discarded=25.75 cfs 2.865 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=25.75 cfs 2.865 af

Total Runoff Area = 56.769 ac Runoff Volume = 2.864 af Average Runoff Depth = 0.61"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 6.34 cfs @ 12.17 hrs, Volume= 0.553 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 7.16 cfs @ 12.19 hrs, Volume= 0.640 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 15.27 cfs @ 12.07 hrs, Volume= 0.993 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 6.71 cfs @ 12.25 hrs, Volume= 0.677 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 YR Rainfall=2.05"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 1 YR event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 1 YR event				
Inflow =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Outflow =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af,	Atten= 0%, Lag= 0.0 min
Discarded =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 588.00' @ 0.01 hrs Surf.Area= 2,602 sf Storage= 0 cf
Flood Elev= 596.50' Surf.Area= 8,471 sf Storage= 33,359 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	33,359 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,602	214.0	0	0	2,602
594.00	2,602	214.0	15,612	15,612	3,886
594.01	5,857	299.0	41	15,653	7,356
595.00	6,782	318.0	6,251	21,904	8,338
596.00	7,939	350.0	7,353	29,257	10,071
596.50	8,471	359.0	4,102	33,359	10,609

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27**
			Offset (feet) 0.00 3.00 13.00 16.00
			Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	596.00'	**Special & User-Defined**
			Head (feet) 0.00 1.00
			Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 18.07 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond SB:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.61" for 1 YR event				
Inflow =	30.89 cfs @	12.12 hrs,	Volume=	2.864 af	
Outflow =	25.75 cfs @	12.24 hrs,	Volume=	2.865 af,	Atten= 17%, Lag= 7.5 min
Discarded =	25.75 cfs @	12.24 hrs,	Volume=	2.865 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 597.40' @ 12.24 hrs Surf.Area= 3,669 sf Storage= 6,465 cf
Flood Elev= 598.50' Surf.Area= 4,655 sf Storage= 11,027 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.3 min (879.7 - 878.4)

Volume	Invert	Avail.Storage	Storage Description
#1	595.00'	11,027 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
595.00	1,783	231.0	0	0	1,783
596.00	2,519	254.0	2,140	2,140	2,703
597.00	3,332	280.0	2,916	5,056	3,840
598.00	4,200	299.0	3,758	8,814	4,762
598.50	4,655	308.0	2,213	11,027	5,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	595.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	597.50'	**Asymmetrical Weir, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	598.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=25.75 cfs @ 12.24 hrs HW=597.40' (Free Discharge)
└─**1=Exfiltration** (Controls 25.75 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=595.00' TW=588.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=595.00' TW=588.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.81"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=9.02 cfs 0.759 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.86"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=10.03 cfs 0.870 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.76"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=21.84 cfs 1.375 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.92"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=9.29 cfs 0.912 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=588.00' Storage=0 cf Inflow=12.73 cfs 0.187 af
Discarded=12.73 cfs 0.187 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=12.73 cfs 0.187 af

Pond SB: Peak Elev=597.99' Storage=8,792 cf Inflow=43.98 cfs 3.916 af
Discarded=29.50 cfs 3.729 af Primary=12.73 cfs 0.187 af Secondary=0.00 cfs 0.000 af Outflow=42.23 cfs 3.917 af

Total Runoff Area = 56.769 ac Runoff Volume = 3.916 af Average Runoff Depth = 0.83"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 9.02 cfs @ 12.17 hrs, Volume= 0.759 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 10.03 cfs @ 12.19 hrs, Volume= 0.870 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 21.84 cfs @ 12.06 hrs, Volume= 1.375 af, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 9.29 cfs @ 12.25 hrs, Volume= 0.912 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2 YR Rainfall=2.39"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 2 YR event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.04" for 2 YR event
Inflow = 12.73 cfs @ 12.16 hrs, Volume= 0.187 af
Outflow = 12.73 cfs @ 12.16 hrs, Volume= 0.187 af, Atten= 0%, Lag= 0.0 min
Discarded = 12.73 cfs @ 12.16 hrs, Volume= 0.187 af
Primary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 588.00' @ 12.16 hrs Surf.Area= 2,602 sf Storage= 0 cf
Flood Elev= 596.50' Surf.Area= 8,471 sf Storage= 33,359 cf

Plug-Flow detention time= 0.0 min calculated for 0.187 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (732.2 - 732.2)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	33,359 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,602	214.0	0	0	2,602
594.00	2,602	214.0	15,612	15,612	3,886
594.01	5,857	299.0	41	15,653	7,356
595.00	6,782	318.0	6,251	21,904	8,338
596.00	7,939	350.0	7,353	29,257	10,071
596.50	8,471	359.0	4,102	33,359	10,609

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	596.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=18.07 cfs @ 12.16 hrs HW=588.00' (Free Discharge)
└─**1=Exfiltration** (Controls 18.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond SB:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.83" for 2 YR event
Inflow = 43.98 cfs @ 12.11 hrs, Volume= 3.916 af
Outflow = 42.23 cfs @ 12.16 hrs, Volume= 3.917 af, Atten= 4%, Lag= 3.0 min
Discarded = 29.50 cfs @ 12.16 hrs, Volume= 3.729 af
Primary = 12.73 cfs @ 12.16 hrs, Volume= 0.187 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 597.99' @ 12.16 hrs Surf.Area= 4,195 sf Storage= 8,792 cf
Flood Elev= 598.50' Surf.Area= 4,655 sf Storage= 11,027 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.6 min (870.1 - 868.5)

Volume	Invert	Avail.Storage	Storage Description
#1	595.00'	11,027 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
595.00	1,783	231.0	0	0	1,783
596.00	2,519	254.0	2,140	2,140	2,703
597.00	3,332	280.0	2,916	5,056	3,840
598.00	4,200	299.0	3,758	8,814	4,762
598.50	4,655	308.0	2,213	11,027	5,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	595.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	597.50'	**Asymmetrical Weir, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	598.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=29.50 cfs @ 12.16 hrs HW=597.99' (Free Discharge)
└─**1=Exfiltration** (Controls 29.50 cfs)

Primary OutFlow Max=12.72 cfs @ 12.16 hrs HW=597.99' TW=588.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 12.72 cfs @ 1.98 fps)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=595.00' TW=588.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=1.21"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=13.74 cfs 1.124 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=1.27"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=15.05 cfs 1.275 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=1.14"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=33.48 cfs 2.059 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=1.33"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=13.78 cfs 1.323 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=592.38' Storage=11,406 cf Inflow=37.31 cfs 0.818 af
Discarded=18.57 cfs 0.821 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=18.57 cfs 0.821 af

Pond SB: Peak Elev=598.04' Storage=9,003 cf Inflow=67.15 cfs 5.781 af
Discarded=29.82 cfs 4.964 af Primary=14.87 cfs 0.461 af Secondary=22.44 cfs 0.357 af Outflow=67.13 cfs 5.782 af

Total Runoff Area = 56.769 ac Runoff Volume = 5.781 af Average Runoff Depth = 1.22"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 13.74 cfs @ 12.17 hrs, Volume= 1.124 af, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5 YR Rainfall=2.94"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 15.05 cfs @ 12.18 hrs, Volume= 1.275 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5 YR Rainfall=2.94"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 33.48 cfs @ 12.06 hrs, Volume= 2.059 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5 YR Rainfall=2.94"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 13.78 cfs @ 12.25 hrs, Volume= 1.323 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 5 YR Rainfall=2.94"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 5 YR event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.17" for 5 YR event
Inflow = 37.31 cfs @ 12.11 hrs, Volume= 0.818 af
Outflow = 18.57 cfs @ 12.28 hrs, Volume= 0.821 af, Atten= 50%, Lag= 10.6 min
Discarded = 18.57 cfs @ 12.28 hrs, Volume= 0.821 af
Primary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 592.38' @ 12.28 hrs Surf.Area= 2,602 sf Storage= 11,406 cf
Flood Elev= 596.50' Surf.Area= 8,471 sf Storage= 33,359 cf

Plug-Flow detention time= 6.3 min calculated for 0.818 af (100% of inflow)
Center-of-Mass det. time= 6.3 min (737.3 - 731.0)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	33,359 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,602	214.0	0	0	2,602
594.00	2,602	214.0	15,612	15,612	3,886
594.01	5,857	299.0	41	15,653	7,356
595.00	6,782	318.0	6,251	21,904	8,338
596.00	7,939	350.0	7,353	29,257	10,071
596.50	8,471	359.0	4,102	33,359	10,609

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	596.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=18.57 cfs @ 12.28 hrs HW=592.38' (Free Discharge)
└─**1=Exfiltration** (Controls 18.57 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond SB:

Inflow Area =	56.769 ac,	24.63% Impervious,	Inflow Depth =	1.22"	for 5 YR event
Inflow =	67.15 cfs @	12.10 hrs,	Volume=	5.781 af	
Outflow =	67.13 cfs @	12.11 hrs,	Volume=	5.782 af,	Atten= 0%, Lag= 0.2 min
Discarded =	29.82 cfs @	12.11 hrs,	Volume=	4.964 af	
Primary =	14.87 cfs @	12.11 hrs,	Volume=	0.461 af	
Secondary =	22.44 cfs @	12.11 hrs,	Volume=	0.357 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 598.04' @ 12.11 hrs Surf.Area= 4,240 sf Storage= 9,003 cf
Flood Elev= 598.50' Surf.Area= 4,655 sf Storage= 11,027 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.5 min (858.4 - 856.8)

Volume	Invert	Avail.Storage	Storage Description
#1	595.00'	11,027 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
595.00	1,783	231.0	0	0	1,783
596.00	2,519	254.0	2,140	2,140	2,703
597.00	3,332	280.0	2,916	5,056	3,840
598.00	4,200	299.0	3,758	8,814	4,762
598.50	4,655	308.0	2,213	11,027	5,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	595.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	597.50'	**Asymmetrical Weir, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	598.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=29.82 cfs @ 12.11 hrs HW=598.04' (Free Discharge)
└─**1=Exfiltration** (Controls 29.82 cfs)

Primary OutFlow Max=14.87 cfs @ 12.11 hrs HW=598.04' TW=589.68' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 14.87 cfs @ 2.06 fps)

Secondary OutFlow Max=22.41 cfs @ 12.11 hrs HW=598.04' TW=589.68' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 22.41 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=1.59"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=18.32 cfs 1.482 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=1.66"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=19.91 cfs 1.670 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=1.52"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=44.83 cfs 2.733 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=1.73"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=18.09 cfs 1.722 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=594.55' Storage=18,955 cf Inflow=59.57 cfs 1.574 af
Discarded=44.95 cfs 1.575 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=44.95 cfs 1.575 af

Pond SB: Peak Elev=598.09' Storage=9,177 cf Inflow=89.68 cfs 7.607 af
Discarded=30.08 cfs 6.033 af Primary=16.72 cfs 0.654 af Secondary=42.86 cfs 0.920 af Outflow=89.65 cfs 7.607 af

Total Runoff Area = 56.769 ac Runoff Volume = 7.607 af Average Runoff Depth = 1.61"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 18.32 cfs @ 12.17 hrs, Volume= 1.482 af, Depth= 1.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 19.91 cfs @ 12.18 hrs, Volume= 1.670 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 44.83 cfs @ 12.06 hrs, Volume= 2.733 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 18.09 cfs @ 12.25 hrs, Volume= 1.722 af, Depth= 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 YR Rainfall=3.44"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 10 YR event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.33" for 10 YR event
Inflow = 59.57 cfs @ 12.10 hrs, Volume= 1.574 af
Outflow = 44.95 cfs @ 12.22 hrs, Volume= 1.575 af, Atten= 25%, Lag= 6.9 min
Discarded = 44.95 cfs @ 12.22 hrs, Volume= 1.575 af
Primary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 594.55' @ 12.22 hrs Surf.Area= 6,354 sf Storage= 18,955 cf
Flood Elev= 596.50' Surf.Area= 8,471 sf Storage= 33,359 cf

Plug-Flow detention time= 7.4 min calculated for 1.574 af (100% of inflow)
Center-of-Mass det. time= 7.5 min (738.3 - 730.9)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	33,359 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,602	214.0	0	0	2,602
594.00	2,602	214.0	15,612	15,612	3,886
594.01	5,857	299.0	41	15,653	7,356
595.00	6,782	318.0	6,251	21,904	8,338
596.00	7,939	350.0	7,353	29,257	10,071
596.50	8,471	359.0	4,102	33,359	10,609

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	596.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=44.95 cfs @ 12.22 hrs HW=594.55' (Free Discharge)
└─**1=Exfiltration** (Controls 44.95 cfs)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond SB:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 1.61" for 10 YR event
Inflow = 89.68 cfs @ 12.10 hrs, Volume= 7.607 af
Outflow = 89.65 cfs @ 12.10 hrs, Volume= 7.607 af, Atten= 0%, Lag= 0.1 min
Discarded = 30.08 cfs @ 12.10 hrs, Volume= 6.033 af
Primary = 16.72 cfs @ 12.10 hrs, Volume= 0.654 af
Secondary = 42.86 cfs @ 12.10 hrs, Volume= 0.920 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 598.09' @ 12.10 hrs Surf.Area= 4,276 sf Storage= 9,177 cf
Flood Elev= 598.50' Surf.Area= 4,655 sf Storage= 11,027 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.4 min (850.3 - 848.9)

Volume	Invert	Avail.Storage	Storage Description
#1	595.00'	11,027 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
595.00	1,783	231.0	0	0	1,783
596.00	2,519	254.0	2,140	2,140	2,703
597.00	3,332	280.0	2,916	5,056	3,840
598.00	4,200	299.0	3,758	8,814	4,762
598.50	4,655	308.0	2,213	11,027	5,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	595.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	597.50'	**Asymmetrical Weir, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	598.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=30.08 cfs @ 12.10 hrs HW=598.09' (Free Discharge)
└─**1=Exfiltration** (Controls 30.08 cfs)

Primary OutFlow Max=16.71 cfs @ 12.10 hrs HW=598.09' TW=593.27' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 16.71 cfs @ 2.11 fps)

Secondary OutFlow Max=42.81 cfs @ 12.10 hrs HW=598.09' TW=593.27' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 42.81 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=2.23"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=25.93 cfs 2.083 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=2.32"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=27.92 cfs 2.329 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=2.15"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=63.73 cfs 3.871 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=2.40"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=25.17 cfs 2.385 af

Pond AP1: Adjacent Property Peak Elev=593.66' Storage=1,337 cf Inflow=36.77 cfs 0.366 af
Discarded=31.81 cfs 0.366 af Secondary=0.00 cfs 0.000 af Outflow=31.81 cfs 0.366 af

Pond DP1: Peak Elev=596.02' Storage=29,387 cf Inflow=96.57 cfs 2.985 af
Discarded=56.52 cfs 2.622 af Primary=27.27 cfs 0.341 af Secondary=9.16 cfs 0.025 af Outflow=93.32 cfs 2.988 af

Pond SB: Peak Elev=598.15' Storage=9,468 cf Inflow=127.12 cfs 10.668 af
Discarded=30.51 cfs 7.683 af Primary=19.97 cfs 0.942 af Secondary=76.60 cfs 2.043 af Outflow=127.08 cfs 10.668 af

Total Runoff Area = 56.769 ac Runoff Volume = 10.668 af Average Runoff Depth = 2.26"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 25.93 cfs @ 12.15 hrs, Volume= 2.083 af, Depth= 2.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25 YR Rainfall=4.23"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 27.92 cfs @ 12.18 hrs, Volume= 2.329 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25 YR Rainfall=4.23"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 63.73 cfs @ 12.05 hrs, Volume= 3.871 af, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25 YR Rainfall=4.23"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 25.17 cfs @ 12.25 hrs, Volume= 2.385 af, Depth= 2.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25 YR Rainfall=4.23"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.08" for 25 YR event
Inflow = 36.77 cfs @ 12.14 hrs, Volume= 0.366 af
Outflow = 31.81 cfs @ 12.17 hrs, Volume= 0.366 af, Atten= 13%, Lag= 1.4 min
Discarded = 31.81 cfs @ 12.17 hrs, Volume= 0.366 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.66' @ 12.17 hrs Surf.Area= 4,573 sf Storage= 1,337 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.6 min (732.2 - 731.6)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=31.71 cfs @ 12.17 hrs HW=593.66' (Free Discharge)
└─**1=Exfiltration** (Controls 31.71 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.63" for 25 YR event				
Inflow =	96.57 cfs @	12.10 hrs,	Volume=	2.985 af	
Outflow =	93.32 cfs @	12.14 hrs,	Volume=	2.988 af,	Atten= 3%, Lag= 2.7 min
Discarded =	56.52 cfs @	12.14 hrs,	Volume=	2.622 af	
Primary =	27.27 cfs @	12.14 hrs,	Volume=	0.341 af	
Secondary =	9.16 cfs @	12.14 hrs,	Volume=	0.025 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 596.02' @ 12.14 hrs Surf.Area= 7,956 sf Storage= 29,387 cf
Flood Elev= 596.50' Surf.Area= 8,471 sf Storage= 33,359 cf

Plug-Flow detention time= 6.9 min calculated for 2.985 af (100% of inflow)
Center-of-Mass det. time= 7.0 min (737.9 - 730.9)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	33,359 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,602	214.0	0	0	2,602
594.00	2,602	214.0	15,612	15,612	3,886
594.01	5,857	299.0	41	15,653	7,356
595.00	6,782	318.0	6,251	21,904	8,338
596.00	7,939	350.0	7,353	29,257	10,071
596.50	8,471	359.0	4,102	33,359	10,609

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	596.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=56.52 cfs @ 12.14 hrs HW=596.02' (Free Discharge)
└─**1=Exfiltration** (Controls 56.52 cfs)

Primary OutFlow Max=27.27 cfs @ 12.14 hrs HW=596.02' TW=593.54' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 27.27 cfs @ 2.02 fps)

Secondary OutFlow Max=8.13 cfs @ 12.14 hrs HW=596.02' TW=593.58' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 8.13 cfs)

Summary for Pond SB:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 2.26" for 25 YR event
Inflow = 127.12 cfs @ 12.10 hrs, Volume= 10.668 af
Outflow = 127.08 cfs @ 12.10 hrs, Volume= 10.668 af, Atten= 0%, Lag= 0.1 min
Discarded = 30.51 cfs @ 12.10 hrs, Volume= 7.683 af
Primary = 19.97 cfs @ 12.10 hrs, Volume= 0.942 af
Secondary = 76.60 cfs @ 12.10 hrs, Volume= 2.043 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 598.15' @ 12.10 hrs Surf.Area= 4,337 sf Storage= 9,468 cf
Flood Elev= 598.50' Surf.Area= 4,655 sf Storage= 11,027 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.3 min (840.4 - 839.1)

Volume	Invert	Avail.Storage	Storage Description
#1	595.00'	11,027 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
595.00	1,783	231.0	0	0	1,783
596.00	2,519	254.0	2,140	2,140	2,703
597.00	3,332	280.0	2,916	5,056	3,840
598.00	4,200	299.0	3,758	8,814	4,762
598.50	4,655	308.0	2,213	11,027	5,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	595.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	597.50'	**Asymmetrical Weir, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	598.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=30.51 cfs @ 12.10 hrs HW=598.15' (Free Discharge)
└─**1=Exfiltration** (Controls 30.51 cfs)

Primary OutFlow Max=19.97 cfs @ 12.10 hrs HW=598.15' TW=595.62' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 19.97 cfs @ 2.20 fps)

Secondary OutFlow Max=76.59 cfs @ 12.10 hrs HW=598.15' TW=595.62' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 76.59 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=2.85"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=33.13 cfs 2.658 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=2.94"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=35.45 cfs 2.958 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=2.76"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=81.59 cfs 4.962 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=3.03"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=31.78 cfs 3.015 af

Pond AP1: Adjacent Property Peak Elev=594.17' Storage=5,124 cf Inflow=74.41 cfs 1.230 af
Discarded=67.37 cfs 1.230 af Secondary=0.00 cfs 0.000 af Outflow=67.37 cfs 1.230 af

Pond DP1: Peak Elev=596.08' Storage=29,916 cf Inflow=131.51 cfs 4.429 af
Discarded=57.03 cfs 3.201 af Primary=33.14 cfs 0.733 af Secondary=41.27 cfs 0.497 af Outflow=131.44 cfs 4.431 af

Pond SB: Peak Elev=598.22' Storage=9,745 cf Inflow=162.48 cfs 13.593 af
Discarded=30.92 cfs 9.164 af Primary=23.24 cfs 1.201 af Secondary=108.27 cfs 3.228 af Outflow=162.43 cfs 13.593 af

Total Runoff Area = 56.769 ac Runoff Volume = 13.593 af Average Runoff Depth = 2.87"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 33.13 cfs @ 12.15 hrs, Volume= 2.658 af, Depth= 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50 YR Rainfall=4.95"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 35.45 cfs @ 12.18 hrs, Volume= 2.958 af, Depth= 2.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50 YR Rainfall=4.95"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 81.59 cfs @ 12.05 hrs, Volume= 4.962 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50 YR Rainfall=4.95"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 31.78 cfs @ 12.24 hrs, Volume= 3.015 af, Depth= 3.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 50 YR Rainfall=4.95"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.26" for 50 YR event
Inflow = 74.41 cfs @ 12.10 hrs, Volume= 1.230 af
Outflow = 67.37 cfs @ 12.15 hrs, Volume= 1.230 af, Atten= 9%, Lag= 3.0 min
Discarded = 67.37 cfs @ 12.15 hrs, Volume= 1.230 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 594.17' @ 12.15 hrs Surf.Area= 9,671 sf Storage= 5,124 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.0 min (731.3 - 730.3)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=67.35 cfs @ 12.15 hrs HW=594.17' (Free Discharge)
└─**1=Exfiltration** (Controls 67.35 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.94" for 50 YR event
Inflow = 131.51 cfs @ 12.10 hrs, Volume= 4.429 af
Outflow = 131.44 cfs @ 12.10 hrs, Volume= 4.431 af, Atten= 0%, Lag= 0.2 min
Discarded = 57.03 cfs @ 12.10 hrs, Volume= 3.201 af
Primary = 33.14 cfs @ 12.10 hrs, Volume= 0.733 af
Secondary = 41.27 cfs @ 12.10 hrs, Volume= 0.497 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 596.08' @ 12.10 hrs Surf.Area= 8,026 sf Storage= 29,916 cf
Flood Elev= 596.50' Surf.Area= 8,471 sf Storage= 33,359 cf

Plug-Flow detention time= 5.8 min calculated for 4.428 af (100% of inflow)
Center-of-Mass det. time= 5.8 min (736.9 - 731.1)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	33,359 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,602	214.0	0	0	2,602
594.00	2,602	214.0	15,612	15,612	3,886
594.01	5,857	299.0	41	15,653	7,356
595.00	6,782	318.0	6,251	21,904	8,338
596.00	7,939	350.0	7,353	29,257	10,071
596.50	8,471	359.0	4,102	33,359	10,609

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	596.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=57.03 cfs @ 12.10 hrs HW=596.08' (Free Discharge)
└─**1=Exfiltration** (Controls 57.03 cfs)

Primary OutFlow Max=33.14 cfs @ 12.10 hrs HW=596.08' TW=594.05' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 33.14 cfs @ 2.11 fps)

Secondary OutFlow Max=41.24 cfs @ 12.10 hrs HW=596.08' TW=594.05' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 41.24 cfs)

Summary for Pond SB:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 2.87" for 50 YR event
Inflow = 162.48 cfs @ 12.10 hrs, Volume= 13.593 af
Outflow = 162.43 cfs @ 12.10 hrs, Volume= 13.593 af, Atten= 0%, Lag= 0.1 min
Discarded = 30.92 cfs @ 12.10 hrs, Volume= 9.164 af
Primary = 23.24 cfs @ 12.10 hrs, Volume= 1.201 af
Secondary = 108.27 cfs @ 12.10 hrs, Volume= 3.228 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 598.22' @ 12.10 hrs Surf.Area= 4,394 sf Storage= 9,745 cf
Flood Elev= 598.50' Surf.Area= 4,655 sf Storage= 11,027 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.2 min (833.4 - 832.2)

Volume	Invert	Avail.Storage	Storage Description
#1	595.00'	11,027 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
595.00	1,783	231.0	0	0	1,783
596.00	2,519	254.0	2,140	2,140	2,703
597.00	3,332	280.0	2,916	5,056	3,840
598.00	4,200	299.0	3,758	8,814	4,762
598.50	4,655	308.0	2,213	11,027	5,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	595.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	597.50'	**Asymmetrical Weir, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	598.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=30.92 cfs @ 12.10 hrs HW=598.22' (Free Discharge)
└─**1=Exfiltration** (Controls 30.92 cfs)

Primary OutFlow Max=23.24 cfs @ 12.10 hrs HW=598.22' TW=596.08' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 23.24 cfs @ 2.27 fps)

Secondary OutFlow Max=108.22 cfs @ 12.10 hrs HW=598.22' TW=596.08' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 108.22 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=0.08"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=0.39 cfs 0.078 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=0.10"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=0.57 cfs 0.099 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=0.07"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=0.70 cfs 0.126 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=0.11"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=0.66 cfs 0.113 af

Pond AP1: Adjacent Property Peak Elev=593.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DP1: Peak Elev=588.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond SB: Peak Elev=595.00' Storage=0 cf Inflow=2.07 cfs 0.416 af
Discarded=2.07 cfs 0.416 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=2.07 cfs 0.416 af

Total Runoff Area = 56.769 ac Runoff Volume = 0.416 af Average Runoff Depth = 0.09"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 0.39 cfs @ 12.27 hrs, Volume= 0.078 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 0.57 cfs @ 12.27 hrs, Volume= 0.099 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 0.70 cfs @ 12.13 hrs, Volume= 0.126 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 0.66 cfs @ 12.32 hrs, Volume= 0.113 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 90% Rainfall=1.00"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 90% event
Inflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 593.00' @ 0.01 hrs Surf.Area= 312 sf Storage= 0 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 2.17 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.00" for 90% event				
Inflow =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Outflow =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af,	Atten= 0%, Lag= 0.0 min
Discarded =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 588.00' @ 0.01 hrs Surf.Area= 2,602 sf Storage= 0 cf
Flood Elev= 596.50' Surf.Area= 8,471 sf Storage= 33,359 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	33,359 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,602	214.0	0	0	2,602
594.00	2,602	214.0	15,612	15,612	3,886
594.01	5,857	299.0	41	15,653	7,356
595.00	6,782	318.0	6,251	21,904	8,338
596.00	7,939	350.0	7,353	29,257	10,071
596.50	8,471	359.0	4,102	33,359	10,609

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	596.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 18.07 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=588.00' TW=593.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond SB:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 0.09" for 90% event				
Inflow =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af	
Outflow =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af,	Atten= 0%, Lag= 0.0 min
Discarded =	2.07 cfs @	12.26 hrs,	Volume=	0.416 af	
Primary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	
Secondary =	0.00 cfs @	0.01 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 595.00' @ 0.01 hrs Surf.Area= 1,783 sf Storage= 0 cf
Flood Elev= 598.50' Surf.Area= 4,655 sf Storage= 11,027 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (961.0 - 961.0)

Volume	Invert	Avail.Storage	Storage Description
#1	595.00'	11,027 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
595.00	1,783	231.0	0	0	1,783
596.00	2,519	254.0	2,140	2,140	2,703
597.00	3,332	280.0	2,916	5,056	3,840
598.00	4,200	299.0	3,758	8,814	4,762
598.50	4,655	308.0	2,213	11,027	5,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	595.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	597.50'	**Asymmetrical Weir, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	598.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=0.00 cfs @ 12.26 hrs HW=595.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 12.38 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.01 hrs HW=595.00' TW=588.00' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=595.00' TW=588.00' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Controls 0.00 cfs)

Time span=0.01-72.00 hrs, dt=0.01 hrs, 7200 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment3S: Hoag Ln E Runoff Area=487,543 sf 23.00% Impervious Runoff Depth=3.60"
Flow Length=1,370' Slope=0.0650 '/' Tc=22.5 min CN=80 Runoff=41.80 cfs 3.359 af

Subcatchment4S: Hoag Ln W / Runoff Area=525,701 sf 29.76% Impervious Runoff Depth=3.70"
Flow Length=950' Slope=0.0190 '/' Tc=24.0 min CN=81 Runoff=44.49 cfs 3.723 af

Subcatchment5S: Churchill Ln N / Runoff Area=940,277 sf 22.12% Impervious Runoff Depth=3.50"
Flow Length=1,455' Slope=0.0530 '/' Tc=13.3 min CN=79 Runoff=103.13 cfs 6.299 af

Subcatchment6S: Muirfield Dr Runoff Area=519,341 sf 25.50% Impervious Runoff Depth=3.80"
Flow Length=1,460' Slope=0.0160 '/' Tc=29.4 min CN=82 Runoff=39.72 cfs 3.779 af

Pond AP1: Adjacent Property Peak Elev=594.93' Storage=14,312 cf Inflow=116.01 cfs 2.487 af
Discarded=101.63 cfs 2.487 af Secondary=0.00 cfs 0.000 af Outflow=101.63 cfs 2.487 af

Pond DP1: Peak Elev=596.15' Storage=30,478 cf Inflow=173.64 cfs 6.270 af
Discarded=57.56 cfs 3.786 af Primary=39.85 cfs 1.129 af Secondary=76.16 cfs 1.358 af Outflow=173.57 cfs 6.273 af

Pond SB: Peak Elev=598.29' Storage=10,080 cf Inflow=205.09 cfs 17.160 af
Discarded=31.42 cfs 10.890 af Primary=27.45 cfs 1.514 af Secondary=146.19 cfs 4.755 af Outflow=205.05 cfs 17.160 af

Total Runoff Area = 56.769 ac Runoff Volume = 17.160 af Average Runoff Depth = 3.63"
75.37% Pervious = 42.789 ac 24.63% Impervious = 13.980 ac

Summary for Subcatchment 3S: Hoag Ln E

Runoff = 41.80 cfs @ 12.15 hrs, Volume= 3.359 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
375,419	74	>75% Grass cover, Good, HSG C
112,124	98	Paved parking/Roofs, HSG C
487,543	80	Weighted Average
375,419		77.00% Pervious Area
112,124		23.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.5	100	0.0650	0.11		**Sheet Flow, 1** Woods: Light underbrush n= 0.400 P2= 2.39"
3.0	230	0.0650	1.27		**Shallow Concentrated Flow, 2** Woodland Kv= 5.0 fps
3.0	740	0.0650	4.10		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.0	300	0.0650	5.18		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
22.5	1,370	Total			

Summary for Subcatchment 4S: Hoag Ln W / Thornwood Ln / Muirfield Rd S

Runoff = 44.49 cfs @ 12.17 hrs, Volume= 3.723 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

	Area (sf)	CN	Description
	369,278	74	>75% Grass cover, Good, HSG C
*	156,423	98	Paved parking/Roofs, HSG C
	525,701	81	Weighted Average
	369,278		70.24% Pervious Area
	156,423		29.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	80	0.0190	0.14		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.0	20	0.0190	0.05		**Sheet Flow, 2** Woods: Light underbrush n= 0.400 P2= 2.39"
4.7	630	0.0190	2.22		**Shallow Concentrated Flow, 3** Unpaved Kv= 16.1 fps
1.7	70	0.0190	0.69		**Shallow Concentrated Flow, 4** Woodland Kv= 5.0 fps
0.9	150	0.0190	2.80		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
24.0	950	Total			

Summary for Subcatchment 5S: Churchill Ln N / Dawley Rd / Jackson Rd

Runoff = 103.13 cfs @ 12.05 hrs, Volume= 6.299 af, Depth= 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
732,281	74	>75% Grass cover, Good, HSG C
207,996	98	Paved parking/Roofs, HSG C
940,277	79	Weighted Average
732,281		77.88% Pervious Area
207,996		22.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0530	0.22		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
4.0	900	0.0530	3.71		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
1.6	455	0.0530	4.67		**Shallow Concentrated Flow, 3** Paved Kv= 20.3 fps
13.3	1,455	Total			

Summary for Subcatchment 6S: Muirfield Dr

Runoff = 39.72 cfs @ 12.24 hrs, Volume= 3.779 af, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 YR Rainfall=5.80"

Area (sf)	CN	Description
216,867	74	>75% Grass cover, Good, HSG C
55,333	98	Paved parking/Roofs, HSG C
170,049	80	>75% Grass cover, Good, HSG D
77,092	98	Paved parking/Roofs, HSG D
519,341	82	Weighted Average
386,916		74.50% Pervious Area
132,425		25.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4	100	0.0160	0.13		**Sheet Flow, 1** Grass: Short n= 0.150 P2= 2.39"
7.8	950	0.0160	2.04		**Shallow Concentrated Flow, 2** Unpaved Kv= 16.1 fps
8.7	330	0.0160	0.63		**Shallow Concentrated Flow, 3** Woodland Kv= 5.0 fps
0.5	80	0.0160	2.57		**Shallow Concentrated Flow, 4** Paved Kv= 20.3 fps
29.4	1,460	Total			

Summary for Pond AP1: Adjacent Property

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 0.53" for 100 YR event
Inflow = 116.01 cfs @ 12.10 hrs, Volume= 2.487 af
Outflow = 101.63 cfs @ 12.16 hrs, Volume= 2.487 af, Atten= 12%, Lag= 3.9 min
Discarded = 101.63 cfs @ 12.16 hrs, Volume= 2.487 af
Secondary = 0.00 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 594.93' @ 12.16 hrs Surf.Area= 14,549 sf Storage= 14,312 cf
Flood Elev= 595.00' Surf.Area= 15,016 sf Storage= 15,287 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.8 min (731.7 - 729.9)

Volume	Invert	Avail.Storage	Storage Description
#1	593.00'	15,287 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
593.00	312	131.0	0	0	312
594.00	8,720	469.0	3,560	3,560	16,453
595.00	15,016	596.0	11,726	15,287	27,230

Device	Routing	Invert	Outlet Devices
#1	Discarded	593.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Secondary	595.00'	**Special & User-Defined** Head (feet) 0.00 1.00

Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=101.58 cfs @ 12.16 hrs HW=594.93' (Free Discharge)
└─**1=Exfiltration** (Controls 101.58 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.01 hrs HW=593.00' (Free Discharge)
└─**2=Special & User-Defined** (Controls 0.00 cfs)

Summary for Pond DP1:

Inflow Area =	56.769 ac, 24.63% Impervious, Inflow Depth = 1.33" for 100 YR event				
Inflow =	173.64 cfs @	12.10 hrs,	Volume=	6.270 af	
Outflow =	173.57 cfs @	12.10 hrs,	Volume=	6.273 af,	Atten= 0%, Lag= 0.2 min
Discarded =	57.56 cfs @	12.10 hrs,	Volume=	3.786 af	
Primary =	39.85 cfs @	12.10 hrs,	Volume=	1.129 af	
Secondary =	76.16 cfs @	12.10 hrs,	Volume=	1.358 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 596.15' @ 12.10 hrs Surf.Area= 8,099 sf Storage= 30,478 cf
Flood Elev= 596.50' Surf.Area= 8,471 sf Storage= 33,359 cf

Plug-Flow detention time= 4.9 min calculated for 6.269 af (100% of inflow)
Center-of-Mass det. time= 5.0 min (736.2 - 731.3)

Volume	Invert	Avail.Storage	Storage Description
#1	588.00'	33,359 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
588.00	2,602	214.0	0	0	2,602
594.00	2,602	214.0	15,612	15,612	3,886
594.01	5,857	299.0	41	15,653	7,356
595.00	6,782	318.0	6,251	21,904	8,338
596.00	7,939	350.0	7,353	29,257	10,071
596.50	8,471	359.0	4,102	33,359	10,609

Device	Routing	Invert	Outlet Devices
#1	Discarded	588.00'	**300.000 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 430.00'
#2	Primary	595.50'	**Asymmetrical Weir X 2.00, C= 3.27**
			Offset (feet) 0.00 3.00 13.00 16.00
			Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	596.00'	**Special & User-Defined**
			Head (feet) 0.00 1.00
			Disch. (cfs) 0.000 500.000

Discarded OutFlow Max=57.56 cfs @ 12.10 hrs HW=596.15' (Free Discharge)
└─**1=Exfiltration** (Controls 57.56 cfs)

Primary OutFlow Max=39.85 cfs @ 12.10 hrs HW=596.15' TW=594.72' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 39.85 cfs @ 2.20 fps)

Secondary OutFlow Max=76.14 cfs @ 12.10 hrs HW=596.15' TW=594.72' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 76.14 cfs)

Summary for Pond SB:

Inflow Area = 56.769 ac, 24.63% Impervious, Inflow Depth = 3.63" for 100 YR event
Inflow = 205.09 cfs @ 12.10 hrs, Volume= 17.160 af
Outflow = 205.05 cfs @ 12.10 hrs, Volume= 17.160 af, Atten= 0%, Lag= 0.1 min
Discarded = 31.42 cfs @ 12.10 hrs, Volume= 10.890 af
Primary = 27.45 cfs @ 12.10 hrs, Volume= 1.514 af
Secondary = 146.19 cfs @ 12.10 hrs, Volume= 4.755 af

Routing by Dyn-Stor-Ind method, Time Span= 0.01-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 598.29' @ 12.10 hrs Surf.Area= 4,463 sf Storage= 10,080 cf
Flood Elev= 598.50' Surf.Area= 4,655 sf Storage= 11,027 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.1 min (826.7 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	595.00'	11,027 cf	**Vault/Basin (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
595.00	1,783	231.0	0	0	1,783
596.00	2,519	254.0	2,140	2,140	2,703
597.00	3,332	280.0	2,916	5,056	3,840
598.00	4,200	299.0	3,758	8,814	4,762
598.50	4,655	308.0	2,213	11,027	5,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	595.00'	**300.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 430.00'
#2	Primary	597.50'	**Asymmetrical Weir, C= 3.27** Offset (feet) 0.00 3.00 13.00 16.00 Height (feet) 1.00 0.00 0.00 1.00
#3	Secondary	598.00'	**Special & User-Defined** Head (feet) 0.00 1.00 Disch. (cfs) 0.000 500.000

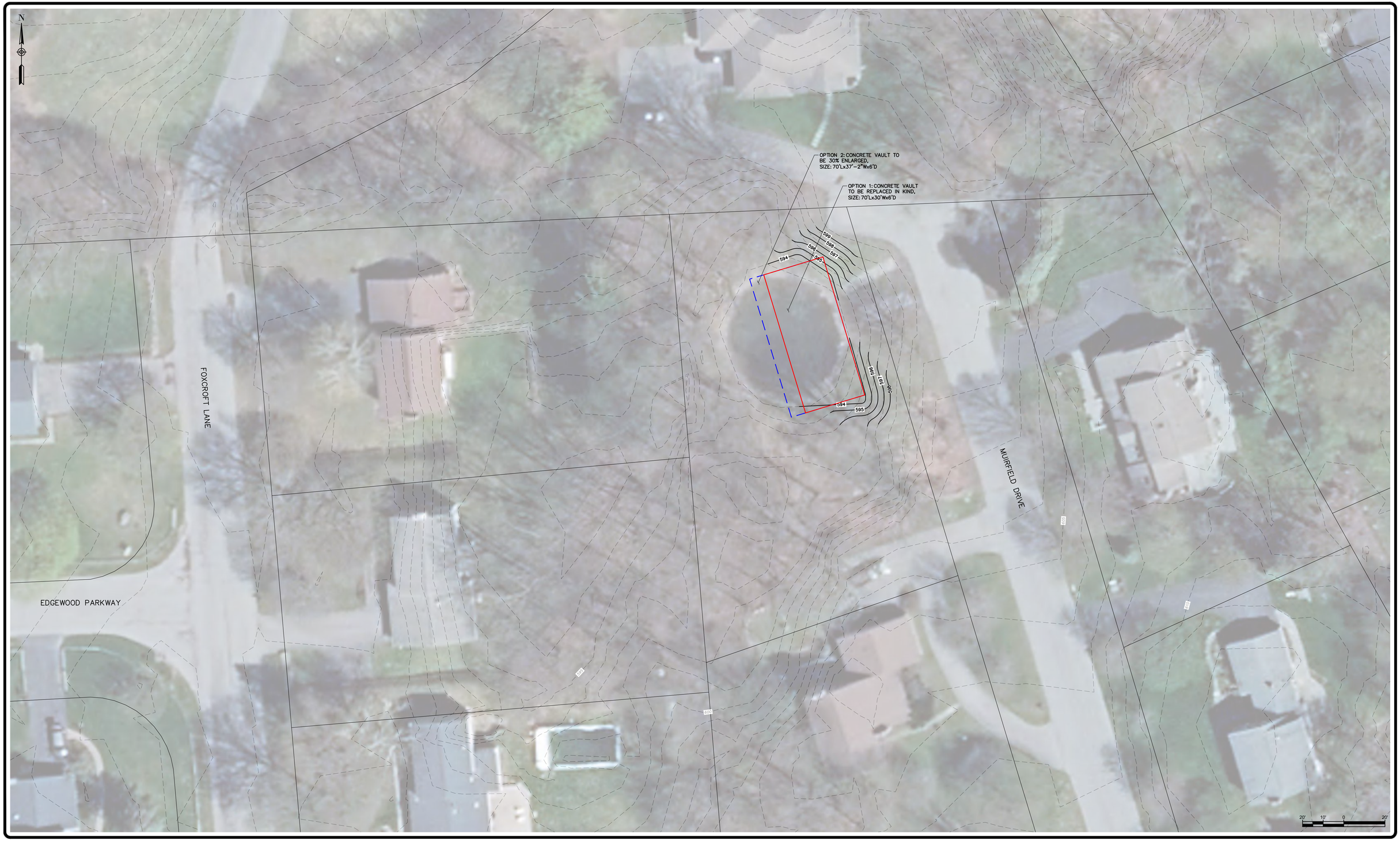
Discarded OutFlow Max=31.41 cfs @ 12.10 hrs HW=598.29' (Free Discharge)
└─**1=Exfiltration** (Controls 31.41 cfs)

Primary OutFlow Max=27.44 cfs @ 12.10 hrs HW=598.29' TW=596.15' (Dynamic Tailwater)
└─**2=Asymmetrical Weir** (Weir Controls 27.44 cfs @ 2.35 fps)

Secondary OutFlow Max=146.09 cfs @ 12.10 hrs HW=598.29' TW=596.15' (Dynamic Tailwater)
└─**3=Special & User-Defined** (Custom Controls 146.09 cfs)

Appendix I

Concept Plan



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Engineering and Land Surveying, P.C.
1533 Crescent Road - Clifton Park, NY 12065

MUIRFIELD DRIVE DRAINAGE STUDY

MUIRFIELD DRIVE RETENTION SYSTEM
OPTION 1 & 2 PLAN

TOWN OF MANLIUS NEW YORK

SCALE: AS SHOWN
CONTRACT No.: N.A.
MJ PROJ. No.: 1456.07
DATE: FEB. 3, 2023

FIG 2

File Name: C:\Users\aborza\AppData\Local\Temp\AcPublish_29172\MJ1456.07_XENG.dwg (Layout: FIG 2)
Date: Wed, Mar 15, 2023 - 5:54 PM (Name: aborza)

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MUIRFIELD DRIVE DRAINAGE STUDY

MUIRFIELD DRIVE RETENTION SYSTEM
OPTION 3 PLAN

TOWN OF MANLIUS NEW YORK

SCALE: AS SHOWN
CONTRACT No.: N.A.
MJ PROJ. No.: 1456.07
DATE: FEB. 3, 2023

FIG 3

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MUIRFIELD DRIVE DRAINAGE STUDY

MUIRFIELD DRIVE RETENTION SYSTEM OPTION 4 PLAN

TOWN OF MANLIUS NEW YORK

SCALE: AS SHOWN
CONTRACT No.: N.A.
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FIG 4

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Appendix J

Site Estimate

TOWN OF MANLIUS
MUIRFIELD DRIVE DRAINAGE IMPROVEMENTS ASSESSMENT

MJ Project Number:
1456.07

Preliminary Cost Estimate

MJ Engineering & Land Surveying, P.C.
1533 Crescent Road
Clifton Park, NY 12065

Engineering and
Land Surveying, P.C.

March 16, 2023

TOWN OF MANLIUS

MUIRFIELD DRIVE DRAINAGE IMPROVEMENTS ASSESSMENT

Preliminary Cost Estimate: Summary Sheet

March 2023

Description		Total Cost Option 1	Total Cost Option 2	Total Cost Option 3	Total Cost Option 4
Construction Costs		$81,050	$135,500	$29,550	$187,575
General Conditions	10%	$8,105	$13,550	$2,955	$18,758
Overhead & Profit	10%	$8,916	$14,905	$3,251	$20,633
Design Contingency	20%	$19,614	$32,791	$7,151	$45,393
Bid Contingency	5%	$5,884	$9,837	$2,145	$13,618
Escalation*	3.5%	$4,325	$7,230	$1,577	$10,009
Design & Construction Services	12%	$15,347	$25,658	$1,632	$35,518
Total Project Cost		**$143,241**	**$239,471**	**$48,261**	**$331,504**

Note: These costs are subject to change based of further engineering and design.

* Escalation assumed at 0.25 per month til May 2024

TOWN OF MANLIUS

MUIRFIELD DRIVE DRAINAGE IMPROVEMENTS ASSESSMENT

Preliminary Cost Estimate: Flooding Mitigation Option 1

March 2023

Item / Description	Quantity	Units	Material		Labor		Total	
			Rate	Amount	Rate	Amount	Rate	Amount
Clearing and Grubbing	6000	SF	$0.20	$1,200.00	$0.25	$1,500.00	$0.45	$2,700.00
Unclassified Excavation and Disposal	195	CY	$30.00	$5,850.00	$20.00	$3,900.00	$50.00	$9,750.00
Remove Existig Vault	1	LS	$0.00	$0.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00
Proposed Vault (Replaced in Kind)	1	LS	$20,000.00	$20,000.00	$20,000.00	$20,000.00	$40,000.00	$40,000.00
Grading	6000	SF	$0.25	$1,500.00	$0.35	$2,100.00	$0.60	$3,600.00
Landscaping & Site Restoration	1	LS	$3,000.00	$3,000.00	$2,000.00	$2,000.00	$5,000.00	$5,000.00
Work Zone Traffic Control	1	LS	$2,000.00	$2,000.00	$3,000.00	$3,000.00	$5,000.00	$5,000.00
							subtotal	***$81,050.00***

Note: These costs are subject to change based of further engineering and design.

TOWN OF MANLIUS

MUIRFIELD DRIVE DRAINAGE IMPROVEMENTS ASSESSMENT

Preliminary Cost Estimate: Flooding Mitigation Option 2

March 2023

Item / Description	Quantity	Units	Material		Labor		Total	
			Rate	Amount	Rate	Amount	Rate	Amount
Clearing and Grubbing	10000	SF	$0.20	$2,000.00	$0.25	$2,500.00	$0.45	$4,500.00
Unclassified Excavation and Disposal	550	CY	$30.00	$16,500.00	$20.00	$11,000.00	$50.00	$27,500.00
Remove Existig Vault	1	LS	$0.00	$0.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00
Proposed Vault (30% Increase in Size)	1	LS	$35,000.00	$35,000.00	$35,000.00	$35,000.00	$70,000.00	$70,000.00
Grading	10000	SF	$0.25	$2,500.00	$0.35	$3,500.00	$0.60	$6,000.00
Landscaping & Site Restoration	1	LS	$4,500.00	$4,500.00	$3,000.00	$3,000.00	$7,500.00	$7,500.00
Work Zone Traffic Control	1	LS	$2,000.00	$2,000.00	$3,000.00	$3,000.00	$5,000.00	$5,000.00
							subtotal	***$135,500.00***

Note: These costs are subject to change based of further engineering and design.

TOWN OF MANLIUS

MUIRFIELD DRIVE DRAINAGE IMPROVEMENTS ASSESSMENT

Preliminary Cost Estimate: Flooding Mitigation Option 3

March 2023

Item / Description	Quantity	Units	Material		Labor		Total	
			Rate	Amount	Rate	Amount	Rate	Amount
Clearing and Grubbing	6000	SF	$0.20	$1,200.00	$0.25	$1,500.00	$0.45	$2,700.00
Unclassified Excavation and Disposal	275	CY	$30.00	$8,250.00	$20.00	$5,500.00	$50.00	$13,750.00
Grading	6000	SF	$0.25	$1,500.00	$0.35	$2,100.00	$0.60	$3,600.00
Landscaping & Site Restoration	1	LS	$2,500.00	$2,500.00	$1,500.00	$1,500.00	$4,000.00	$4,000.00
24" HDPE Pipe & Fittings (Including Excavation)	50	LF	$60.00	$3,000.00	$50.00	$2,500.00	$110.00	$5,500.00
							subtotal	***$29,550.00***

Note: These costs are subject to change based of further engineering and design.

TOWN OF MANLIUS

MUIRFIELD DRIVE DRAINAGE IMPROVEMENTS ASSESSMENT

Preliminary Cost Estimate: Flooding Mitigation Option 4

March 2023

Item / Description	Quantity	Units	Material		Labor		Total	
			Rate	Amount	Rate	Amount	Rate	Amount
Clearing and Grubbing	19000	SF	$0.20	$3,800.00	$0.25	$4,750.00	$0.45	$8,550.00
Unclassified Excavation and Disposal	800	CY	$30.00	$24,000.00	$20.00	$16,000.00	$50.00	$40,000.00
Remove Existig Vault	1	LS	$0.00	$0.00	$15,000.00	$15,000.00	$15,000.00	$15,000.00
Proposed Vault (30% Increase in Size)	1	LS	$35,000.00	$35,000.00	$35,000.00	$35,000.00	$70,000.00	$70,000.00
Grading	19000	SF	$0.25	$4,750.00	$0.35	$6,650.00	$0.60	$11,400.00
Landscaping & Site Restoration	1	LS	$8,000.00	$8,000.00	$4,000.00	$4,000.00	$12,000.00	$12,000.00
Fence & Gate	575	LF	$25.00	$14,375.00	$10.00	$5,750.00	$35.00	$20,125.00
24" HDPE Pipe & Fittings (Including Excavation)	50	LF	$60.00	$3,000.00	$50.00	$2,500.00	$110.00	$5,500.00
Work Zone Traffic Control	1	LS	$2,000.00	$2,000.00	$3,000.00	$3,000.00	$5,000.00	$5,000.00
							subtotal	***$187,575.00***

Note: These costs are subject to change based of further engineering and design.

Appendix K

Statewide Assessment of Karst Aquifers in New York

Prepared in cooperation with the New York State Department of Environmental Conservation

Statewide Assessment of Karst Aquifers in New York With an Inventory of Closed-Depression and Focused-Recharge Features

Scientific Investigations Report 2020–5030

U.S. Department of the Interior
U.S. Geological Survey

Cover. Front. Entrance to Schoharie Caverns in Schoharie County, New York. Entrance is in the Manlius Limestone near the top of a steep slope. The spring at the cave opening is perched high above nearby creek.

Back. Photograph of a cave passage from McFail's Cave. Photograph by Art Palmer, professor emeritus, State University of New York at Oneonta, New York.

Statewide Assessment of Karst Aquifers in New York With an Inventory of Closed-Depression and Focused-Recharge Features

By William M. Kappel, James E. Reddy, and Jonathan C. Root

Prepared in cooperation with the New York State Department of Environmental Conservation

Scientific Investigations Report 2020–5030

U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
DAVID BERNHARDT, Secretary

U.S. Geological Survey
James F. Reilly II, Director

U.S. Geological Survey, Reston, Virginia: 2020

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Data associated with this publication:
Reddy, J.E., Kappel, W.M., and Root, J.C., 2020, Data for statewide assessment of New York's karst aquifers with an inventory of closed-depression and focused-recharge features: U.S. Geological Survey data release, https://doi.org/10.5066/P9HGN5IJ.

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The New York State Department of Health and individual county health departments provided information on numerous contamination events that were in karst areas. In a similar fashion, the New York State soil and water conservation districts provided data to assist in identifying where contamination issues in karst has occurred across the State.

The authors acknowledge Art Palmer, professor emeritus at State University of New York at Oneonta, who has shared his extensive knowledge of karst both in eastern New York and internationally. Thom Engel, trustee of the Northeastern Cave Conservancy and board member of the National Speleological Society, also shared his extensive knowledge of New York caves and karst. Albert Ash of the New York State Department of Environmental Conservation provided geographic information system (GIS) coverages of closed depressions from several counties in eastern New York. Paul Rubin of HydroQuest shared his knowledge of cave research in eastern and southeastern New York.

The authors also thank numerous local government agencies, public institutions, and individuals who shared their knowledge of specific karst features or information about such features from their office or personal files. Without these sources, illustrating the effects of karst on local and regional environmental scales throughout New York State would have been difficult.

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Conversion Factors

U.S. customary units to International System of Units

Multiply	By	To obtain
inch (in.)	2.54	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
yard (yd)	0.9144	meter (m)
acre	0.4047	hectare (ha)
square mile (mi^2)	2.590	square kilometer (km^2)
gallon (gal)	3.785	liter (L)

International System of Units to U.S. customary units

Multiply	By	To obtain
centimeter (cm)	0.3937	inch (in.)
meter (m)	3.281	foot (ft)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$°F = (1.8 \times °C) + 32.$$

Datum

Vertical coordinate information is referenced to the North American Vertical Datum of 1988 (NAVD 88).

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Elevation, as used in this report, refers to distance above the vertical datum.

Abbreviations

DEM	digital elevation model
DRG	digital raster graphic
E. coli	*Escherichia coli*
GIS	geographic information system
gSSURGO	gridded Soil Survey Geographic database
lidar	light detection and ranging
NHD	National Hydrography Dataset
NLCD	National Land Cover Database
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
SSURGO	Soil Survey Geographic database
TCE	trichloroethene
USGS	U.S. Geological Survey

Statewide Assessment of Karst Aquifers in New York With an Inventory of Closed-Depression and Focused-Recharge Features

By William M. Kappel, James E. Reddy, and Jonathan C. Root

Abstract

Karst is a landscape formed from the dissolution of soluble rock or rock containing minerals that are easily dissolved from within the rock. The landscape is characterized by sinkholes, caves, losing streams, springs, and underground drainage systems, which rapidly move water through the karst. The two forms of karst in New York State include carbonate karst, which forms in carbonate rock (limestone, marble, and dolostone), and evaporite karst, which forms in rock that contains the evaporite minerals gypsum and halite.

Past and recent studies of karst across the State have shown that areas of focused recharge in karstic carbonate rock allow contaminants to enter aquifer systems with little attenuation. Focused areas of recharge need to be identified to help prevent such contamination from sources on or adjacent to the karst. The New York State Departments of Environmental Conservation and Health are collaborating with the agricultural community to make farmers and farm-planning advisors more aware of karst and how to manage daily farming activities to reduce their impact on surface water and groundwater resources, especially in karst areas. There is also a need to make regulators, planners, and the general public aware of New York's karst resources and to properly protect and manage these resources to protect the quality of groundwater and surface water that can flow into, through, and from karst bedrock.

Using publicly available geospatial data, karst bedrock and closed depressions over or near karst rock were identified across New York. Carbonate, evaporite, and marble geologic units were selected from a statewide 1:250,000-scale bedrock geology dataset. The selected geologic units were intersected with 7.5-minute quadrangle maps to define the study area.

The U.S. Geological Survey has compiled an inventory of closed depressions from statewide digital contour data, scanned 7.5-minute topographic maps known as a digital raster graphics, and light detection and ranging (lidar) digital elevation models. Analysis of the data resulted in the identification of 5,023 closed depressions statewide. The inventory was conducted to eliminate duplication of results from analysis of the three data sources. A series of overlay analyses was conducted using the closed depressions and thematic data known to be key factors in determining the probability of a closed depression contributing to focused groundwater recharge; the thematic data include bedrock geology, soil type, soil infiltration rate, and land cover.

Though the extent of karst development is important in understanding the interaction between surface water and groundwater in karst terrains, some of the worst cases of groundwater contamination in karst can occur where only minor karst features might be present. The presence of karst—be it a short section of a solutioned fracture or an extensive cave system—requires careful consideration, forward-looking environmental planning, and consistent water-quality protection to preserve New York State's water resources.

Introduction

The New York State Department of Environmental Conservation (NYSDEC) and Department of Health (NYSDOH) are concerned about **groundwater**[1] contamination in the karst **aquifers** of New York State (fig. 1), especially relating to the unintended introduction of industrial contaminants (such as volatile organic compounds [VOCs]) or agricultural contaminants (such as liquid manure; Reddy and Kappel, 2010). The NYSDEC and NYSDOH have started collaborating with the agricultural community to make farmers and farm-planning advisors more aware of karst and how to manage daily farming activities to reduce their impact on surface water and groundwater resources, especially in karst areas. To this end, the U.S. Geological Survey (USGS) has compiled an inventory of closed depressions from statewide digital contour data, scanned 7.5-minute topographic maps known as a digital raster graphics, and light detection and ranging (lidar) digital elevation models. This report provides information on the location of karst bedrock and associated closed depressions

[1]Words that appear in bold typeface are defined in the glossary of this report.

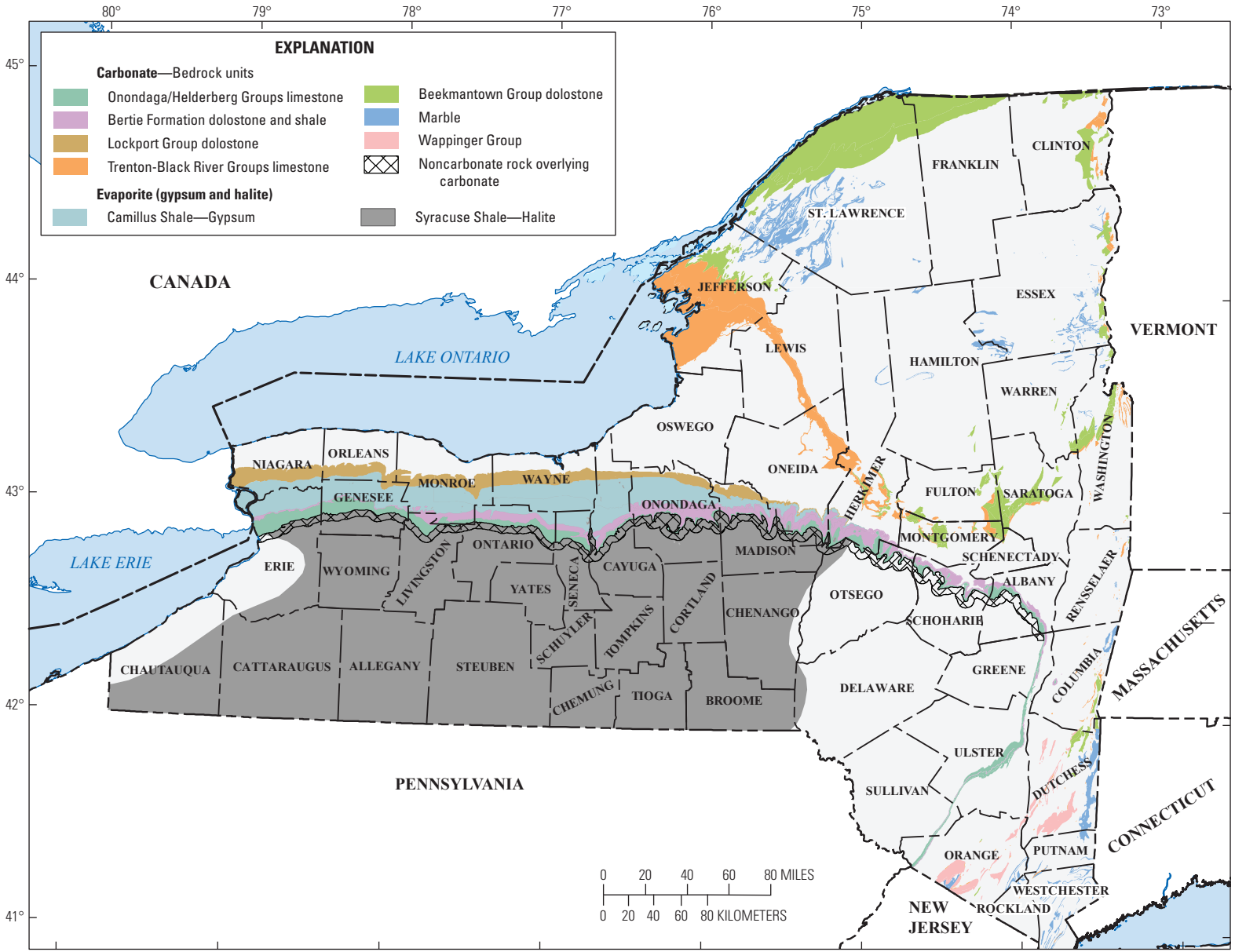


Figure 1. Major geologic units in which karst may be developed in New York State.

that focus surface water recharge to groundwater in karst areas across New York. The report also provides examples of why it is important to carefully manage and protect this resource.

Karst development (**karstification**) forms highly **permeable** bedrock aquifers that transmit and yield water from solution-enlarged fractures, **bedding planes**, and other openings (Olcott, 1995). Karst is a landscape formed from the dissolution of soluble rock or rocks that contain minerals that are easily dissolved from within the rock. The landscape is characterized by **sinkholes**, **caves**, losing streams, **springs**, and underground drainage systems, which rapidly move water through the karst. The two most common types are karst that forms in **carbonate** rock, such as **limestone**, **marble**, and **dolostone** (carbonate karst), and karst that forms in rock that contains evaporite minerals, such as **gypsum** or halite (evaporite karst).

The potential for focused recharge in karst (figs. 2 through 5) is greatest where the rocks crop out at or near land surface and where **closed depressions** at the land surface can focus infiltration of surface-water runoff into the aquifer. Karst aquifers are recharged by direct infiltration of precipitation that falls on the karst landscape and by infiltration of surface runoff at closed depressions, sinkholes, and **swallets**. Surface runoff may include runoff from adjacent lowlands underlain by glaciolacustrine deposits or shale-bedrock uplands that are mantled with glacial till.

Evaporite deposits of gypsum and halite associated with some shales are the most soluble of the common rock types with solubilities at standard temperature (20 degrees Celsius) and atmospheric pressure (1 bar) of 2.5 grams per liter (g/L) for gypsum and 360 g/L for halite. Karst features similar to those present in carbonate rock can develop in these evaporite deposits. The solubility of carbonate bedrock is 0.39 g/L for dolostone and 0.0062 g/L for limestone, making the rocks relatively insoluble in relation to evaporite deposits. A major difference between carbonate- and evaporite-rock karst is the time it takes for karst features to develop. Karst in carbonate rock develops over years, decades, or centuries, but karst in evaporite rock can develop over days, weeks, or years (Johnson, 2007). Gypsum deposits are more common than halite deposits and represent most evaporite-type karst in the United States (Dean and Johnson, 1989; Johnson, 2003). The solutioning of gypsum, where gypsum crops out at land surface or is within 100 feet (ft) of the land surface, can form karst features, but halite rarely appears at or near the land surface because it usually is dissolved at depths ranging from tens to hundreds of feet below the land surface (Johnson, 2007). Karst development in the carbonate rock of New York State is dependent on the rock type (limestone versus dolostone), rock structure (bedding dip and fracturing), and potential for focused recharge. Karst can develop in carbonate rock at any depth where favorable conditions are present and as long as there is a continuity of flow from where water enters and eventually exits the soluble rock.

A

B

Figure 2. A small sinkhole in Genesee County, New York, *A*, with a small stream disappearing into it (a swallet) and *B*, in early spring. As snowmelt runoff exceeded the swallet capacity, the area flooded, and an ice sheet formed. When runoff ceased and all water drained into the swallet, the unsupported ice cover collapsed into it. Photographs courtesy of Paul Richards, State University of New York at Brockport.

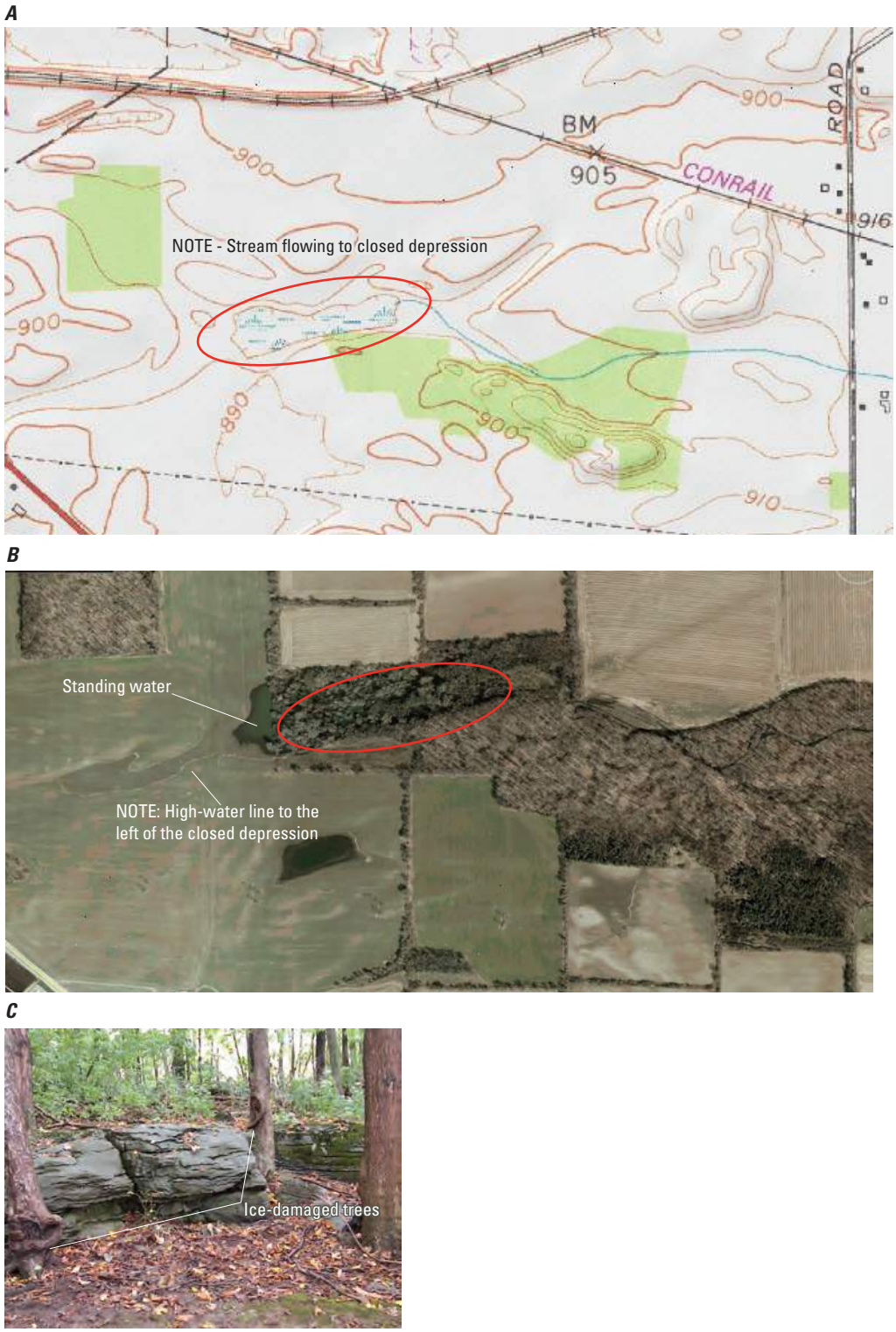


Figure 3. A closed depression near Batavia, Genesee County, New York, from *A*, a part of a 1:24,000-scale topographic map and *B*, a Google Earth image showing a closed depression (red ellipse) and *C*, the interior of the closed depression where surface water infiltrates into the Onondaga Limestone. The high-water line is shown to the left of the wooded area and standing water adjacent to the woods. Tree 'scars' (*C*) appear where ice formed when the depression was filled with water and the ice damaged the bark layer of several trees.

Figure 4. Karst bedrock features in Madison County, New York. *A*, Google Earth image of the fractured bedrock surface at a limestone quarry north of Perryville, New York; quarry floor is in the shadow left of the fractured bedrock surface. *B*, Dry streambed in carbonate bedrock; the streamflow disappears into the bedrock upstream from this location. *C*, Karren pavement with trees growing between fractured and solutioned carbonate bedrock.

Figure 5. Swallet entrance to McFails Cave in Schoharie County, New York, during *A*, the dry season and *B*, a 50-year flood discharge in January 1996; photographs courtesy of Art Palmer, professor emeritus, State University of New York at Oneonta.

Contamination in Karst

The karst landscape creates a situation where surface water and any contamination source can rapidly move from the land surface to an underlying aquifer. These contaminants, after entering the aquifer, can move rapidly with groundwater from areas of focused recharge to points of discharge and to any other intermediary location where groundwater is withdrawn, such as a water-supply well.

Karst aquifers are susceptible to contamination beneath urban areas from varied contaminant sources, including septic-tank effluent, runoff containing metals, oil and grease, solid and liquid wastes, and accidental or intentional dumping of chemical wastes by industrial facilities and homeowners (Veni and others, 2001). Karst aquifers in New York have been contaminated by unintended or improper chemical disposal or spills of contaminants such as petroleum products or trichloroethene (TCE) and its breakdown residuals. These contaminants, dependent on their nature, can readily move into karst aquifers to cause short- or long-term water-quality issues in regional aquifer systems (fig. 6). The age and degree of dissolution in karst bedrock can also lead to land-surface **subsidence** and infrastructure issues (leaking pipelines and storage tanks or damaged septic systems resulting from subsidence) in rural and urban settings which, in turn, might also affect local and regional water quality.

In rural and agricultural areas, karst aquifers are also subject to environmental degradation from a variety of sources, including natural and chemical fertilizers, pesticides, and herbicides, along with their breakdown products (Veni and others, 2001). In New York, groundwater contamination from liquid manure applications and resulting water-quality issues, such as fecal coliform bacteria (*Escherichia coli* [*E. coli*]) and nitrate, were increasing in the early 2000s, and contamination incidents were reported to the NYSDEC (Reddy and

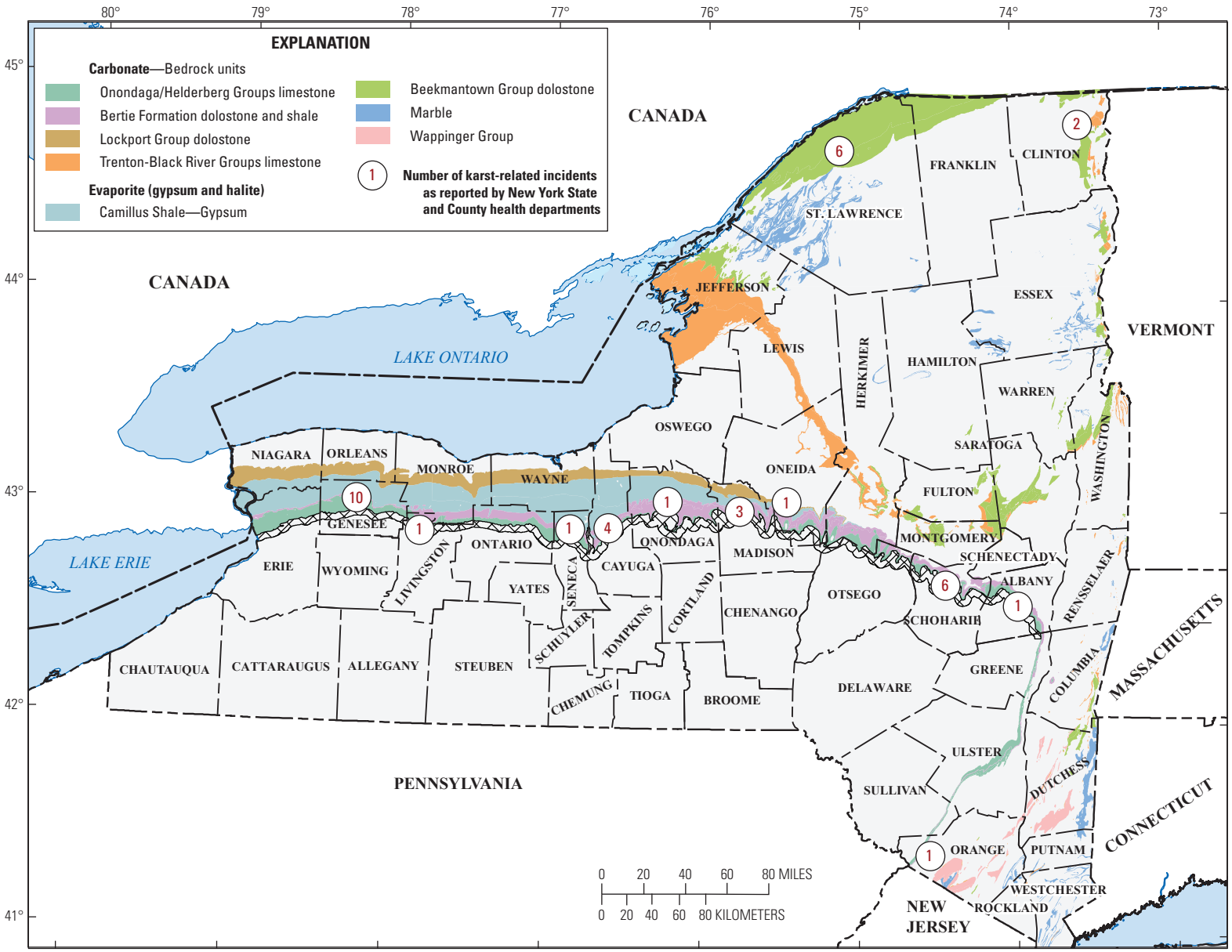


Figure 6. Contamination issues in karst areas in New York, by county, as reported by the New York State Department of Health and county health departments between 2000 and 2016.

Kappel, 2010). Nitrate from fertilizer is highly soluble in water and thus can move readily through the soil and enter the groundwater system. *E. coli* bacteria are not water soluble, but because of their small size, they can move through larger soil pores and into bedrock fractures, especially solution-widened fractures in the **karstic** rock. The high water content and organic nature of liquid manure may enhance movement of some contaminants under certain meteorological and soil conditions. As these rural contamination issues were being reported, the use of bacterial source tracking—using DNA "fingerprints" to determine the source(s) of *E. coli* pollution—identified or ruled out certain bacterial sources, allowing watershed management decisions that are better informed.

New York Bedrock as Affected by Karst and Glacial Processes in New York State

Karstification in New York State is highly variable because of the type of bedrock present; how the bedrock has been affected by tectonic, glacial, and other geological forces; the amount of water that moves through the karst aquifer (focused recharge); the topographic position of the rock; and how long the dissolution process has been active. Most of the bedrock in New York has little in the way of primary permeability and **porosity**—that is, water cannot easily move through or be stored in the bedrock matrix. Secondary permeability in the form of bedrock joints and other fractures was created by continental tectonic forces and stress relief including the loading and unloading of glacial ice. Weathering and dissolution of bedrock fractures in carbonate and evaporite bedrock increase the amount of water moving through the fracture system, which further enhances water movement, widens and lengthens openings, and increases permeability (sometimes termed tertiary permeability) and storage, (Ford and Williams, 2007; Kresic, 2007). In the short term, these processes can create simple, localized recharge to and discharge from a fracture or set of connected fractures over several hundreds or thousands of feet. In the long-term, these processes can create complex regional **conduit** and **cave systems** that can extend in three dimensions throughout a carbonate bedrock sequence over many square miles. How these systems develop can mean the difference between diffuse flow systems that may be seasonally unaffected by individual precipitation events and systems that may, under focused-recharge conditions, rapidly transmit surface water to groundwater and then rapidly allow groundwater to reappear as surface water at a downgradient discharge location.

Although the extent of karst development is important for understanding the surface water–groundwater interaction in a karst terrain, "the number of karst features has little to do with the problems of groundwater flow and contamination in karst. In fact, sparse karst can give a false security. Some of the worst cases of groundwater contamination are in carbonates with only minor karst features" (Art Palmer, professor emeritus, State University of New York at Oneonta, written commun., 2016).

Karst Hydrology: New York Examples

Rapid changes in groundwater levels in karst aquifers highlight the hydraulic effect of focused recharge. For example, in Livingston County in western New York, there are two groundwater wells (LV county designation) about 3 miles (mi) distant from each other, and water-level changes are monitored as part of the statewide groundwater level cooperative monitoring program between the NYSDEC and the USGS. These two wells (U.S. Geological Survey, 2015) are near Caledonia (fig. 7); one well monitors the groundwater level in a surficial sand and gravel aquifer (well LV 330; USGS site number 425833077503901) and the other monitors the groundwater level in the underlying Onondaga Limestone, a karstic bedrock aquifer (well LV 333; USGS site number 425844077532901).

The water levels in the two wells both react to individual precipitation events, but the magnitude of reaction is quite different. The water level in well LV 330 changed only about 0.3 ft between summer and fall 2016, following a summer-long drought and subsequent average amounts of autumn precipitation and recharge. On the other hand, the water-level change in well LV 333 was about 12 ft during the same period (fig. 7). Following one precipitation event in which about 2 inches (in.) of precipitation fell on October 21, 2016, the water level in well LV 330 rose by about 0.20 ft during the following few days, whereas the water level in well LV 333 rose by more than 11 ft and then declined rapidly by more than 3 ft the following day. Knowing how and where water moves into and out of a karst aquifer system is important, as was demonstrated in this example case: the Onondaga Limestone, like many karst aquifers, has limited storage capacity but can rapidly transmit water through bedrock solution-enhanced fractures.

In this same area, the effects of water moving through karst can be seen by comparing two aerial images of a closed depression at a nearby golf course just east of LeRoy and west of Caledonia (fig. 8). In figure 8*A,* there is a slight trace of a dry streambed and several small sinkholes in the upper photograph, but in figure 8*B*, the same closed depression is filled with water with a high-water outlet at the upper (northern) end of the pond. Water filled this depression from both surface runoff from the upgradient shale bedrock watershed (which is termed **allogenic recharge**) as well as groundwater flowing in bedrock fractures that filled then overflowed the fractures to create the standing water body. Reportedly from groundskeepers at the golf course, in most cases, this closed depression fills and drains within a few days.

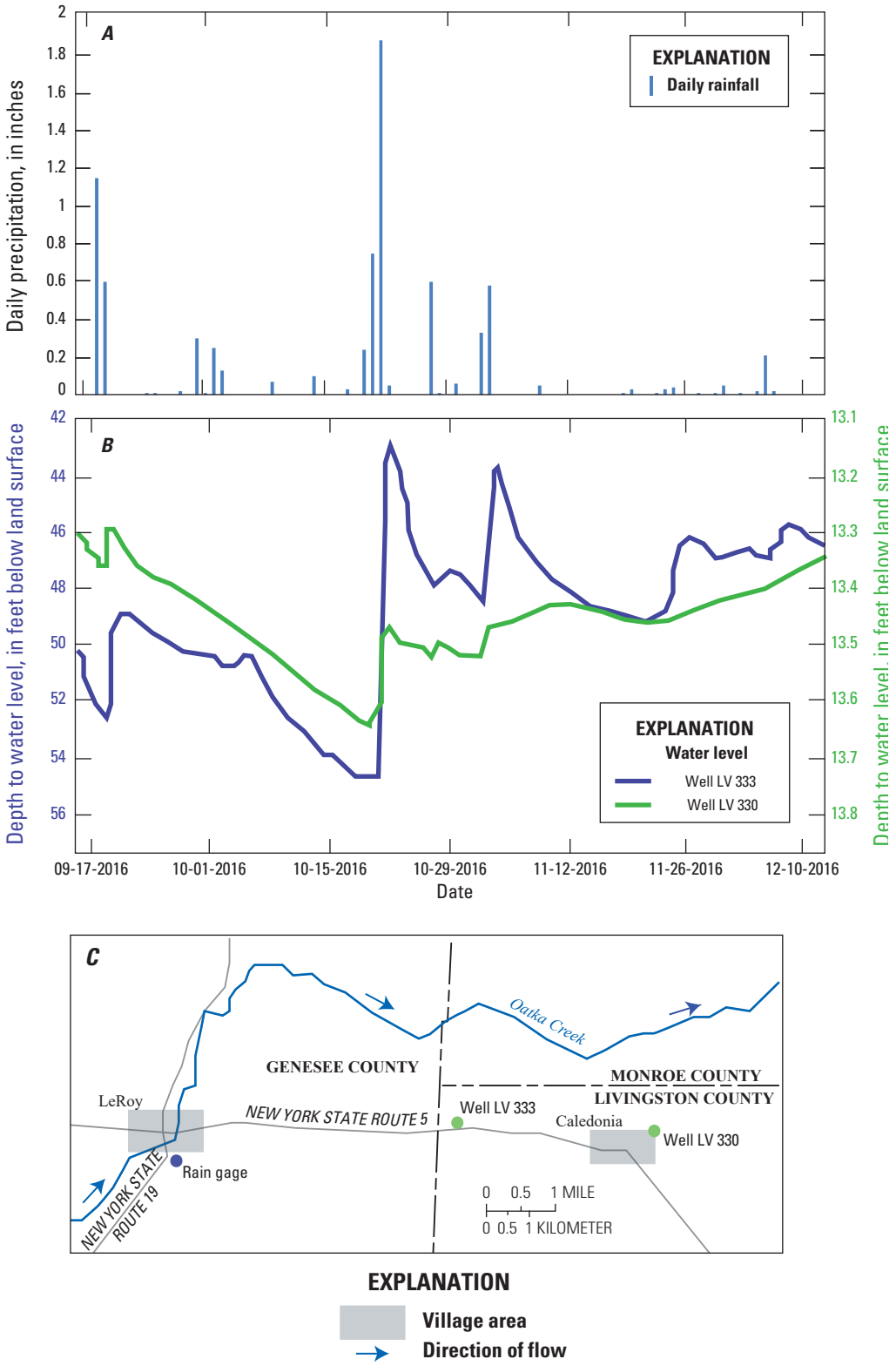


Figure 7. Comparison of two well hydrographs and local rainfall between mid-September and mid-December 2016 in western New York. *A*, Precipitation in LeRoy; *B*, water-level fluctuations at well LV 330 in an unconsolidated sand and gravel aquifer (green line) and well LV 333 in the Onondaga Limestone bedrock aquifer (blue line); *C*, location map for wells LV 330 and LV 333 and LeRoy. Note difference in water-level elevation scales for the two wells.

A similar karst situation occurs further east, near Marcellus in Onondaga County, at the locally so-called "Disappearing Lake." The closed depression is dry in September (fig. 9*A*) but filled with water in June (fig. 9*B*) with allogenic recharge from the surrounding steep shale hillsides and the interaction with the underlying karst aquifer (Proett, 1978; van der Hoorne, 2010). There are several small exposures of bedrock on the floor of the depression that can only receive or discharge a certain amount of water to or from the underlying carbonate aquifer. The lake feature may take months to drain but, dependent on local precipitation patterns and **water table** elevations, this flow can rapidly exceed the ability of the bedrock fractures to accept surface water to the groundwater system or discharge groundwater to the land surface

Near the City of Watertown in Jefferson County in northern New York, a holding pond for surface-water runoff was built over the Black River Limestone (fig. 10). The construction drawings clearly show the pond being constructed between several closed depressions, avoiding what could have been subsidence caused by minor sinkhole development or soil being removed by the fluctuating groundwater levels in the limestone bedrock below the clay. The pond functioned as designed for a number of years but then catastrophically failed, draining part of the volume of the pond. A dike was built to isolate the leak and, upon clearing the clay soil from the floor of the pond, a fracture in the limestone bedrock (fig. 10*A*) and a small solution-enlarged hole along the bedrock fracture were present where the water had drained into the limestone bedrock (fig. 10*B*). The hole was sealed, the clay replaced and consolidated, and the pond now functions as designed. Reviewing the location of the closed depressions, the orientation of bedrock fractures in the nearby channel of the Black River (fig. 10*C*), and the joint in the partly drained pond reveal that the fracture orientation extends through two of the closed depressions on either side of the holding pond.

Although the exact cause of the leak is still undetermined, the continuous saturation of the clay over the bedrock feature may have weakened the clay, while the fluctuating water table may have removed the clay from below, making the surface-water-to-groundwater connection. Additionally, several months before the failure, an earthquake occurred to the east in the Adirondack Mountain region. This earthquake may have affected the bedrock fracture and the overlying clay, causing the leak to slowly increase to the point that the clay seal failed and the pond partly drained.

A. **September 2013**

B. **March 2010**

Figure 8. A closed depression (sinkhole-swallet) in Onondaga Limestone at the LeRoy Country Club in LeRoy, Genesee County, New York, in *A*, March 2010 and *B*, September 2013. Surface water contributed from a shale bedrock watershed to the south of this view. In March 2010, the depression was filled with surface-water runoff and had a karst water table above land surface, whereas in September 2013, the karst water table was below land surface.

***A*. September 2009**

***B*. June 2011**

Figure 9. Disappearing Lake near Marcellus, Onondaga County, New York. *A*, Aerial image from September 2009, with no standing water in the closed depression; *B*, Aerial image from June 2011 following a wet spring season, where runoff from the surrounding shale hillsides has filled the closed depression and water is slowly draining into the underlying Onondaga Limestone.

A

B

C

Figure 10. Draining of a surface-water holding pond in Watertown, New York. *A*, Bedrock fracture found below approximately 6 feet of glacial clayey soil in which the holding pond was located; *B*, solutional opening along this fracture where surface water drained to groundwater; *C*, orientations of primary bedrock fractures in the Black River, southwest of the holding pond and east of the New York State Route 12 bridge in Watertown.

Karst in Bedrock of New York State

In New York State, karst is present in a number of bedrock lithologies (limestone, marble, dolostone, and shale with evaporite deposits; table 1.1) and is also dependent on the structure of and within the rock (strike and dip of the rock and the presence of joints, fractures, faults, and bedding planes within the rock mass). Karst develops in either gently dipping west-to-east oriented bands in western and central New York or in steeply dipping beds or isolated exposures in southeastern New York. Weary (2008) characterizes New York's carbonate karst into two major groups, each with a subgroup based on glacial-cover thickness.

The first group of bedrock consists of gently folded and flat-lying carbonate rocks that have not been strongly deformed. One subclass of this group is thinly covered with glacial material and the other subclass has thick (more than 50-ft) unconsolidated glacial materials that tend to obscure karst land-surface features. In this group, where the carbonate-rocks are thick and extensive, cave systems may be long and complex. Where the carbonates are thin and interbedded with noncarbonates, caves are small and short (Weary, 2008). Palmer (1991) indicates that the geometry of caves that follow stratigraphic and bedding planes form meandering branchwork (stream-like) caves and **passages**.

The second group of karst bedrock is composed of folded and faulted carbonate rocks flanking structural deformation zones that may be intensely folded, jointed, and faulted. Caves can be small and simple or long and complex (Weary, 2008). Palmer (1991) indicates that cave patterns in this group show structural control and form networked (angular grid- or road-like) cave patterns as well as vertical connections to the land surface. Here, too, where the glacial deposits are thick (more than 50 ft), the karst features typically are not apparent at land surface.

Cooper and Mylroie (2015) described the geologic age and location of karst bedrock in New York (fig. 1; table 1) as

- Precambrian Grenville Complex marble in the Adirondack Mountain region;
- Precambrian, Cambrian, and Ordovician marble in eastern New York (Wappinger and Chazy Groups);
- Cambrian and Ordovician limestone in northern New York lowlands and the Mohawk Valley (Trenton Group, Black River Group, and Beekmantown Group);
- Silurian and Devonian limestone and dolostone in nearly flat-lying beds from western to east-central New York (Onondaga Limestone, Helderberg Group, and Lockport Group), and within gypsum- and halite-bearing shale (Salina Group) in western to central New York. Other carbonate beds are present in the Silurian and Devonian sequence and can be karstic locally (such as the Manlius, Coeymans, Rondout, and Tully Limestones and the Akron-Bertie Dolostone), but they are not highlighted here because they are generally associated with the previously mentioned bedrock units.
- Silurian and Devonian limestone and dolostone in structurally deformed and steeply dipping beds along the western side of the Hudson River Valley in eastern New York (Onondaga Limestone and Helderberg Group).

All bedrock in New York has been affected to various degrees through geologic time by continental movement (plate tectonics) and the associated structural deformation including folding, fracturing, and faulting. In an extreme case in the lower Hudson River Valley, bedrock strata have been deformed from a horizontal to a nearly vertical orientation (fig. 11*A*). The Adirondack Mountain dome continues to rise to this day, slowly deforming the sedimentary bedrock that surrounds it.

During the past 2.6 million years, bedrock in New York State has been subjected to periods of continental glaciation (Fullerton, 1980) and intervening periods of erosion and deposition by fluvial processes. During and following each glacial period (1) the bedrock surface was reshaped, (2) surface-water and groundwater drainage patterns were modified, locally and regionally, (3) internal drainage through dissolution of carbonate rock or evaporite deposits was enhanced, and (4) internal bedrock flow and storage were increased, developing secondary and tertiary permeability and porosity. Dependent on the age and degree of karst development, surface water and groundwater interaction in karst has been affected by both glacial and interglacial dissolution processes. For example, some caves predate the most recent glacial episode (Wisconsinan) and were partially filled with glacial sediments that were subsequently re-excavated (fig. 12). Continued dissolution of karstic bedrock today further develops karst systems and highlights the need to understand and protect karst-aquifer water resources in New York State.

The carbonate and evaporite bedrock units in New York have undergone various degrees of karst development, from recent dissolution that may only extend several hundred feet within carbonate bedrock to long-term (several tens to hundreds of thousands of years) development of large karst-aquifers that evolved into interconnected cave systems that extend over many square miles. In some places, the karst bedrock is overlain by unconsolidated deposits and bedrock that may be in hydraulic contact with the underlying karstic bedrock, termed **subjacent karst.** Adjacent and topographically higher nonkarst bedrock can also route surface water and groundwater into a nearby karst aquifer (allogenic recharge). These adjacent areas are part of the focused-recharge watershed of karst aquifers, even though they might not be types of bedrock in which karst would normally form in or flow through. Figures 8 and 9 are examples of shale uplands that drain to a karst feature.

Table 1. Stratigraphic column of New York State bedrock indicating those units in which karst features might be present

[Cells shaded in blue indicate formations prone to carbonate karst development; cells shaded in green indicate formations somewhat prone to carbonate karst development; cells shaded in orange indicate formations somewhat prone to gypsum evaporite karst development; cells shaded in yellow indicate formations somewhat prone to halite or gypsum evaporite karst development; and cells not shaded indicate formations that do not have karst development]

Period	Epoch	Group or formation	Location of group in New York						Formation or member	Generalized lithology
			West	Central	East	Southeast	Champlain	St. Lawrence		
Devonian	Upper	Conewango	X						Cattaraugus	Shale and sandstone
		Conneaut	X						Ellicott/Chadakoin/Whitesville	Shale
		Canadaway	X	X					Gowanda/Dunkirk/Caneadea/Wellsville	Shale and sandstone
		West Falls-Java	X	X					Hanover/Wiscoy/Angola/Nunda/Rhinestreet	Shale; shale and sandstone
					X				Slide Mountain	Shale, sandstone, conglomerate
		Sonyea	X	X					Cashaqua/Middlesex/Rock Stream	Shale; shale and sandstone
				X	X				Glen Aubrey/Lower Walton	Shale and sandstone
		Genesee	X	X					West River/Penn Yan	Shale
			X	X	X				Geneseo/Ithaca/Oneonta	Shale and sandstone
	Middle	Tully Limestone		X					Tully	Limestone
		Hamilton			X				Ashokan/Manorkill	Shale and sandstone
			X	X	X				Moscow/Portland Point	Shale; limestone
					X				Cooperstown	Shale and sandstone
			X	X	X				Centerfield/Ludlowville/Skaneateles/Panther Mountain	Shale and limestone
			X	X	X				Marcellus (Union Springs-Oatka Creek)/ Mount Marion	Shale; shale and sandstone
		Onondaga Limestone	X	X	X	X			Onondaga	Limestone
	Lower	Tristates	X		X	X			Bois Blanc/Schoharie	Limestone; shale
					X	X			Esopus	Shale
				X	X	X			Oriskany/Glenerie	Sandstone; limestone
		Helderberg			X	X			Alsen/Port Ewen	Limestone; shale
					X	X			Becraft	Limestone
					X	X			Kalkberg/New Scotland	Limestone; shale
				X	X				Manlius/Coeymans	Limestone
				X	X				Chrysler/Rondout	Dolostone
Silurian	Upper	Salina	X	X	X				Akron/Cobleskill	Dolostone; limestone
			X	X	X				Bertie	Dolostone with gypsum
			X	X					Camillus	Shale, with gypsum
			X	X	X				Syracuse/Wawarsing/Poxono Island	Shale, with halite, limestone; shale
			X	X	X				Vernon/Bloomsburg	Shale, with halite and gypsum; shale and sandstone
		Lockport	X	X					Guelph/Eramosa/Sconondoa	Dolostone; limestone and dolostone
					X				Ilion/Shawangunk	Shale and dolostone; conglomerate and sandstone
			X	X					Goat Island/Gasport/Penfield/Sconondoa	Dolostone; limestone and dolostone
						X			Green Pond	Conglomerate
		Clinton	X	X	X				DeCew/Glenmark	Dolostone; shale
			X	X	X				Burleigh Hill/Rochester/Gates/Herkimer	Shale; dolomite and shale; sandstone
	Lower		X	X	X				Irondequoit/Thorold/Rockway/Dawes	Limestone and shale; sandstone; dolostone
						X			Green Pond	Conglomerate
		Medina	X						Grimsby/Kodak/Power Glen/Whirlpool	Sandstone; shale and siltstone; sandstone
Ordovician	Upper	Queenston Shale	X	X					Queenston	Shale
		Lorraine		X	X				Oswego/Pulaski/Frankfort	Sandstone and shale; sandstone and shale; shale and siltstone; shale
	Middle	Trenton		X	X				Hillier/Denley/Sugar River/Kings Falls/ Selby	Limestones
				X	X		X		Utica/Snake Hill/Stony Point	Shale; shale and siltstone
							X		Glens Falls/Orwell	Limestones
		Black River		X	X				Watertown/Lowville/Pamelia/Isle la Motte	Limestones
		Chazy					X		Valcour/Crown Point/Day Point	Limestones
	Lower	Beekmantown-Wappinger					X		Tribes Hill/Copake	Dolostone, limestone, and siltstone; limestone
						X			Copake/Rochdale/Halcyon Lake (Hudson Valley area)	Limestone; limestone and dolostone; dolostone and siltstone
Cambrian	Upper-Middle-Lower	Wappinger-Stockbridge				X			Briarcliff/Pine Plains (Hudson Valley area)	Dolostone; dolostone, sandstone, and shale
		New York City Group				X			Inwood	Marble
	Upper-Middle	Beekmantown			X				Tribes Hill/Little Falls/Hoyt/Galway	Dolostone; limestone; sandstone and dolostone
							X		Providence Island/Fort Ann/Great Meadows/ Whitehall/Galway	Limestone and dolostone; limestone, dolostone, siltstone; dolostone and sandstone
	Middle-Lower							X	Theresa	Dolostone, sandstone, and siltstone
								X	Potsdam	Sandstone

This table can be downloaded as a full-size PDF version at https://doi.org/10.3133/sir20205030.

A

B

Figure 11. Karst features in the Rondout Valley in Ulster County, New York: *A*, heavily jointed and fractured Onondaga Limestone (note near-vertical bedding orientation of the rock, typical for sedimentary bedrock west of the Hudson River), and *B*, roadside ditch draining into small sinkhole-swallet feature near Stone Ridge, New York. Photographs by Paul Heisig, U.S. Geological Survey.

Figure 12. Glacial-related features common in Schoharie Creek Valley caves. *A*, Varved glaciolacustrine clay near the floor of the cave likely deposited during the Wisconsinan glacial period; *B*, glacial boulders trapped in a cave passage. These features indicate the cave was present before and during the Wisconsinan glacial period. Photographs courtesy of Art Palmer, professor emeritus, State University of New York at Oneonta.

Western and Central New York

Most bedrock in western to east-central New York dips to the south at approximately 30 to 50 feet per mile. Zones of allogenic recharge have been identified in central and western New York, topographically upgradient and south of specific karst units, such as the Onondaga Limestone and Lockport Group. Because of glacial erosion and the dip of the regional bedrock, the Onondaga Limestone is typically at or near land surface at its northern extent, creating a bedrock escarpment (cliff). However, south of the escarpment the Onondaga Limestone is buried by progressively thicker glacial deposits—mostly till and glaciolacustrine fine sand, silt, and clay, but locally sand and gravel (Staubitz and Miller, 1987). The Onondaga Limestone is considered a karst aquifer because of the amount of karst development that has occurred along joints and other fractures and nearly horizontal bedding planes. The Onondaga Limestone has been characterized as a principal aquifer in New York, which is defined as "an aquifer known to be highly productive or whose geology suggests abundant potential water supply, but which is not intensively used currently as a source of water supply by major municipal systems" (New York State Department of Environmental Conservation, 2020).

In a similar fashion, the dolostone of the Lockport Group gently dips to the south and has a northern escarpment in western New York, but the escarpment is buried further to the east. At the Niagara escarpment, the bedrock is at land surface but further to the south, it is buried by thick glaciolacustrine silt and clay, especially in western New York (Kappel and Jennings, 2012). Owing to fine-grained sediment cover and the fact that the dolostone is not as easily solutioned as limestone (because dolostone, which is calcium magnesium carbonate, has different mineral characteristics compared with limestone, which is calcium carbonate), the Lockport Group is less likely to develop karst features. Some karst development in the form of sinkholes and springs has been documented in the Lockport Group but typically along bedding planes near the bedrock

surface (Yager and Kappel, 1987). Regionally, the Lockport aquifer system is generally confined to these bedding-plane structures and the weathered bedrock surface.

Numerous carbonate rock quarries are present in both the Onondaga Limestone and Lockport Group dolostone in this part of the State. Products derived from these quarries vary from large to small rip-rap rock, construction-base material, and agricultural lime. These quarries generally are dewatered to some extent to allow for the removal of the rock. The amount of water removed is generally greatest in the spring (especially if the quarry shuts down operation in the winter), but the amount of water removed varies between quarry operations. In general, more dewatering takes place from quarries in limestone as compared to those in dolostone due to the greater potential for solutioned-enhanced permeabilities (Kappel and Jennings, 2012).

Northern New York

In northern New York, the Trenton and Black River Group limestones and Beekmantown Group sandstone and dolostone that surround the Adirondack Mountains (fig. 1) have variable regional bedrock strike and dip. These regional differences in bedrock dip may limit the northern carbonate rocks from having a zone of allogenic recharge similar to the gently dipping, east-west trending carbonate-rock units of central and western New York. The Black River Limestone near Watertown is known for young karst development (shallow solutional fractures, sinkholes, and cave systems), especially where these rocks are adjacent to surface water, such as the Black River (Waller and Ayer, 1975). As an example of this type of karst development, a **fluorescein** dye trace was completed in the Black River Limestone in December 2016 to determine the connection between some small karst features (swallets) and the Black River. The dye took just over 4 hours to move from the swallets to the Black River, a distance of 1,500 ft, and when the dye appeared, its color intensity was not substantially diluted (fig. 13).

The Trenton Limestone, on the other hand, is not known for karst development or for comprising a regionally extensive aquifer system (Waller and Ayer, 1975). The difference between these two units is that the Black River Limestone is generally a massive and pure limestone prone to dissolution at shallow depth and the Trenton Limestone is more argillaceous (shaley), thinner bedded, and less prone to solution.

The Beekmantown Group of northern New York unconformably (former overlying bedrock units not present because of erosion millions of years ago) overlies the Precambrian Shield (Bernstein, 1992); the deep part of the Beekmantown Group is generally a sandstone, but the shallow units are dolostone. The aquifer within the Beekmantown Group is generally present at the weathered bedrock surface and within the relatively shallow fractured bedrock resulting from glacial rebound of the land surface. Fracture density and orientations vary across this system (Cooper and Mylroie, 2015), and karst development is considered young and slowly developing. Bedrock quarries are present in all carbonate units in this region. Dewatering volumes necessary to maintain quarry operations are dependent on the type of bedrock being mined and the location of the quarry in relation to its regional topographic position within the local water table, with greater dewatering volumes being produced when the quarry is below the local water table.

Eastern and Southeastern New York

In the eastern part of New York, the strata of the Onondaga Limestone and Helderberg Group transition from dipping gently to the south in the Mohawk River Basin to steeply dipping along the western side of the Hudson River Valley. The eastern Mohawk basin has New York's most strongly developed karst, including the oldest known cave systems in the northeastern United States. Lauritzen and Mylroie (2000) have dated stalagmites in some caves to be more than 350,000 years old, indicating cave development through several complete glacial cycles (Cooper and Mylroie, 2015). These caves (figs. 14, 15, and 16) have been explored since the mid-1800s and have been extensively studied since the 1950s (Baker, 1976; Palmer, 1991; Palmer and others, 1991, 2003; Lauritzen and Mylroie 2000; Weremeichik and Mylroie, 2014; Cooper and Mylroie, 2015). It is likely that many more cave systems have yet to be discovered in this area. Numerous large carbonate quarries are present in this part of the State and, depending on their location and elevation within the well-developed karst aquifer system, need either substantial or little dewatering to carry on their quarrying operations. At Howe Caverns in Schoharie County, a quarry operation just downgradient from the caverns affected the flow and water level in the caverns until an inadvertent breach of the karst aquifer in the quarry was sealed.

Along the western Hudson River Valley, the tectonic forces that created the valley have caused the sedimentary rocks on the west side to become steeply inclined and fractured. Because of their steep orientation, carbonate rock here is less prone to deep groundwater infiltration as the solution process must have an outlet to the surface to enhance karst development. The age of karst here is varied, dependent on its topographic location. The karst features that have been reported are generally confined to near-surface exposures in these bedrock units (Cooper and Mylroie, 2015). In areas such as Kingston and Rosendale in Ulster County, extensive natural cement mines were developed beginning in the early 1800s. The miners followed veins of the argillaceous (shaley) Rondout Formation limestone that in some places are inclined as much as 70 degrees from horizontal (fig. 17). Other carbonate quarries are present throughout the region, which can have variable amounts of dewatering required during the quarry production season. Evaporite karst is not present in the eastern half of New York because there are no gypsum or halite deposits present in that area (fig. 1).

Photograph courtesy of S. Mooney, O'Brien and Gere Engineers.

Photograph courtesy of S. Mooney, O'Brien and Gere Engineers.

Photograph by W. Kappel, USGS

Photograph by W. Kappel, USGS

Figure 13. Dye trace in Black River Limestone, near Watertown, Jefferson County, New York. *A*, Injection of fluorescein dye into small closed depression where water flows laterally into a bedrock fracture (movement indicated by white arrows), and dye flowing *B*, in down-gradient bedrock fracture, *C*, from foundation drainpipe adjacent to the Black River, approximately 4 hours after injection, and *D*, into the Black River about 1,500 feet from dye injection point shown in *A*.

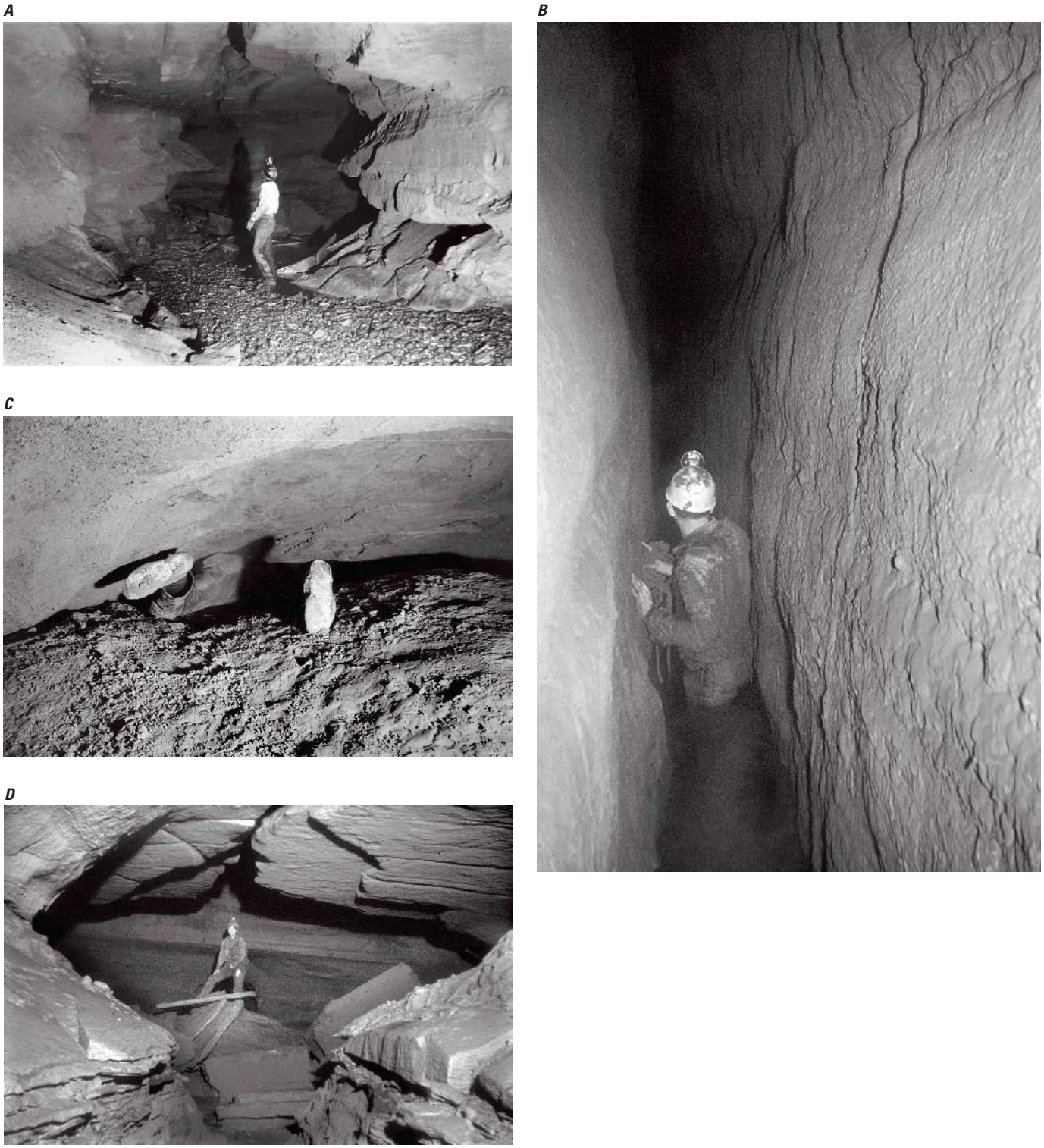


Figure 14. Cave passage features in Knox Cave in Albany County, New York. *A* and *B*, Dissolution features in cave; *C*, glacial sediments found within most cave passages; *D*, Coeymans Limestone in the ceiling and Manlius Limestone below. Photographs courtesy of Art Palmer, professor emeritus, State University of New York at Oneonta.

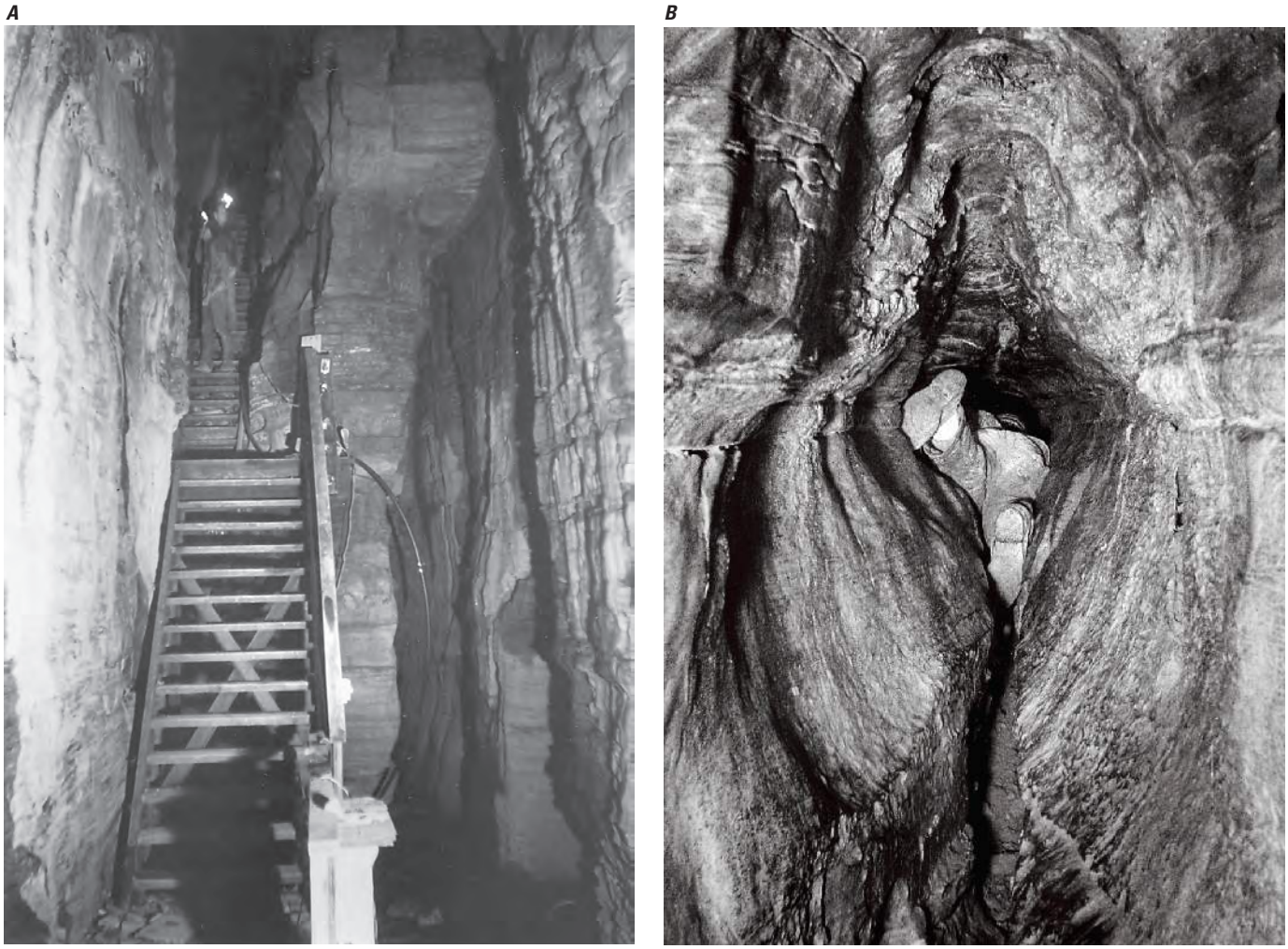


Figure 15. Features in Knox Cave in Albany County, New York. *A*, Linear passage along major joint in Manlius Limestone and *B*, the Gun Barrel cave feature along the Manlius Limestone (above) and Rondout dolomitic limestone (below) contact. Photographs courtesy of Art Palmer, professor emeritus, State University of New York at Oneonta.

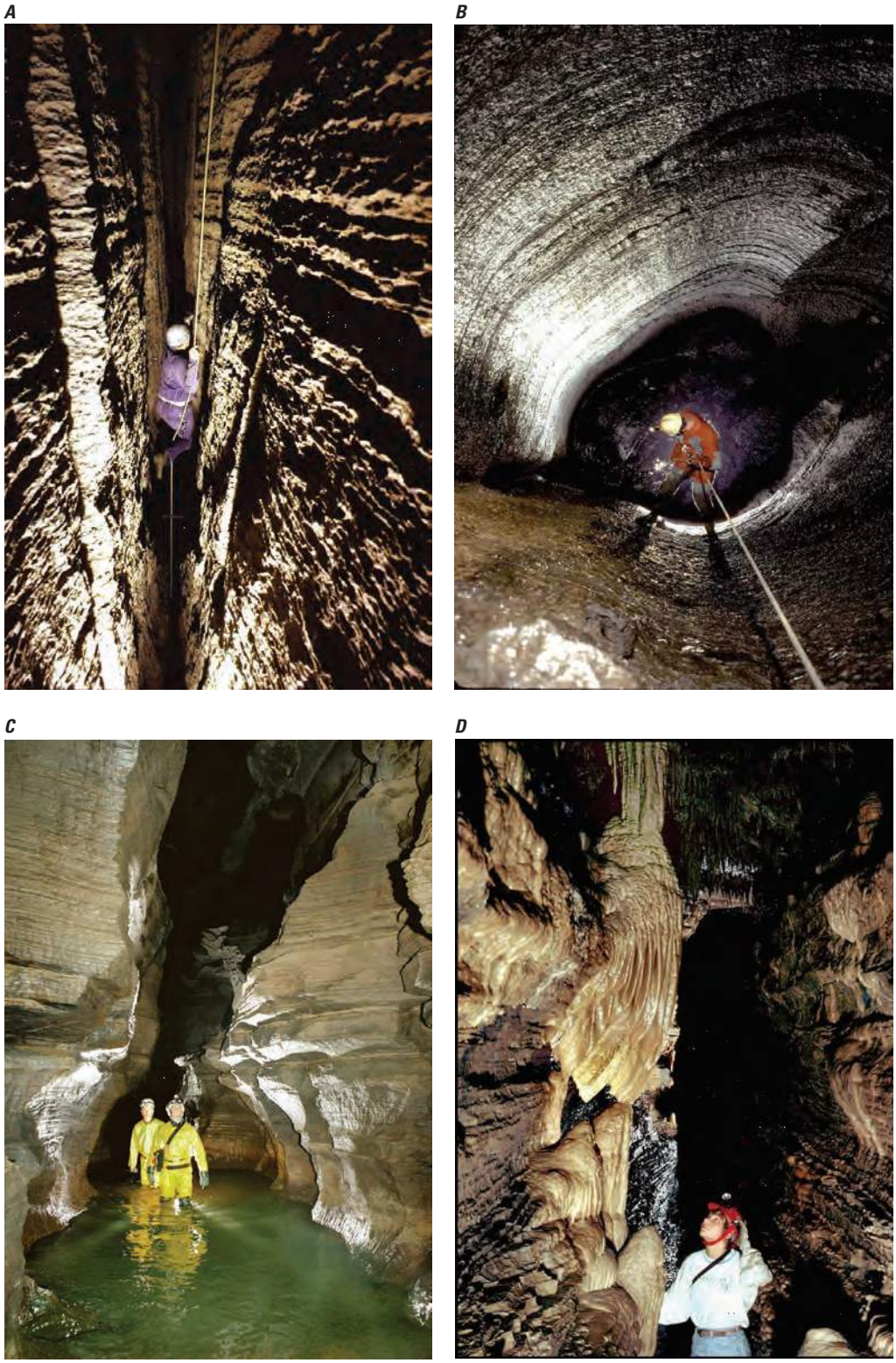


Figure 16. Cave passages from the valley of the Cobleskill Creek, a tributary to Schoharie Creek, in Schoharie County. *A*, Joint-controlled fissure passage in Coeymans Limestone; *B*, 78-foot-deep shaft enlarged by a major sinking stream, also in Coeymans Limestone; *C*, downstream passage in McFails Cave in Manlius Limestone; and *D*, calcite dripstone deposits in Manlius Limestone passageway. Photographs courtesy of Art Palmer, professor emeritus, State University of New York at Oneonta.

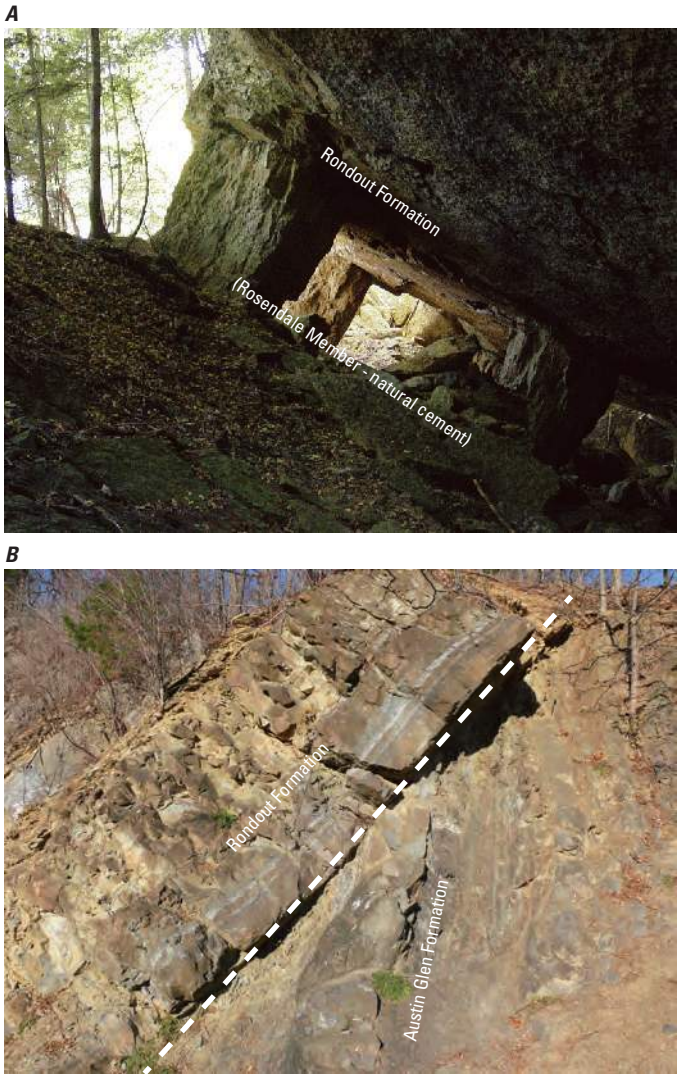


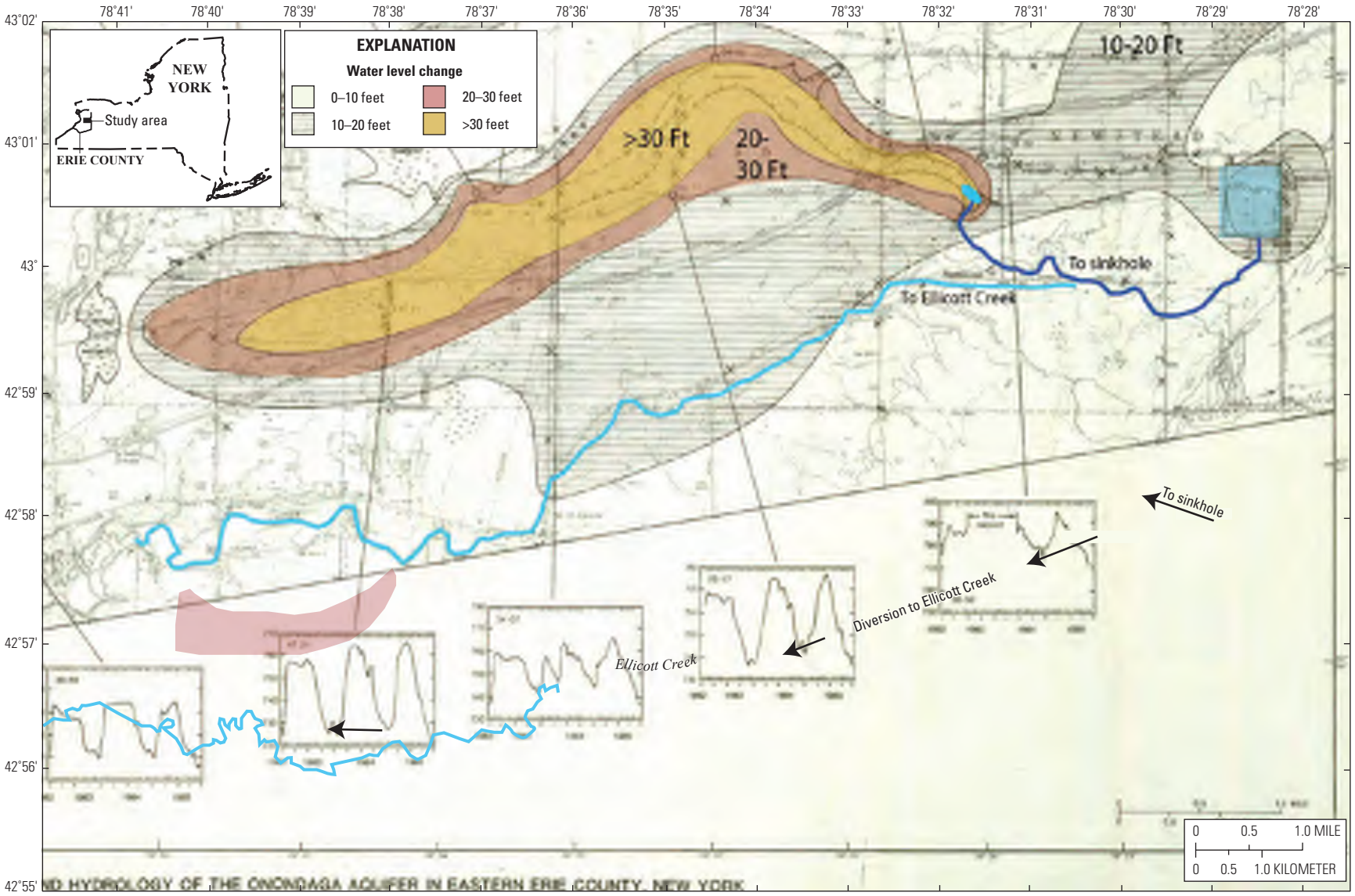
Figure 17. West side of the Hudson River Valley, New York. *A*, Entrance to a natural cement mine at Rosendale, New York, showing the dip of the bedrock; and *B*, Taconic unconformity (white dotted line) at Catskill, New York, between mid-Ordovician Austin Glen Formation and late Silurian Rondout Formation. Note the high-angled nature of the dip of both bedrock units. Photographs courtesy of Steven Schimmrich, Ulster Community College, State University of New York.

Marble of the Wappinger Group is present in the downstate region of New York into the New York City area (Inwood Marble) but other marble is present as inclusions in the Precambrian metamorphic rocks of the Adirondack Mountains in northern New York. As a result of the Acadian orogeny in the downstate area, the limestone bedrock in this region is highly deformed but the extent of marble deposits is limited (Cooper and Mylroie, 2015). During the construction of the Catskill and Delaware water-supply conduits from their respective watersheds to New York City, when borings and construction of the conduits crossed under the Rondout valley, workers encountered glacial and interglacial bedrock valleys, overthrust faults, and numerous caves and clay-filled cavities and joints, about 800 ft below land surface. At its greatest depth, these features were below about 540 ft of unconsolidated material and an additional 260 ft into bedrock. In some cases, the cavities extended for vertical distances of 20 ft or more (Fluhr, 1973). The Inwood Marble in the New York City area was also intersected during conduit construction. In some cases, during the drilling of test borings, the marble bedrock was heavily fractured and eroded to depths greater than 300 ft, and a substantial amount of water had to be grouted or otherwise removed to allow for construction of the conduits (Fluhr and Terenzio, 1984). The deep karst development noted in Fluhr (1973) and Fluhr and Terenzio (1984) likely formed when glaciers were active and the high hydraulic pressure at the glacial ice-bedrock interface created ideal conditions for karst development. During deglaciation, thick sequences of glacial sediments were deposited, especially in the deeper bedrock valleys, possibly slowing karst development unless there was an active flow system to continue the karst development process.

Previous U.S. Geological Survey Karst Studies in New York

In the early 1980s, the USGS, in cooperation with the Erie County Department of Environment and Planning, monitored groundwater-level declines in a 2.2-mi-long by 800-ft-wide closed depression area in eastern Erie County (Staubitz and Miller, 1987; fig. 18). More than 60 domestic water wells and several wetlands went dry and several new sinkholes developed or expanded. The water-level decline was caused by the combination of groundwater withdrawal at a limestone quarry and the diversion of that water away from a down-gradient sinkhole-swallet in the eastern end of the large closed depression. The routing of the quarry water away from the former receiving swallet to an adjacent surface-water stream removed the allogenic recharge from the closed depression's groundwater watershed west of the quarry and caused the water-level declines noted in many homeowner wells within the depression further to the west.

In 2008, the USGS, in cooperation with the NYSDEC, initiated a pilot study to characterize the recharge settings of the carbonate karst in Genesee County in western New York (fig. 1) after a number of groundwater contamination issues were reported during the previous decade (Reddy and Kappel, 2010). Gently dipping Onondaga Limestone is present as an east-west band across Genesee County. The Onondaga Limestone crops out to the north along an escarpment and a 2- to 5-mi-wide band of the limestone is covered by glacial deposits to the south. A series of 1:24,000-scale maps was constructed and showed areas where focused recharge can most readily infiltrate into the karst carbonate bedrock and potentially contaminate the groundwater-flow system (Reddy



Base From New York State Department of Transportation. 1975, 1:24,000

Figure 18. Decline in water levels in a large closed depression, western New York, from April 1981 to October 1985, indicating the effect of diverting quarry dewatering flow from a downstream sinkhole-swallet to Ellicott Creek; modified from Staubitz and Miller (1986, pl. 4). This diversion removed groundwater from the downstream sinkhole, which caused water-level declines greater than 30 feet in some down-gradient homeowner drinking-water wells.

and Kappel, 2010). Evaporite karst (shale with gypsum) north of the Onondaga Limestone escarpment was not characterized in that study. Using information from the USGS study of Genesee County, Cornell University and the NYSDEC developed manure management guidelines for karst areas in the county, including where concentrated animal feedlot operations were applying manure within karst areas of the County (Czymmek and others, 2011).

The same manure-management practices have been encouraged in other parts of State where the risk of applying manure may impact surface-water and groundwater resources. For example, Madison County (in central New York) has utilized these same manure-management criteria and several other counties in New York have considered following these guidelines to better protect their groundwater resources where karst is present (Karl Czymmek, Cornell University, oral commun., February 2017). Any farm that has a concentrated animal feedlot operation permit is required to follow these or previously designated guidelines to protect groundwater (New York State Department of Environmental Conservation, 2017b).

Between 2001 and 2011, the USGS, in cooperation with the U.S. Environmental Protection Agency (EPA), assisted with a study of volatile-organic compound contamination in the carbonate-bedrock aquifer system in Cayuga County between Auburn and Union Springs (a distance of 7 mi; Eckhardt and others, 2011). The USGS collected and compiled geophysical logs from 93 monitor and water-supply wells in the carbonate-bedrock aquifer between Owasco and Cayuga Lakes, two of central New York's Finger Lakes. The USGS analyzed geophysical logs along with core samples from drilled bedrock wells, inspected outcrops of the bedrock to define the stratigraphic units penetrated by wells, evaluated flow zones within the bedrock aquifers, and developed and installed multilevel monitoring systems for the study (U.S. Environmental Protection Agency, 2012). The USGS also assisted the EPA in a similar fashion in western New York near the town of LeRoy in northeastern Genesee County. In 1970, a railroad tanker car derailment spilled thousands of gallons of trichloroethylene into the local carbonate bedrock (Onondaga Limestone), contaminating drinking water wells (U.S. Environmental Protection Agency, 2017).

Karst Development in New York

The development of karst is variable across New York but is generally related to the geologic characteristics of the rock (carbonate versus evaporite), the quantity and quality of water that the rock is exposed to, and the length of time that the karst process has been occurring. The repeated glaciation of New York has assisted with karst development as glaciers have removed overburden and injected water directly into bedrock, enhancing karst development. However, at the same time, repeated glaciation has destroyed former karst systems by eroding the karstic bedrock and creating a postglacial environment to start the karst-forming process once again.

Western and Central New York

In western and central New York, the gently southward dipping Onondaga Limestone and Lockport Group dolostone have young or early karst features, especially near their escarpments. Apparently during glacial advance, former escarpments were heavily eroded back to more competent bedrock, and the new escarpment initially had limited karst development. The land surface downgradient from each escarpment was usually mantled by glacial and postglacial sediments, which limited karst development until glacial rebound occurred, allowing the dissolution of bedrock joints and fractures as these features opened due to the land-surface rebound processes. The Onondaga Limestone is more prone to karst development than the dolostone of the Lockport Group because of its different geochemical composition. Although karst solution features are present in both units, the Onondaga has more well-developed karst flow systems (large closed depressions, early conduit-cave development, and sinkhole-related subsidence) than the Lockport Group (Staubitz and Miller, 1987). For example, in the town of Clarence (Erie County), a bowling alley was built in the early 1960s on a farm property known as "The Sinks" (The Clarence Museum, written commun., February 2017). The building collapsed into a sinkhole in the early 1980s, and reportedly, a section of New York State Route 5 in front of the bowling alley also slightly subsided at the same time, although the subsidence did not close the roadway. The remaining part of the bowling alley building was demolished, the sinkhole filled, and the site today [2020] remains undeveloped. Although both the Onondaga and Lockport bedrock units have some solution channel and modest cave development, these features more commonly occur near their escarpments and along adjacent steep erosional features (such as along the Niagara River gorge), but as indicated in the bowling alley story, solution features (sinkholes, closed depressions) have occurred elsewhere in the karstic rock.

Just north of the Onondaga Limestone escarpment, gypsum deposits are present within the underlying Salina Group shales (fig. 1). Karstification developed where gypsum deposits are close to the land surface and, in some cases, over former gypsum mines. In western New York, thin beds of gypsum (3 to 5 ft thick) have experienced extensive gypsum mining from the 1800s through the late 1990s. The extent of these mines is roughly from the Clarence area in Erie County eastward through parts of Genesee County to the southwestern part of Monroe County, in the Garbutt area. From Garbutt to just east of Syracuse (Onondaga and Madison Counties), gypsum was obtained from shallow open-pit quarries as the gypsum seams are discontinuous in this part of the State and more easily accessed from the land surface.

Where these former subsurface mines were developed, dissolution of the remaining gypsum support pillars or partial collapse of the mine roof has led to some land-surface subsidence and closed depression development. A number of geologic studies were performed in the town of Clarence, but north of the Onondaga Limestone escarpment, between 1972 and 1989 to determine whether residential and commercial development could occur over a part of the former National Gypsum Company mine (HydroTech Ground Water Consultants, 1989). A summary of these various studies indicated that future sinkhole development was possible because several sinkholes were already present over the mine in 1972, but the timing and extent of such development was difficult to quantify. The site over the former gypsum mine and other places nearby have since been fully developed.

In the town of Wheatland in southwestern Monroe County, the 460-acre Oatka Creek Park is maintained for hiking and cross-country running and skiing along 6.5 mi of trail. In the late 1990s, the USGS was asked why the land surface of the park was experiencing subsidence. A surface examination of the park revealed linear subsidence patterns generally aligned in a north-south direction. A search of the town's history (Schmidt, 1953) and a summary of gypsum resources in New York State (Newland, 1929) revealed that there were at least three former gypsum mines along the southern side of Oatka Creek in this part of the county. The mines had exploited gypsum seams that surfaced along the southern side of Oatka Creek near stream level and mine adits (dipping-to-the-south tunnels) were dug to remove the gypsum. In this case, the present-day park was built over the former Garbutt Gypsum Mine, which utilized such adits (Schmidt, 1953). Subsequent to these findings, the Monroe County Parks Department contracted with a private firm to perform a geophysical (electrical resistivity) survey to confirm the location of the adits. Results of the Oatka Creek Park survey indicated "the presence of numerous sinkhole and subsidence features related to either collapsed shafts [that is, subsidence features related to the bedrock collapse over the trend of the adits] or open-pit mining of gypsum near Oatka Creek" (Forrest Environmental Services, Inc., 2001, p. 2).

As a result of the amount of former gypsum mining in Wheatland, a mine subsidence hazard district was created as a zoning overlay. The stated purpose of the district was, in part, "[i]n the interest of the public health, safety, and welfare, these regulations are intended to protect development located in an area in the Town of Wheatland that has been subjected to underground mining, with much of such area [sic] not provided with maps of the undermining. More specifically, the purpose of these supplementary controls is to prevent the erection of habitable structures in an area that could be unsafe due to undermining, to minimize danger to public health…… due to subsidence" (Town of Wheatland, 2015).

In central and eastern New York (east of Rochester), the gypsum beds become thin to nonexistent because gypsum is present only as pockets and lenses (Tennissen, 1952), which were mined from the land surface. Though these pockets are considered small, apparently some land-surface subsidence has occurred, although such subsidence has been reported in just a few areas. For instance, in Syracuse in Onondaga County, gypsum dissolution may have caused nearly 30 ft of land-surface subsidence since the last period of glaciation, about 12,000 years ago (Phillips, 1955). Such gypsum-dissolution subsidence likely occurred elsewhere within these limited gypsum deposits, but without substantial urban development, land-surface subsidence may not have been noticed other than possible development of isolated sinkholes or closed depressions, some of which may have developed into wetland areas. In the Syracuse area, sinkhole and subsidence have been reported, and in one case, an investigation of the local geology revealed the presence of a heavily weathered shale zone at the bedrock surface and a vertical zone of heavily weathered gypsiferous shale within surrounding unweathered shale that has anhydrite- and gypsum-bearing seams and inclusions (fig. 19) similar to what was indicated by Phillips (1955).

The Salina Group, and in particular the Syracuse Formation, contains beds of halite (rock salt) interbedded with shale (fig. 1). Near the outcrop of the Salina Group at land surface, any halite that may have been present was easily removed by dissolution during and following glacial periods when meltwater was likely forced into the heavily fractured rock by the overburden pressure of the glacier, dissolving halite that interacted with the injected water (Goodman and others, 2011). Any subsidence related to this solution process happened at that time and is of little concern presently. But halite has been and continues to be mined in the subsurface either by solution- or hard-rock-mining techniques in central New York, well to the south of the former outcrop area. There have been cases of land-surface subsidence related to both forms of halite mining. Though the extent of subsidence is locally important—such as subsidence from solution-well mining in the Tully Valley near Syracuse (Hackett and others, 2009) or room-and-pillar mining of halite in the Genesee Valley south of Rochester (Yager and others, 2012)—these types of halite-related subsidence are not extensive across the central and western part of the State.

Northern New York

In northern New York and along the western side of the Adirondack Mountains, strata of the Black River and Trenton Groups are nearly flat lying and have been fractured due to glacial advance and recession and continued tectonic doming of the Adirondack Mountains (Isachsen, 1981). Karst development in this bedrock unit is considered young as it is primarily influenced by recent glaciation and its proximity to flowing surface water and the zone of annual groundwater fluctuation (Waller and Ayer, 1975). In the vicinity of Watertown, the limestone of the Black River Group has karst features and "a vast network of caverns of varying heights and expanses with intricate ramifications and labyrinthine corridors [sic]

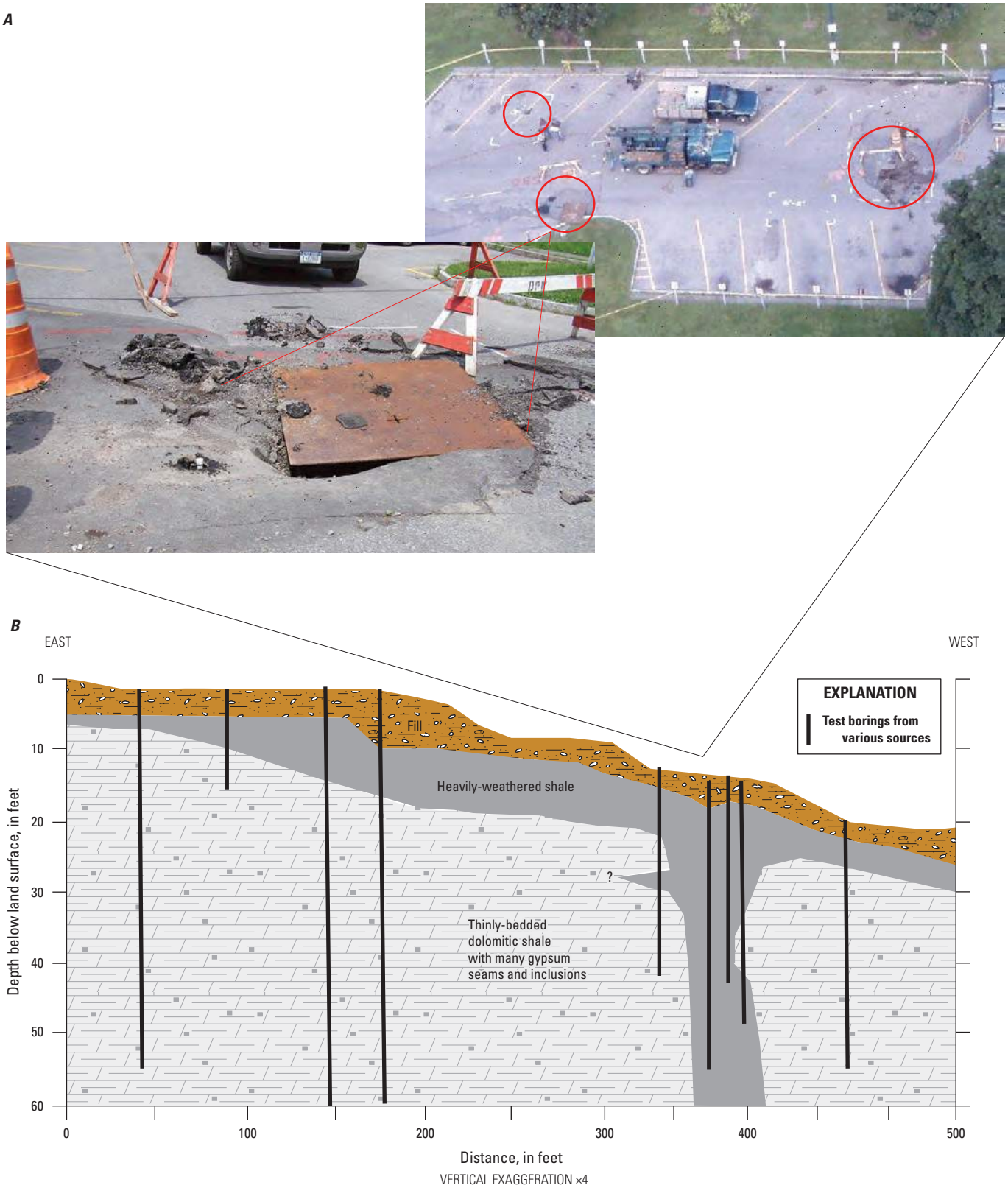


Figure 19. Sinkhole development in evaporite karst bedrock in Syracuse, Onondaga County, New York. *A*, Parking lot subsidence (red circles) in area where deeply solutioned bedrock is present, and closeup of surface area of one of the sinkholes. *B*, Schematic cross section of the depth to heavily weathered shale and more competent shale with gypsum seams and inclusions beneath, and a deep zone of gypsum-solutioned bedrock where continual land-surface subsidence (shown in *A*) has occurred.

occupy the thick and expansive deposit of limestone over which the city of Watertown has been built" (Northern New York Genealogy, 2001). Some of the caves of various sizes and lengths were used to store beer during the summer season, another cave was an attraction for a local amusement park where cave boat tours were given, and several caves in Watertown were considered for use as bomb shelters during the Second World War. Of note is that the entrances to all these caves are presently [2020] sealed.

The Trenton Group, which overlies the Black River Group, does have some vertical fracturing but is less prone to karst development because of its chemical makeup: an argillaceous (shaley) limestone with thin limestone interlayered with shale throughout the Trenton sequence. The Beekmantown Group, primarily in northern New York but also present along the east side of the Adirondack Mountains (fig. 1), is mostly composed of dolostone with interbedded limestone and sandstone. Where the Beekmantown bedrock is near the land surface, it has been weathered and fractured by glacial advance and retreat (glacial rebound), which does enhance some karstic development. This is especially the case where the bedrock is associated with underlying dolostone or permeable sandstone, which allows surface water to move through an upper dolostone layer to a point of discharge or into a deeper bedrock flow system. Some limestone in this region has also been metamorphosed into small bands of marble that also exhibit karstic attributes.

Eastern and Southeastern New York

Karst in eastern New York is well developed because of the great thicknesses of carbonate bedrock (Onondaga and Helderberg Group) and the extended period of time in which the bedrock has been exposed to repeated glaciation and interglacial erosion, especially in the eastern Mohawk River basin (Baker, 1976; Cooper and Mylroie, 2015). Because of the presence of this well-developed karst, several studies have linked karst and the need to protect groundwater from contamination. "These [karst] features complicate the flow of ground water and create special problems regarding water supply. Due to thin soils, there is a potential for widespread ground water contamination and a limited ability to support foundations and building loads. There are few regulatory controls devoted to protecting karst areas" (Schoharie Planning and Development Agency, 2002).

A study of the Cobleskill Plateau by Braun (2000, p. 62–63) indicated that "Of the 40 wells for which chemical analysis was available, 87.5 percent showed some level of contamination from nitrates and 82.5 percent contained phosphates… Of the 43 wells tested for bacteria using a presence or absence test, 81.4 percent showed a presence. These figures indicate a strong degree of interaction of surface water with well water on the limestone plateau. All the wells [tested] on the Cobleskill Plateau are located in an area where dairy farming is the number one industry. One of the wells, which had high nitrate levels, had raw manure coming through the water system….as reported by the homeowner. The well drew water from 116 ft below the surface [likely the location of the well pump, as the water level in the well was not noted]. Adjacent to the house are crop fields where sinkholes form and are filled with fieldstone… The fieldstones fill the sinkholes, but they do not seal the sinkholes, which have a direct connection with groundwater."

The Helderberg-Cobleskill Plateau region (Baker, 1976; Palmer and others, 2003; Cooper and Mylroie, 2015) is an incised carbonate terrain resulting from repeated periods of glaciation and erosion, which, over time, has created solution-derived fracture conduits and well-developed cave systems (figs. 14, 15, and 16). The glacial and interglacial processes bisected the land surface to create a number of hydraulically isolated carbonate rock "islands" where vertical bedrock joints and sinkholes intersected south-dipping bedding planes to create a classic **karst topography**: upgradient losing streams and swallets flowing to downgradient springs, some of which might exhibit artesian flow where former, lower spring outlets were blocked by more recent glacial debris (Palmer and others, 2003). The area of Schoharie, Albany and Greene Counties (Helderberg-Cobleskill plateau) has the oldest known and largest number of well-developed, most-explored, and documented cave systems in New York (fig. 20). Many of these cave systems have been mapped, and some cave-catchment areas have been defined using dye tracing techniques.

Further downstate, along the western side of the Hudson River valley, the Onondaga and Helderberg Groups exhibit localized karst development. A study of the New York City water supply conduit flowing from the Rondout Reservoir through the West Branch Tunnel under Wawarsing (fig. 21) indicated a hydraulic connection between the unlined conduit and the overlying bedrock and near-surface unconsolidated aquifers (Stumm and others, 2012). During construction of the West Branch Tunnel, this section of the tunnel was observed to have been highly faulted and weathered, had inflow of more than 9,000 gallons per minute, and required more than 20,000 bags of concrete and steel reinforcements to stabilize the bedrock (Stumm and others, 2012). This condition indicates fracture solutioning and enhanced permeability within the carbonate bedrock and was likely influenced by the active geologic history of the Hudson River valley creating extensive faulting within the bedrock.

Along Interstate 87 (New York State Thruway) near the city of Saugerties in Ulster County, the use of road salt on the interstate highway has apparently affected a number of homeowner wells that were drilled into the steeply dipping Onondaga Limestone. A nearby water line was extended to these homes to resolve the problem (Paul Rubin, HydroQuest, written commun., January 2016).

There is a number of named cave systems in this region (fig. 20) but far fewer than in the same bedrock units just to the north. Further south, the Inwood Marble also exhibits some karst features, although the amount of karst is limited

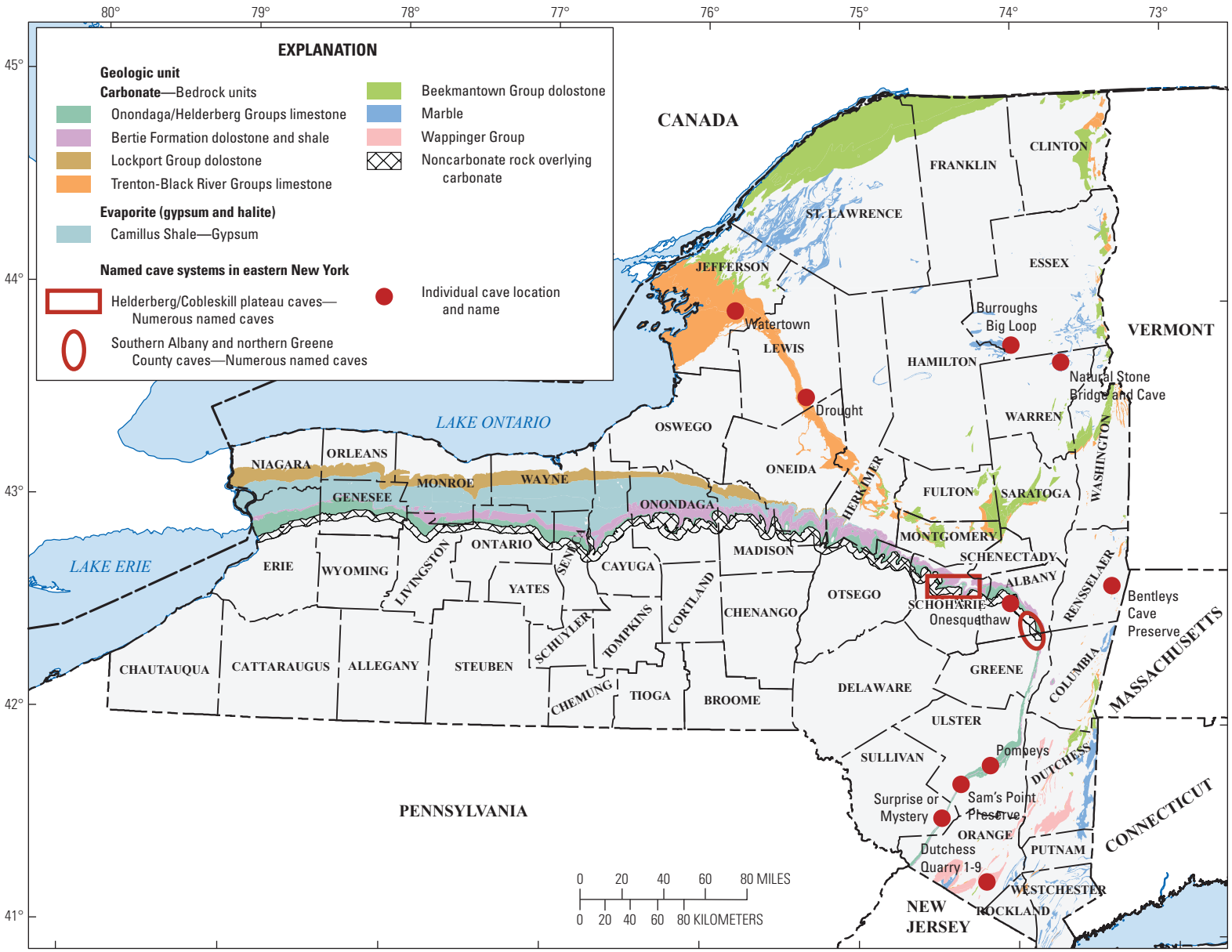


Figure 20. Selected named cave systems in eastern New York.

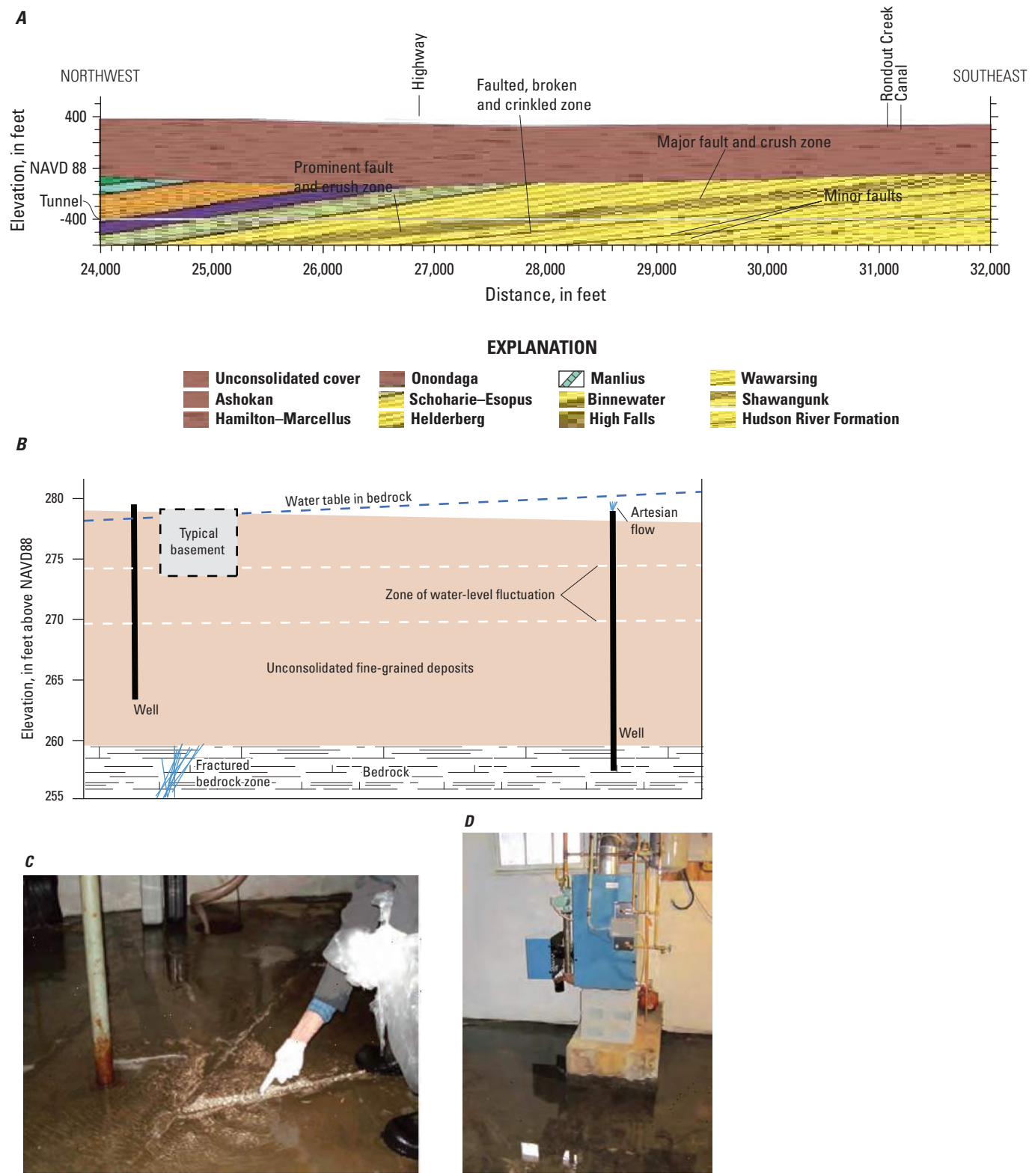


Figure 21. Hydrogeologic conditions at Wawarsing in Ulster County, New York. *A*, Geologic cross section for the Rondout tunnel near Wawarsing, showing bedrock types and fracture-fault locations; modified from Stumm and others (2012); *B*, schematic section of the water-table configuration for unconsolidated and bedrock aquifers. *C* and *D*, Flowing artesian conditions in flooded Wawarsing area basements; from Stumm and others (2012). NAVD 88, North American Vertical Datum of 1988.

by the small extent of the formation and the amount of urban development that has obscured the expression of karst features at land surface.

Closed-Depression and Focused-Recharge Inventory

The objective of the geographic information system (GIS) closed-depression and focused-recharge analyses conducted for this study was to develop a comprehensive inventory of all closed depressions proximal to carbonate, evaporite, or marble units within the State. The distribution of these bedrock units in New York form the basis of the study area. The inventory is restricted to an area defined by bedrock lithologies where karst is known to be present. However, no inference can be made that a mapped closed depression is karstic in origin. Individual evaluation of each inventoried depression would need to be conducted to determine the processes that created the feature. That level of effort is beyond the scope of this study.

A closed depression is defined as an enclosed area lower than the surrounding area that has no surface-drainage outlet and from which water escapes only by evaporation or subsurface drainage (that is, an area of focused recharge). On USGS topographic maps, a closed depression is indicated by a hachured contour line forming a closed loop (Natural Resources Conservation Service, 2017). Examples of closed depressions in a karst area are shown in figure 22. The map representation applies to closed depressions of both natural and anthropogenic origin. Many of the closed depressions

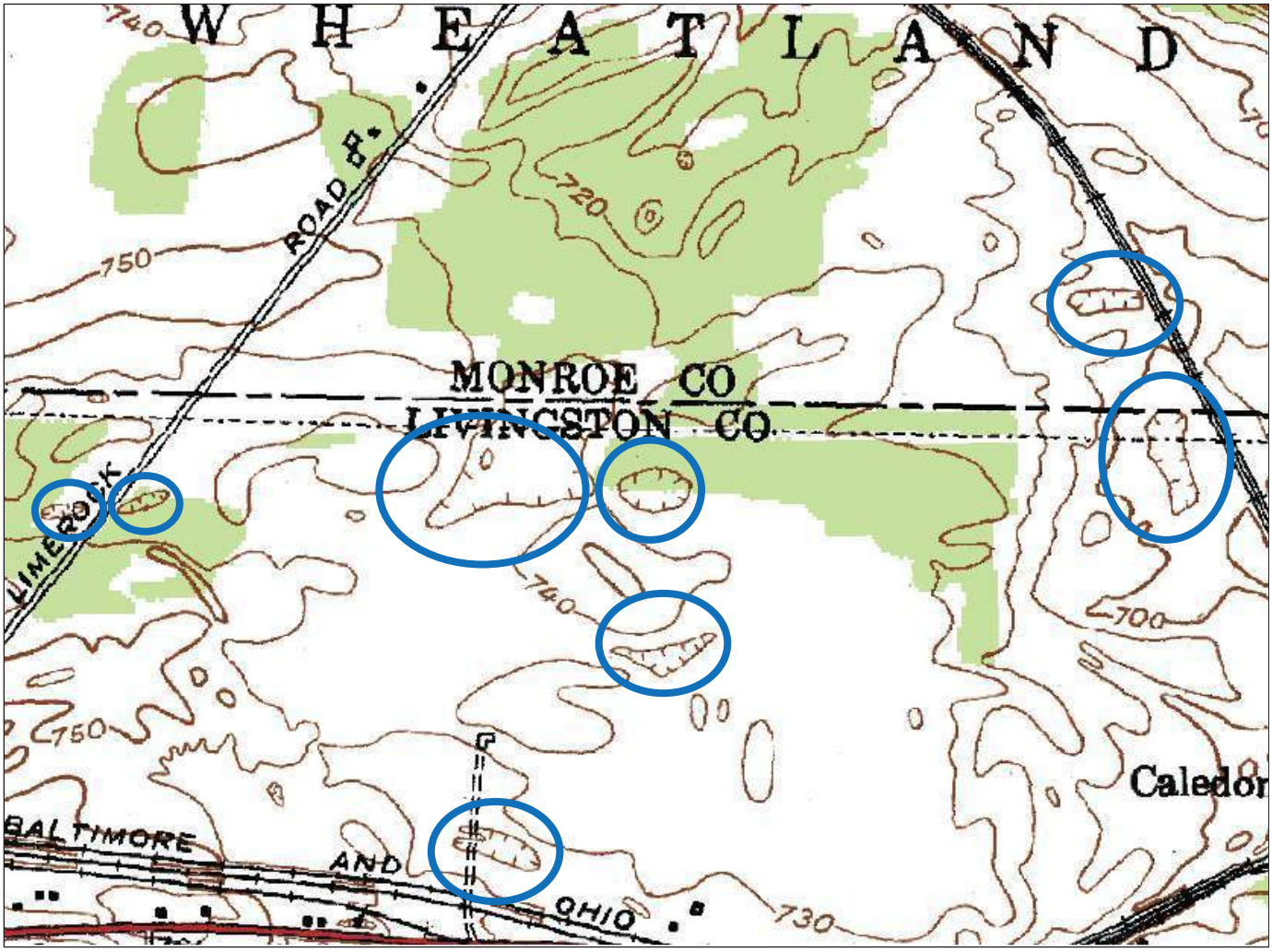


Figure 22. Examples of closed depressions as they appear on a topographic map; modified from U.S. Geological Survey (1950). Closed depressions are indicated within blue circles.

included in this inventory, though not the result of karst processes, are within or adjacent to a karst landscape and could contribute to focused recharge.

Study Area

The study area boundary adopted for the GIS analyses was created by intersecting an index of USGS 1:24,000-scale, 7.5-minute quadrangle maps (U.S. Geological Survey, 2014) with data containing selected bedrock geologic units (table 2; Horton and others, 2017). The final study area boundary covers more than 20,000 square miles, equivalent to 38 percent of New York State and transecting 42 counties (fig. 23).

Data Sources

Data acquired for the GIS analyses can be grouped into two categories: (1) source data for identifying closed depressions and (2) ancillary data used to assign geologic, soil, and land cover characteristics to the inventoried closed depressions (table 3). The spatial relation between ancillary characteristics and closed depressions can be used to assess which closed depressions have a greater potential for contributing focused recharge.

Closed Depressions

The closed depressions were derived from three data sources and were compiled in the following order: (1) digital contour database of closed depressions, (2) digital raster graphic database of closed depressions, and (3) light detection and ranging (lidar) database of closed depressions. All three databases are from Reddy and others (2020). There is no duplication of features among the three databases. Additionally, the closed depressions inventoried were compared with closed depressions mapped in other published geospatial data to eliminate duplication with those datasets. The datasets referenced were New York State Department of Environmental Conservation (2017a) and U.S. Geological Survey (2013).

Table 2. Reclassified bedrock geologic units for karst aquifers in New York.

[Geologic units are from Horton and others (2017). —, not designated]

Major unit 1	Major unit 2	Major unit 3	Formation or unit name
		Onondaga	
Limestone	Chert	Shale; conglomerate	Glenerie Formation
Sandstone	Limestone	—	Oriskany Formation
Limestone	Sandstone	Chert	Onondaga and Bois Blanc Limestones
Limestone	Chert	—	Onondaga Limestone
Shale	Limestone	Siltstone	Onondaga Limestone
Limestone	Dolostone (dolomite)	Sandstone; shale; conglomerate	Undifferentiated Lower Devonian and Silurian rocks
Siltstone	Limestone	Sandstone; dolostone (dolomite); shale	Rondout Formation
		Akron	
Limestone	Dolostone (dolomite)	—	Helderberg Group
Dolostone (dolomite)	Shale	—	Akron Dolostone
Dolostone (dolomite)	Shale	Limestone	Cobleskill Limestone
Limestone	Shale	Dolostone (dolomite)	Cobleskill Limestone
Dolostone (dolomite)	Shale	Evaporite	Syracuse Formation
		Camillus	
Shale	Dolostone (dolomite)	Evaporite; black shale	Camillus, Syracuse, and Vernon Formations
Shale	Dolostone (dolomite)	Evaporite	Camillus and Syracuse Formations
Shale	Black shale	—	Vernon Shale

Table 2. Reclassified bedrock geologic units for karst aquifers in New York.—Continued

[Geologic units are from Horton and others (2017). —, not designated]

Major unit 1	Major unit 2	Major unit 3	Formation or unit name
		Lockport	
Black shale	Dolostone (dolomite)		Ilion Shale
Dolostone (dolomite)	Limestone	—	Lockport Group
		Trenton-Black River	
Shale	Limestone	Dolostone (dolomite); conglomerate	Poultney Formation (“A” Member)
Limestone	—	—	Balmville Limestone
Limestone	Dolostone (dolomite)	Shale; arkose; chert	Black River Group
Carbonate	Melange	—	Cambrian through Middle Ordovician carbonate rock
Limestone	Siltstone	—	Valcour, Crown Point, and Day Point Limestones
Limestone	Shale	—	Trenton Group
Limestone	—	—	Trenton and Black River Groups, undivided
Limestone	Dolostone (dolomite)	—	Trenton and Black River Groups, undivided
		Beekmantown	
Dolostone (dolomite)	Limestone	Sandstone; quartzite	Beekmantown Group
Sandstone	—	—	Potsdam Sandstone
Dolostone (dolomite)	Sandstone	Shale	Theresa (Galway) Formation
Dolostone (dolomite)	Shale	—	Briarcliff Dolostone and Pine Plains Formation
Dolostone (dolomite)	Limestone	Chert; siltstone	Beekmantown Group
Dolostone (dolomite)	Sandstone	—	Theresa Formation
Limestone	Dolostone (dolomite)	Chert	Copake and Halcyon Lake Formations, Rochdale Limestone
		Marble	
Marble	Schist	Granulite; quartzite	Inwood Marble
Schist	Marble	Calc-silicate rock	Manhattan Formation (“A” Member)
Marble	—	—	Stockbridge Formation
Marble	Calc-silicate rock	Amphibolite; granulite; gneiss; quartzite; schist	Undifferentiated dolomitic and calcitic marbles interlayered with significant amounts of calc-silicate rock
Marble	Calc-silicate rock	Amphibolite	Calcitic and dolomitic marble
Gneiss	Marble	Calc-silicate rock	Rusty and gray biotite-quartz-feldspar gneiss
		Wappinger	
Shale	Conglomerate	Limestone	Germantown Formation
Dolostone (dolomite)	Shale	—	Stissing Formation
Limestone	Dolostone (dolomite)	Sandstone; shale; conglomerate	Undifferentiated Lower Devonian and Silurian rocks
Limestone	Dolostone (dolomite)	Shale; chert	Wappinger Group

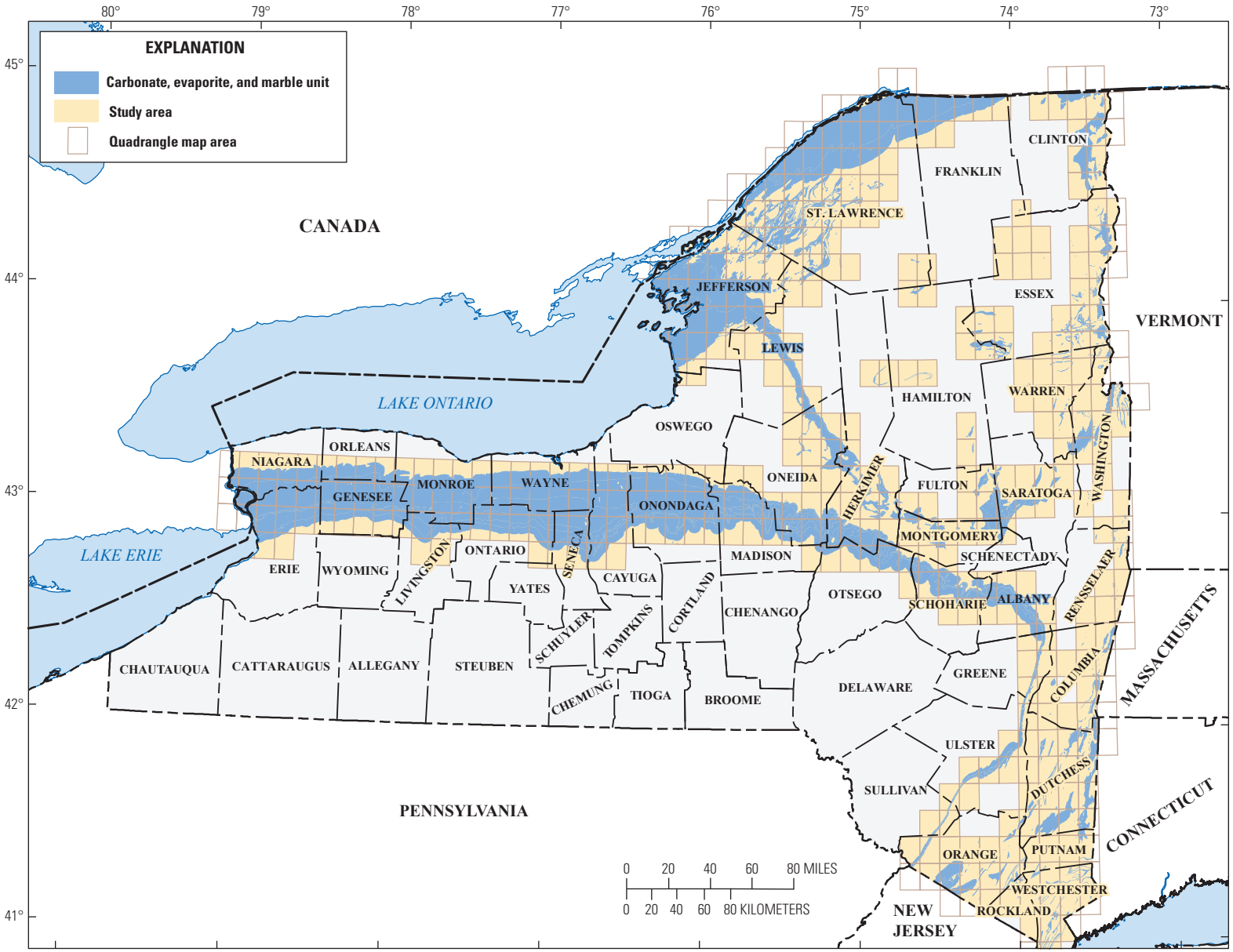


Figure 23. Study area boundary and selected U.S. Geological Survey 7.5-minute quadrangle maps adopted for geographic information system (GIS) analyses of karst aquifers in New York. Selected bedrock geologic units are shown.

Table 3. Sources for data acquired to conduct geographic information system analyses for karst aquifers in New York.

[lidar, light detection and ranging; DEM, digital elevation model; gSSURGO, gridded Soil Survey Geographic database; NLCD 2011, 2011 National Land Cover Database]

Data	Data type	Source
		Closed depression identification data
Digital contours	Vector	Tyler and Greenlee (2012)
Digital raster graphic images	Raster	1:24,000-scale, 7.5-minute topographic maps (U.S. Geological Survey, 2020)
Lidar-derived bare-earth DEMs	Raster	New York State Office of Information Technology Services (2017)
		Ancillary data
Bedrock geology	Vector	Horton and others (2017)
Soils	Raster	gSSURGO for New York (Natural Resources Conservation Service, 2014)
Land cover	Raster	NLCD 2011 (U.S. Geological Survey, 2015)

The digital contour database of closed depressions contains features derived from data associated with Tyler and Greenlee (2012). The source data are a statewide contour dataset that was generated from the National Elevation Dataset (U.S. Geological Survey, 2017a) and the National Hydrography Dataset (U.S. Geological Survey, 2017b) in a fully automated process. The process created digitally produced contours that match, as closely as possible, the cartographic contours that appear on the 1:24,000-scale, 7.5-minute USGS topographic maps. An exact match was not possible because the digitally produced contours are based on newer, more accurate horizontal and vertical datums than those used to create the contours appearing on the topographic maps (Tyler and Greenlee, 2012). Furthermore, deletion of very small polygonal contours was a processing step used in the development of the digital contours (Tyler and Greenlee, 2012). Within the study area, the discrepancy between digitally produced closed depression contours and closed depression contours appearing on 7.5-minute topographic maps is substantial. The digital contour lines representing closed depressions were converted to polygons and added to the inventory (fig. 24).

The features included in the digital raster graphic database of closed depressions were compiled to address the discrepancy between digitally produced closed depression contours and closed depression contours appearing on

Figure 24. Closed depressions converted from line to polygon features. *A*, Closed depression contours appearing on the topographic map and in the digital contour dataset (black hachured lines; Tyler and Greenlee, 2012). An example of a closed depression that appears on the topographic map but is not included in the digital contour dataset (closed depression circled in red); *B*, closed depression contour lines from the digital contour dataset converted to polygons and assigned feature identification numbers for the digital contour database (Reddy and others, 2020).

7.5-minute topographic maps. The features in the digital raster graphic database of closed depressions represent the locations of closed depressions that appear on the 7.5-minute topographic maps but were not represented in the digital contour dataset because of the previously described processing limitations. These closed depressions were digitized as feature centroids from an assemblage of approximately 650 digital raster graphic (DRG) images of scanned USGS 1:24,000-scale topographic maps. A georeferenced DRG was added as a background layer in a GIS. A dataset of disconnected stream reaches imported from the National Hydrography Dataset (U.S. Geological Survey, 2017b) for New York was used to assist with identification of closed depression features appearing on the DRG images (fig. 25).

The lidar database of closed depressions contains polygon features generated from analysis of 1- and 2-meter (m; 3.28- and 6.56-ft) horizontal resolution lidar-derived bare-earth digital elevation models (DEMs; New York State Office of Information Technology Services, 2017). The DEMs were made from multiple collection projects conducted between 2005 and 2017. The vertical accuracy of the lidar projects ranged from a 4.0- to 18.5-centimeter (cm; 1.6- to 7.3-in.) root mean square error, and the horizontal accuracy of each project had less than 2-m root mean square error. At the time of analysis [2017], lidar data existed for approximately 85 percent of the study area (fig. 26). The DEMs were processed to identify closed depressions not represented in the digital contour database or the digital raster graphic database. The processes used followed the methods described by Doctor and Young (2013) using the ArcHydro Tools data modeling toolbox and by Wall and others (2015) using the Esri toolbox Hydrocutter.

A lidar-derived bare-earth DEM was created for each 7.5-minute quadrangle map within the extent of the lidar coverage. Each DEM quadrangle was reconditioned using ArcGIS version 10.5.0 (Esri, 2016) to produce a polygon dataset of possible closed depressions. Reconditioning involved the removal of artificial dams along manmade features, such as streets and railroads, where surface water flows through drainage structures that are hidden to the DEM. Mapped inventories of culverts and bridges are not complete as these features are numerous, often undocumented, or on private land; therefore, it is necessary to develop a method to restore connectivity of flow paths. The hidden flow paths need to be added to the DEM, artificially lowering the DEM at locations of drainage structures, thereby extending flow paths through artificial dams and restoring connectivity of surface-water flow. To do so, methods developed by Doctor and Young (2013) and Wall and others (2015) were incorporated and combined.

Doctor and Young (2013) recondition DEMs by digitally creating flow paths through road and railroad embankments. The reconditioned DEM is run through the ArcGIS Fill tool (part of the Spatial Analyst tools) to identify cells that are lower than all its adjacent neighbors and raise the value of that cell to the lowest value of an adjacent cell. A depth raster is then generated by subtracting the reconditioned DEM from the filled DEM. Cells within the depth raster that satisfy a minimum depth threshold are extracted and converted to polygon features having area characteristics. A final closed depression dataset is then generated that satisfies both minimum depth and area thresholds.

Wall and others (2015) developed the Hydrocutter toolbox to aide in connecting streams through roads and railroad embankments. Two separate tools, Hydro and Cutter, are

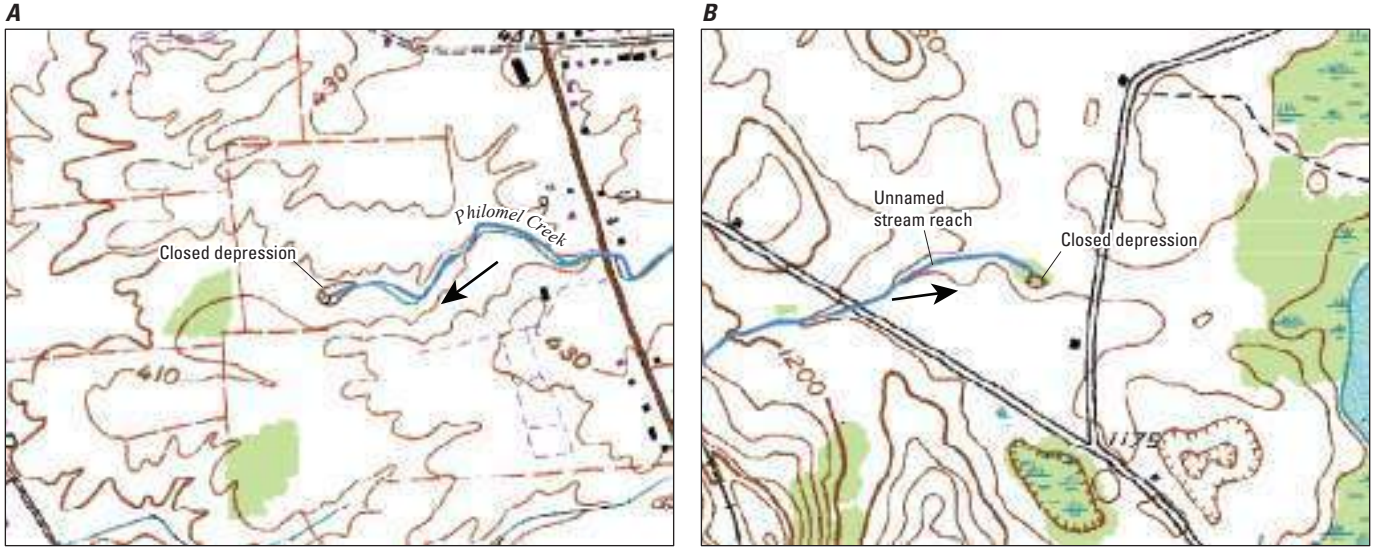


Figure 25. Closed depressions not represented in the digital contour data because of processing limitations that were added to the digital raster graphic database (Reddy and others, 2020) from analysis of digital raster graphic (DRG) images and disconnected stream reaches from the National Hydrography Dataset (NHD; U.S. Geological Survey, 2017b). *A*, Closed depression near Watertown, Jefferson County; *B*, Closed depression near Pine Woods, Madison County.

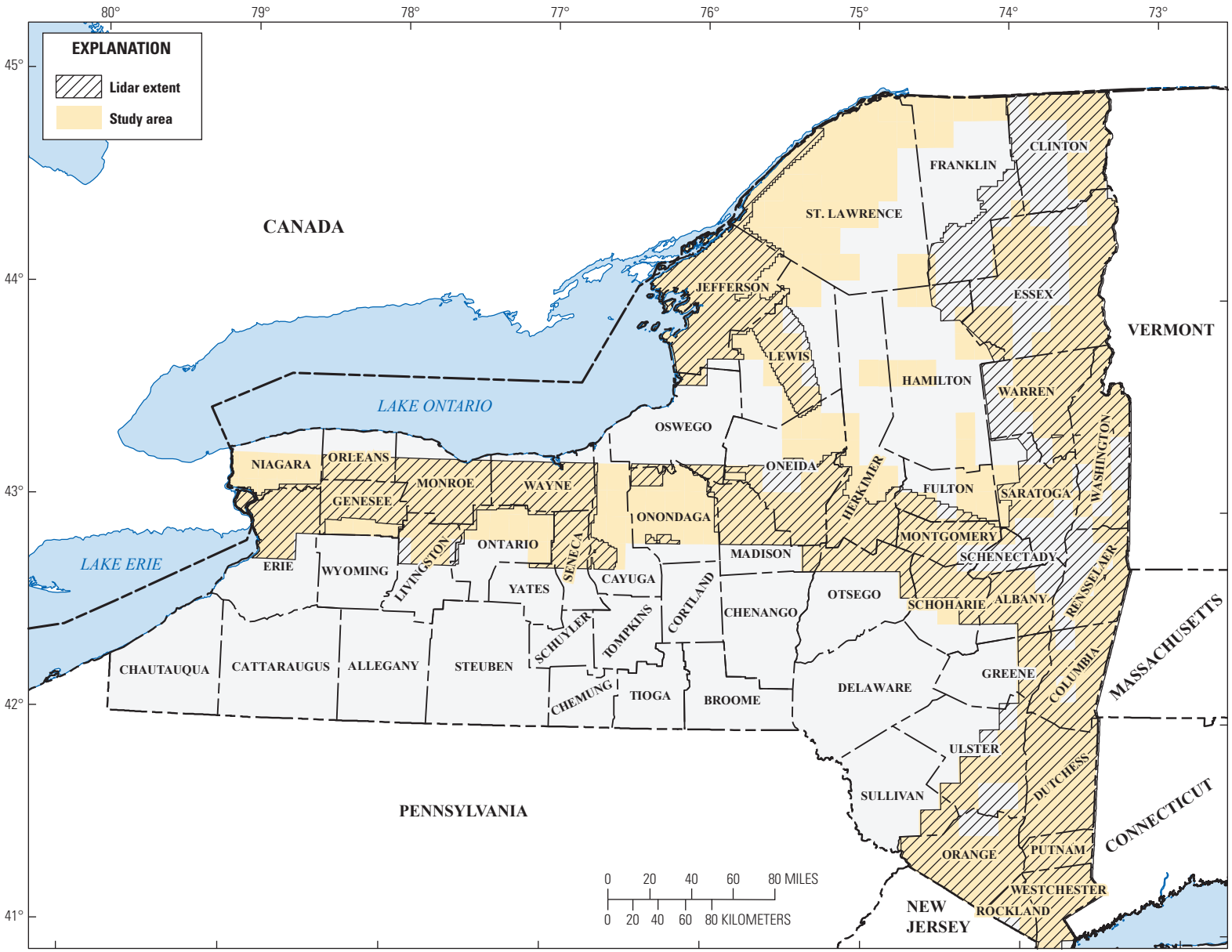


Figure 26. Extent of light detection and ranging (lidar)-derived digital elevation models within the karst aquifer study area in New York.

included with the toolbox, which can be used iteratively to increase the precision of closed depression detections. Hydro allows flow measures to be manipulated and expose flow paths that do not exhibit a surficial, geomorphic expression such as a stream channel. Because of the scope of this study, Hydro was not used because flow paths from the National Hydrography Dataset (U.S. Geological Survey, 2017b) were created with adequate flow conditions to produce closed depressions of the desired scale. Cutter intersects and buffers roads and railroads with flow paths to generate a reconditioned raster DEM, which is then filled. A depth raster is generated by subtracting the reconditioned DEM from the filled DEM, and a final closed depression dataset is produced that satisfies both minimum depth and area thresholds. Results from the two methods were combined into one dataset.

The number of possible depressions identified per DEM quadrangle is determined by the minimum depth and area thresholds applied during data processing. Thresholds used for this statewide study were set at 1-m (3-ft) depth and 4,047-square meter (m^2; 1-acre) area; these threshold values are greater than what is typically used for lidar-based sinkhole identification studies. For the purposes of this study, the use of lidar was primarily intended to identify closed depressions that were not represented in the digital raster graphic database, in the same manner that the DRG images were used to identify closed depressions not represented in the digital contour database. For that reason, the threshold values were based on random sampling of DRG-derived closed depressions within the study area and represent the approximate mean geometric characteristics of the closed depressions sampled. Figures 27 and 28 provide examples of lidar-derived anthropogenic and naturally formed closed depressions inventoried using these thresholds. For ongoing and planned large-scale, county-based assessments in New York, the thresholds will be reduced to 10- and 30-cm (3.9- and 11.8-in.) depth and 100-m^2 (0.025-acre) area.

Aerial imagery from Pictometry International (Pictometry International Corp., 2015) and Google Earth (Google, 2015) was used to photographically verify each lidar-derived closed depression. This process provided the opportunity to delete any remaining artificial depressions and to include a brief description of each feature. The lidar-derived features were grouped into a six-category classification scheme (table 4).

Ancillary Data

Multiple thematic datasets can be used to assess the probability that a closed depression contributes to focused recharge. For this study, the thematic data selected are bedrock type, soil type, soil infiltration rate, and land cover. For each closed depression that was inventoried, a series of overlay analyses were used to determine the predominant bedrock type, soil type, and infiltration rate within a 250-m (820-ft) buffer around the feature. Land cover percentages within a 250-m (820-ft) buffer around each feature were also computed. The results from the overlay analyses for each closed depression are summarized in the “Results” section of this report; results are recorded as feature attributes to the data included in Reddy and others (2020).

The bedrock-type attribute was derived from the State Geologic Map Compilation Geodatabase of the Conterminous United States (Horton and others, 2017). Bedrock geologic

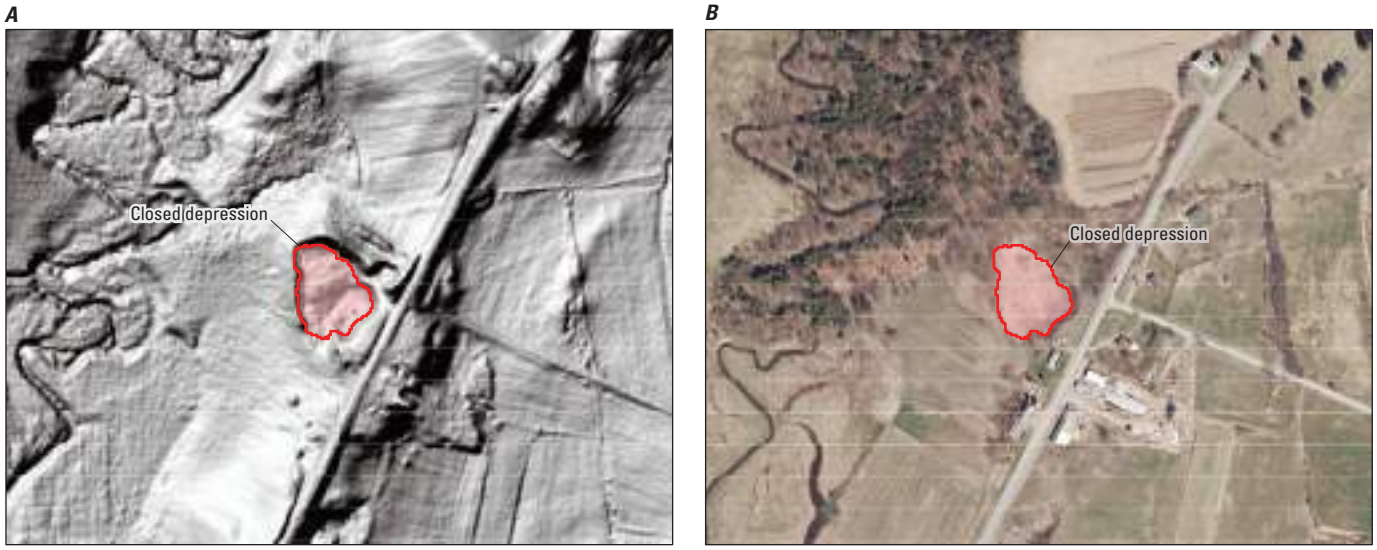


Figure 27. A closed depression near Argyle, Washington County, New York, identified using light detection and ranging (lidar)-derived digital elevation models (DEMs). This feature (inactive gravel pit) was not represented in other data sources; the feature as it appears on *A*, lidar-based hill-shade relief imagery and *B*, Google Earth imagery. The feature is divided between agricultural and developed land cover classes, underlain by noncarbonate bedrock (Canajoharie Shale) and glacial outwash soil with a high infiltration rate.

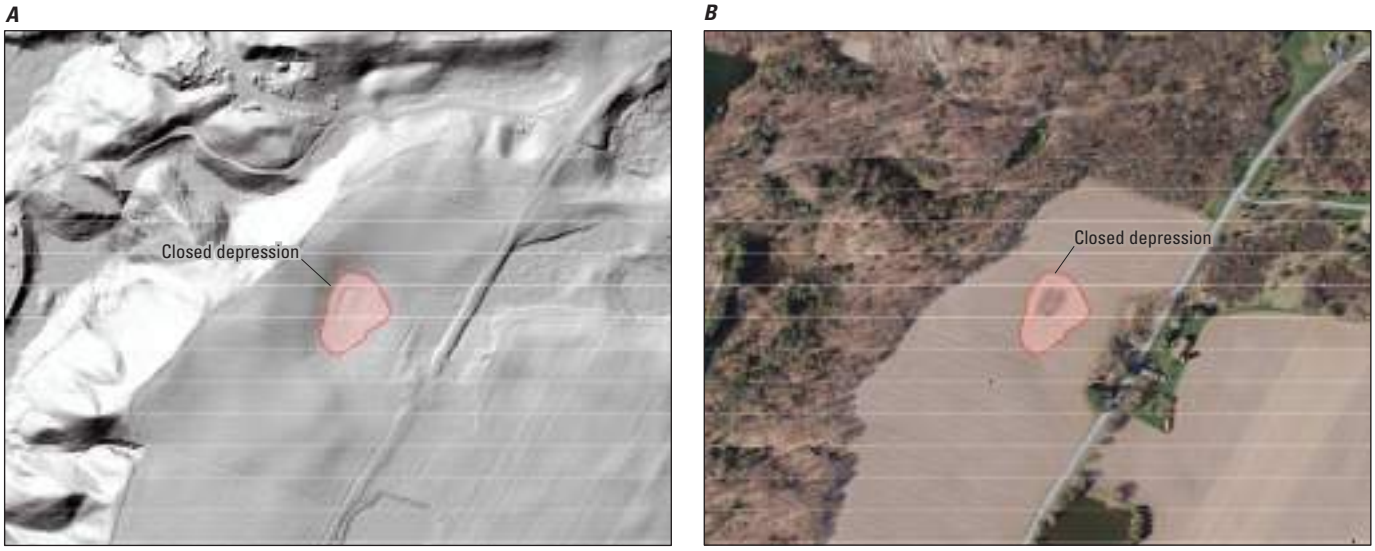


Figure 28. A closed depression near Ludlow Corners, Oneida County, New York, identified using light detection and ranging (lidar)-derived digital elevation models (DEMs); this feature was not represented in other data sources. The probable sinkhole as it appears on *A*, lidar-based hill-shade relief imagery and *B*, Google Earth imagery. The feature is located in an agricultural field, underlain by carbonate bedrock and glacial outwash soil with a high infiltration rate.

units were selected based on their established association with karst development; these units were then grouped into eight categories (table 2). A 2-mi-wide area of noncarbonate bedrock extending from Erie County to Greene County was included in the bedrock-type overlay analyses. In this area, which is south of the Onondaga and Helderberg Groups limestone, carbonate bedrock is overlain by shale. This represents an area of potential allogenic recharge. Surface water in this area flows from shale onto the adjacent carbonate bedrock and contributes to the potential for focused recharge (fig. 29).

Soil type was derived from the gridded Soil Survey Geographic database data for New York (Natural Resources Conservation Service, 2014). Based on research at Cornell University (Czymmek and others, 2004) and the U.S. Department of Agriculture (Stephen Page, Natural Resources Conservation Service, written commun., May 2017), 182 soil types in New York were identified as having characteristics that potentially present an increased risk for groundwater contamination. For this study, the 182 soil types were grouped into five classes (table 5). Three of the five soil classes

Table 4. Classification scheme for light detection and ranging (lidar)-derived closed depressions in New York.

[FeatCode, feature code]

Feat-Code	Origin	Description
1	Natural	Definite closed depression, natural in origin, for example, a closed depression in agricultural land exhibiting sinkhole signature.
2	Anthropogenic	Definite closed depression, anthropogenic in origin, for example, a small gravel pit or a surface water detention basin.
3	Natural and anthropogenic	Probable closed depression, includes natural and anthropogenic in origin, for example, shallow depression in agricultural land or probable detention basin at industrial park.
4	Natural and anthropogenic	Possible closed depression, includes natural and anthropogenic in origin, same as FeatCode 3 but with less certainty.
5	Anthropogenic	Impeded areas where surface water drainage is impeded, resulting in standing liquid, not a true closed depression, anthropogenic in origin, for example, surface water that collects along a roadbed near a culvert.
6	Natural and anthropogenic	Indeterminate, lidar-derived features that could not be verified through photographic analysis, for example, closed depressions in heavily wooded areas.

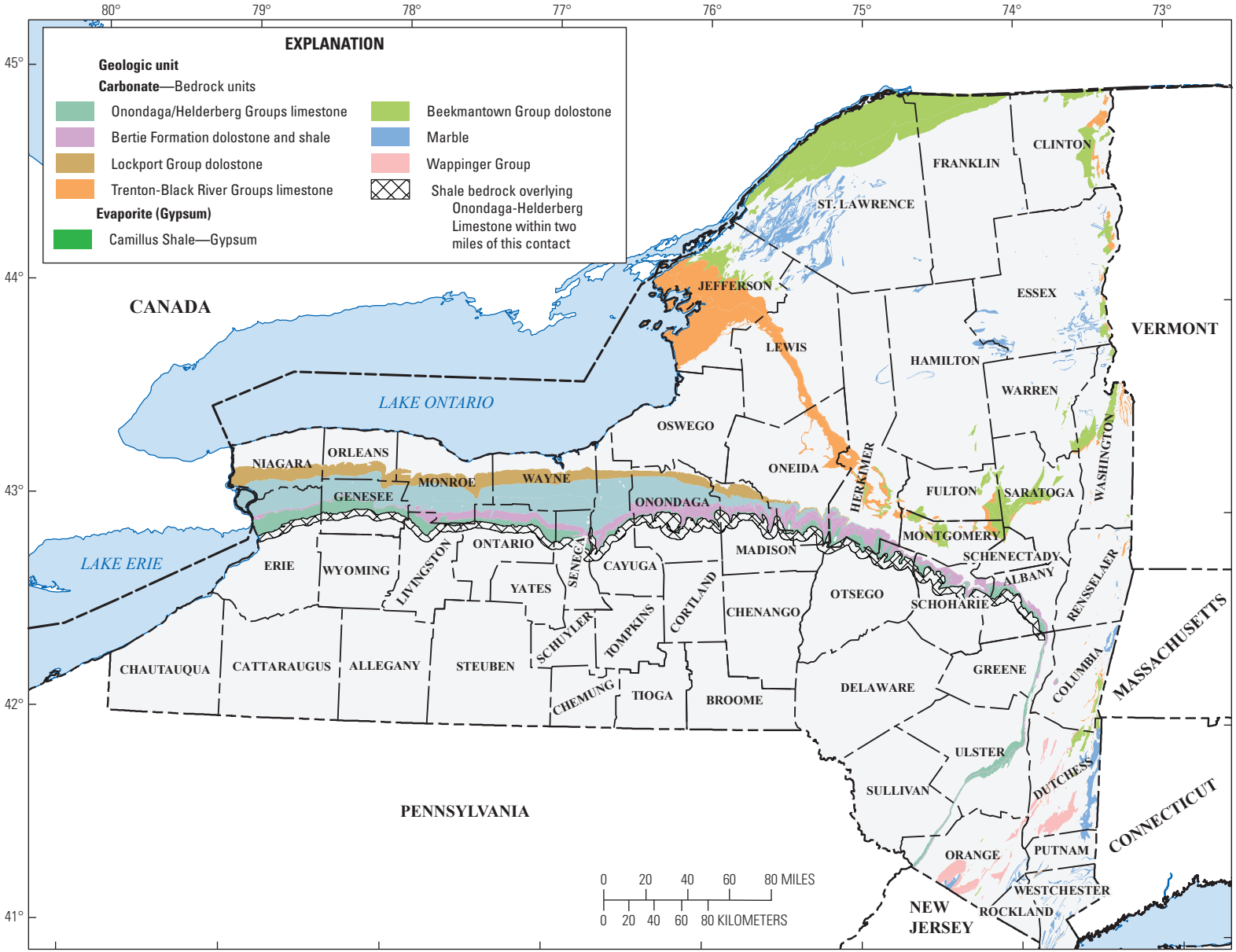


Figure 29. Shale bedrock in New York that may contribute allogenic recharge to the adjacent carbonate-rock aquifer.

Table 5. Classification scheme for soils in New York.

[Soil classifications are from the Soil Survey Geographic database (SSURGO; Natural Resources Conservation Service, 2019). in., inch]

SSURGO map unit name
Soil class 1, depth less than 20 in. over carbonate bedrock
Benson
Farmington
Galoo
Gouverneur
Hannawa
Joliet
Kings Falls
Rockland, limestone
Rubbleland (Genesee County)
Ruse
Summerville
Soil class 2, depth less than 40 in. over carbonate bedrock
Aurora
Brockport
Camillus
Chaumont
Chippeny
Galway
Groton variant (Jefferson Co.)
Guff
Guffin
Lairdsville
Lockport
Madalin variant (Montgomery and Schenectady Co.)
Matoon
Neckrock
Nehasne
Newstead
Ogdensburg
Palatine
Riga
Sun variant (Monroe Co.)
Varick
Wassaic
Wilpoint
Soil class 3, depth range 20 to 60 in. over carbonate bedrock
Allis
Angola
Appleton, limestone substratum (Monroe, Orleans)
Cayuga, limestone substratum (Niagara)

Table 5. Classification scheme for soils in New York.—Continued

[Soil classifications are from the Soil Survey Geographic database (SSURGO; Natural Resources Conservation Service, 2019). in., inch]

SSURGO map unit name
Cazenovia, bedrock substratum (Monroe, Niagara, Orleans, Wayne)
Collamer, bedrock substratum (Jefferson, Seneca)
Gardenisle
Hilton, bedrock substratum (Livingston, Niagara, Orleans, Wayne)
Honeoye, limestone substratum (Monroe)
Kendaia, bedrock substratum (Orleans)
Lakemont, shale substratum (Orleans, Wayne)
Lima, limestone substratum (Monroe)
Lyons, rock substratum (Orleans)
Mohawk, shale substratum (Herkimer)
Niagara, bedrock substratum (Jefferson)
Nuhi
Ontario, bedrock substratum/moderately shallow (Cayuga, Niagara, Orleans, Seneca)
Ontario, stony (Genesee: OsB, OsC)
Ovid, bedrock substratum (Monroe, Niagara, Orleans)
Redwater
Stockbridge (Ulster)
Uwihreh
Yunenyeti
Soil class 4, well-drained glacial outwash bedrock
Adams
Agawam
Allagash
Allard
Allard variant
Altmar
Alton
Atsion
Au Gres
Barbour
Berryland
Bonaparte
Carver
Castile
Champlain
Chenango
Colonie
Colosse
Colton
Constable
Copake

Table 5. Classification scheme for soils in New York.—Continued

[Soil classifications are from the Soil Survey Geographic database (SSURGO; Natural Resources Conservation Service, 2019). in., inch]

SSURGO map unit name
Covert
Croghan
Deerfield
Deford
Deinache
Deposit
Duane
Duneland
Duxbury
Elnora
Enfield
Fahey
Fluvaquents
Fredon
Gougeville
Granby
Grattan
Groton
Halsey
Haven
Hempstead
Hinckley
Homer
Hoosic
Howard
Jebavy
Junius
Kars
Knickerbocker
Linlithgo
Middlebury
Mooers
Naumburg
Ninigret
Oakville
Occum
Occum variant
Olean
Ondawa
Otisville
Palmyra
Pawling

Table 5. Classification scheme for soils in New York.—Continued

[Soil classifications are from the Soil Survey Geographic database (SSURGO; Natural Resources Conservation Service, 2019). in., inch]

SSURGO map unit name
Phelps
Philo
Pipestone
Pits, gravel and sand
Plainfield
Plymouth
Podunk
Pompton
Pootatuck
Raypol
Rippowam
Riverhead
Rumney
Scarboro
Sciota
Searsport
Stafford
Sudbury
Suncook
Trestle
Trout River
Tunkhannock
Udifluvents
Udipsamments
Waddington
Wainola
Wallace
Walpole
Wampsville
Wappinger
Wareham
Windsor
Wyalusing
Soil class 5, depth less than 20 in. over noncarbonate bedrock
Abram
Arnot
Canaan
Couchsachraga
Glover
Halcott
Hawksnest
Hogback

Table 5. Classification scheme for soils in New York.—Continued

[Soil classifications are from the Soil Survey Geographic database (SSURGO; Natural Resources Conservation Service, 2019). in., inch]

SSURGO map unit name
Hollis
Holyoke
Insula
Irona
Kearsarge
Knob Lock
Lordstown variant (Cortland Co.)
Lyman
Nassau
Quetico
Ricker
Rock Land
Rock Outcrop
Skylight
Taconic
Topknot
Tor
Torull
Tuller
Woodstock
Wotalf

represent thin soils over carbonate bedrock, one represents thin soils over noncarbonate bedrock, and the fifth represents soils over well-drained glacial materials.

Infiltration rate is an important soil characteristic to consider when assessing the probability that a closed depression contributes to focused recharge. A soil infiltration rate dataset was derived from the gridded Soil Survey Geographic database for New York (Natural Resources Conservation Service, 2014). The dataset identifies areas in New York with soils that have high and moderate infiltration rates (table 6).

The 2011 National Land Cover Database (NLCD; Homer and others, 2015) was used to compute land cover percentages within a 250-m (820-ft) buffer around each closed depression. The NLCD 2011 data for New York is a 15-class land cover classification system. For this study, the NLCD 2011 data were reclassified to a five-class system (table 7). The land cover percentages were computed in ArcGIS using the Feature Statistics-To-Table tool available in the National Water-Quality Assessment Area-Characterization toolbox (Price and others, 2010)

Table 6. Classification scheme for soil infiltration rate in New York.

[gSSURGO, gridded Soil Survey Geographic database (Natural Resources Conservation Service, 2014); HydroGrp, hydrological group; >, greater than]

HydroGrp	gSSURGO soil group	Description
1	Group A	> 1.42 inches per hour
2	Group B	0.57 to 1.42 inches per hour

Table 7. Land cover classifications for New York.

[Classifications are from the National Land Cover Database for 2011 (Homer and others, 2015)]

Class code	Classification
	Open water
11	Open water
	Developed
21	Developed, open space
22	Developed, low intensity
23	Developed, medium intensity
24	Developed, high intensity
31	Barren land
	Forested
41	Deciduous forest
42	Evergreen forest
43	Mixed forest
52	Shrub/scrub
	Agriculture
71	Grassland/herbaceous
81	Pasture/hay
82	Cultivated crops
	Wetland
90	Woody wetlands
95	Emergent herbaceous wetlands

Results

A total of 5,023 closed depressions were inventoried for this study (table 8). The digital contour database contains 2,032 closed depressions (fig. 30), the digital raster graphic database contains 2,477 closed depressions (fig. 31), and the lidar database contains 514 large closed depressions (fig. 32). Several areas of clustered closed depressions are evident when the findings from the three databases are combined (fig. 33). Some of the clusters occur in areas underlain by noncarbonate bedrock.

Table 8. Closed depressions in New York, by data source.

[lidar, light detection and ranging]

Data source	Data type	Number of closed depressions
Digital contour database	Polygon	2,032
Digital raster graphic database	Point	2,477
Lidar database	Polygon	514

In terms of total number of closed depressions per county, Dutchess, Jefferson, and St. Lawrence rated highest with more than 300 in each county (fig. 34). In terms of concentration of closed depressions per unit study area for each county, Monroe, Ontario, and Oswego are rated highest with greater than 0.2 depression per square kilometer (fig. 35). Comparing the locations of the closed depressions with the selected bedrock geologic units indicated that 51 percent of the features inventoried lie outside the extent of the selected units (fig. 36); 10 percent of the closed depressions lie within the Beekmantown Group, and only 1 percent, within the Wappinger Group. The number of depressions within the remaining limestone, dolostone, and marble units ranges from 4 to 9 percent.

From the overlay analysis between closed depressions and soil class (fig. 37) it was determined that most of the closed depressions lie outside the extent of the five soil classes; 35 percent of the depressions lie within well-drained soils on sand-and-gravel deposits, which might include alluvium, alluvial fan, glaciofluvial, and glaciodeltaic deposits. The number of closed depressions within the remaining four soil classes ranges from 1 to 8 percent.

Twenty-three percent of the closed depressions are on soils with high infiltration rates (fig. 38), and 6 percent are on soils with moderate infiltration rates. Most of the closed depressions lie outside the extent of the high- to moderate-infiltration-rate soils.

Overlaying closed depressions and land cover indicated that half of the closed depressions inventoried lie within the forested land cover class (fig. 39), and 28 percent are in agricultural areas. The wetland land cover class accounts for 12 percent of the depressions; 9 percent are in areas classified as developed, and 1 percent of the closed depressions lie within the open water land cover class (these are typically small ponds or marshes).

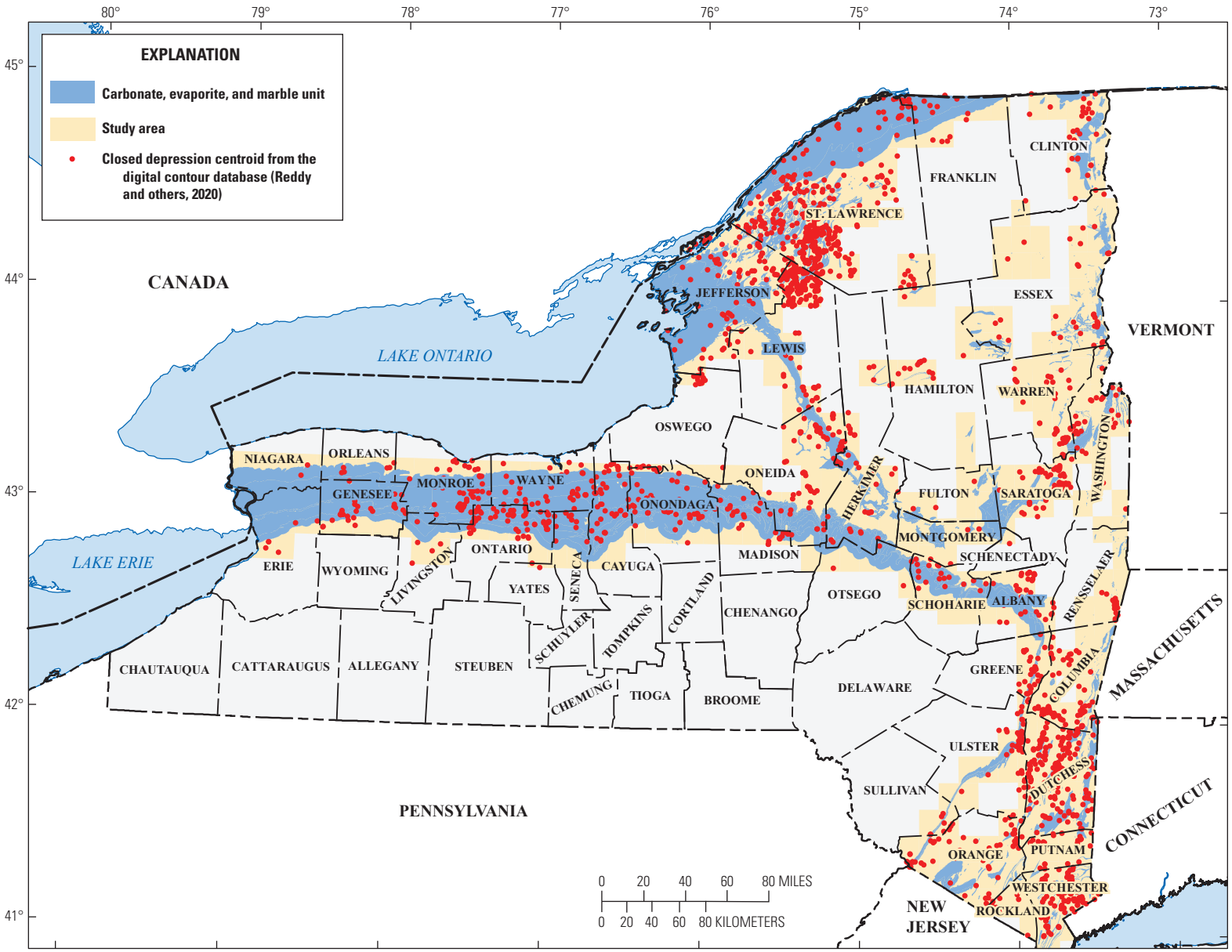


Figure 30. Distribution of closed depressions in New York in the digital contour database (Reddy and others, 2020).

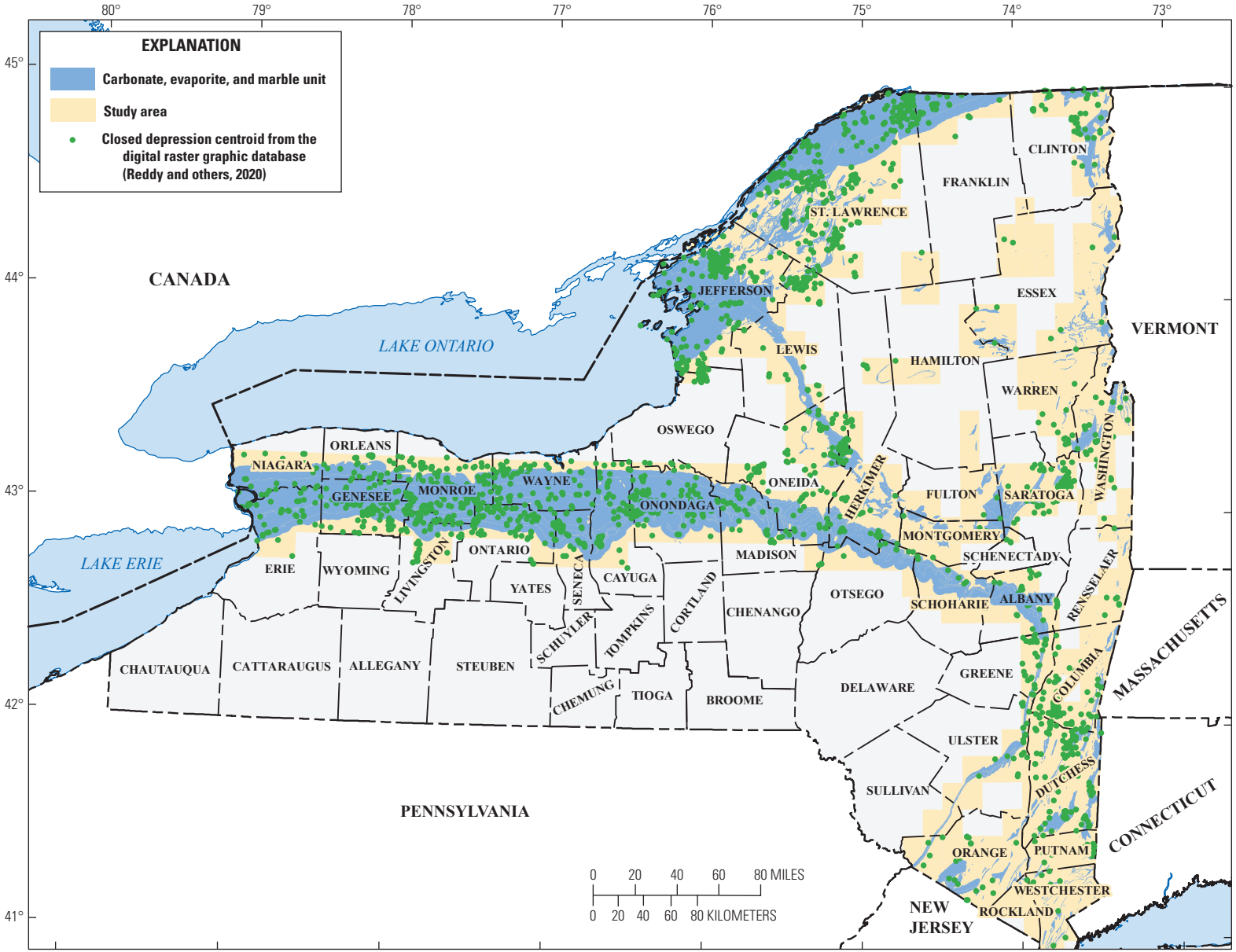


Figure 31. Distribution of closed depressions in New York in the digital raster graphic database (Reddy and others, 2020).

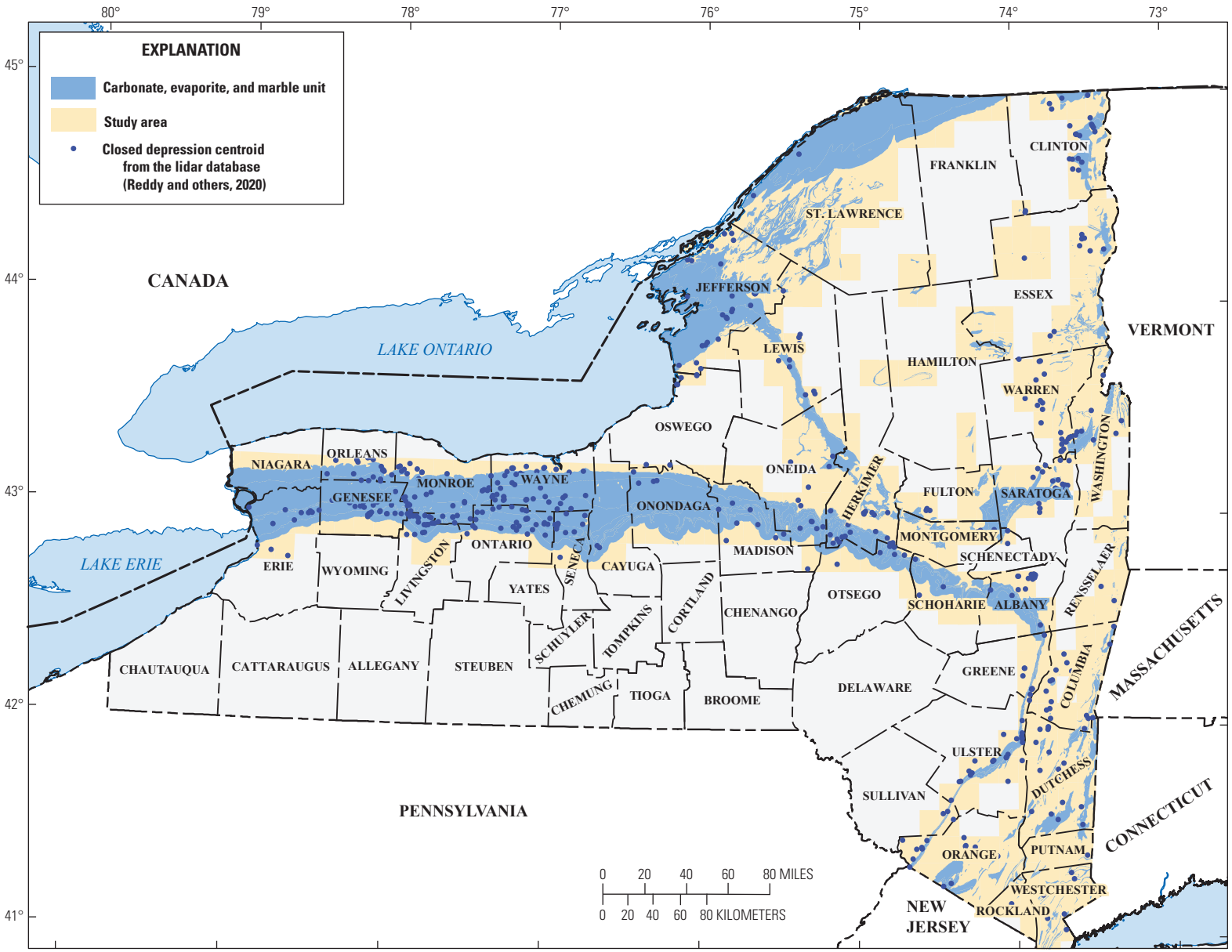


Figure 32. Distribution of closed depressions in New York in the light detection and ranging (lidar) database (Reddy and others, 2020).

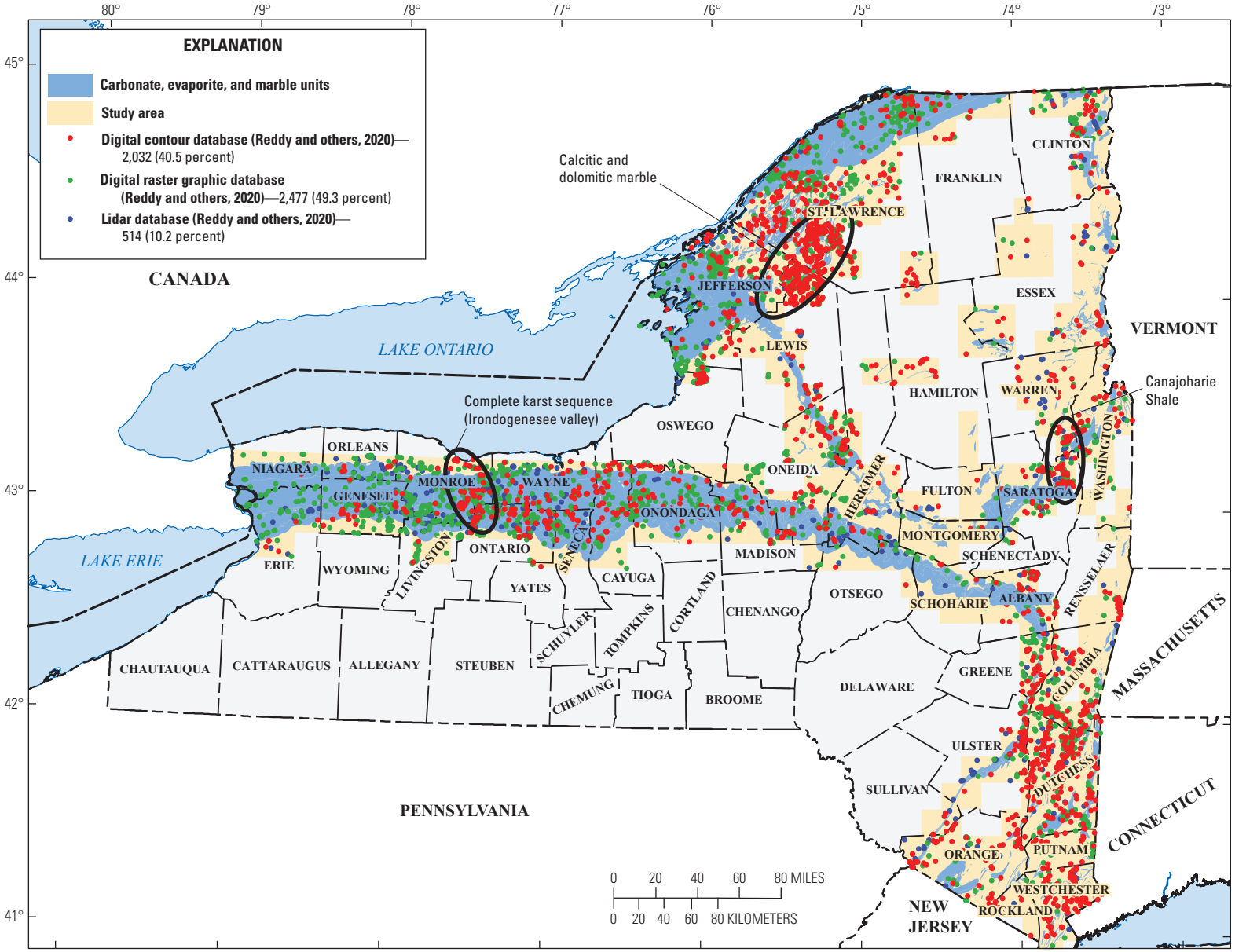


Figure 33. Distribution of all closed depressions in New York, from the digital contour, digital raster graphic, and light detection and ranging (lidar) databases (Reddy and others, 2020).

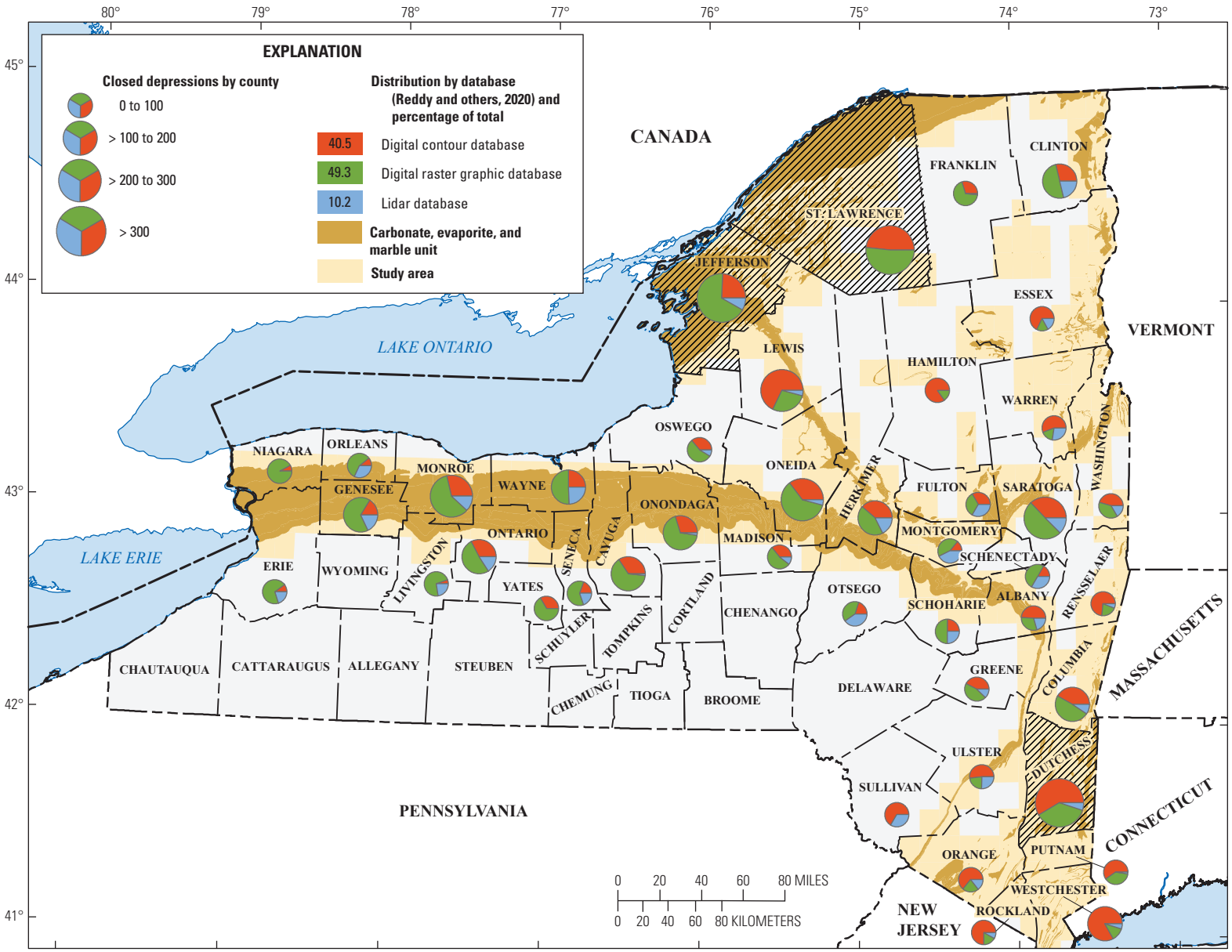


Figure 34. Concentration of closed depressions in New York, by source and quantity for each county. Dutchess, Jefferson, and St. Lawrence Counties (hachured) rate highest with more than 300 depressions in each county. >, greater than.

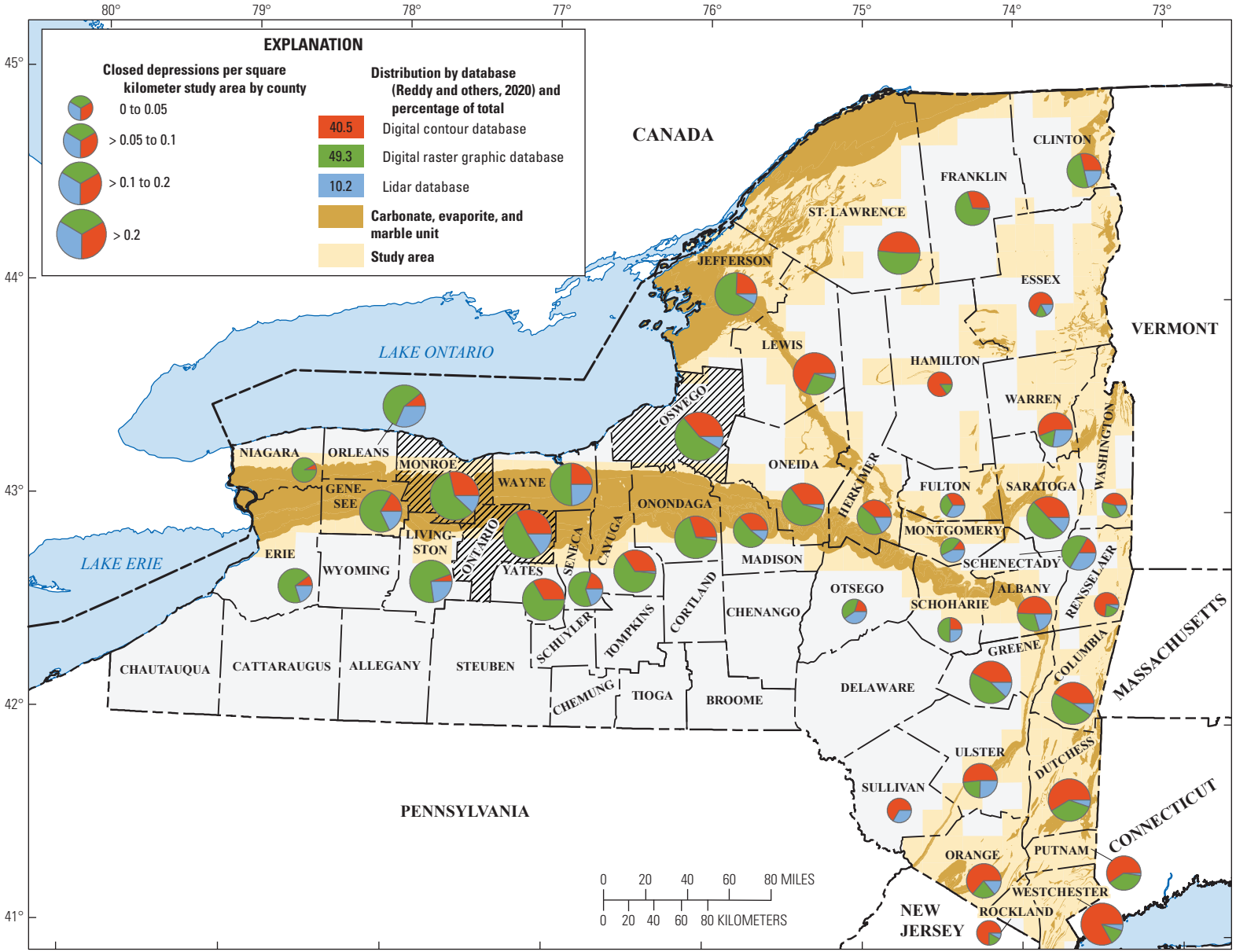


Figure 35. Concentration of closed depressions in New York, per square kilometer of study area for each county. The counties with the highest concentration of closed depressions (hachured) are Monroe, Ontario, and Oswego. >, greater than.

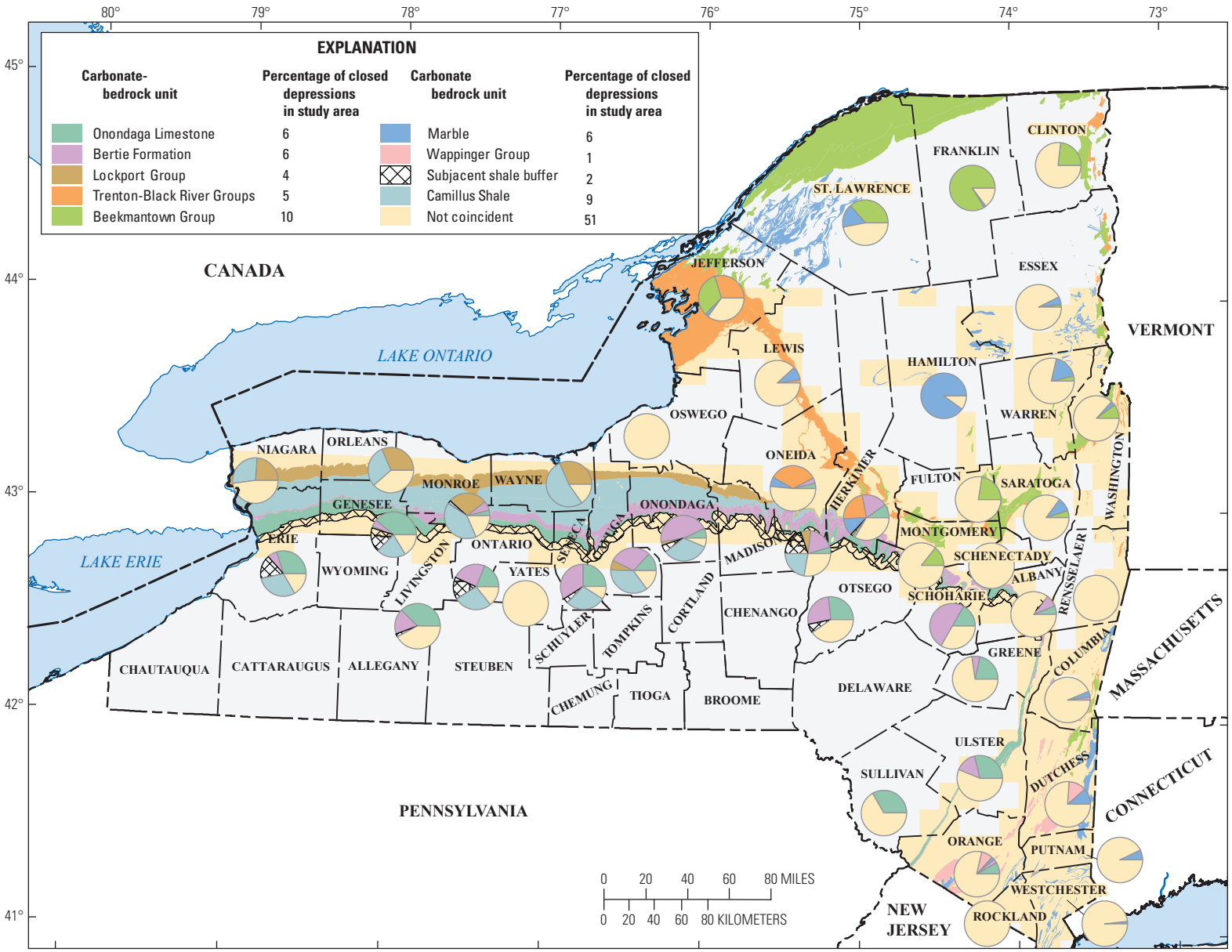


Figure 36. Bedrock geology and distribution of closed depressions in New York, by county.

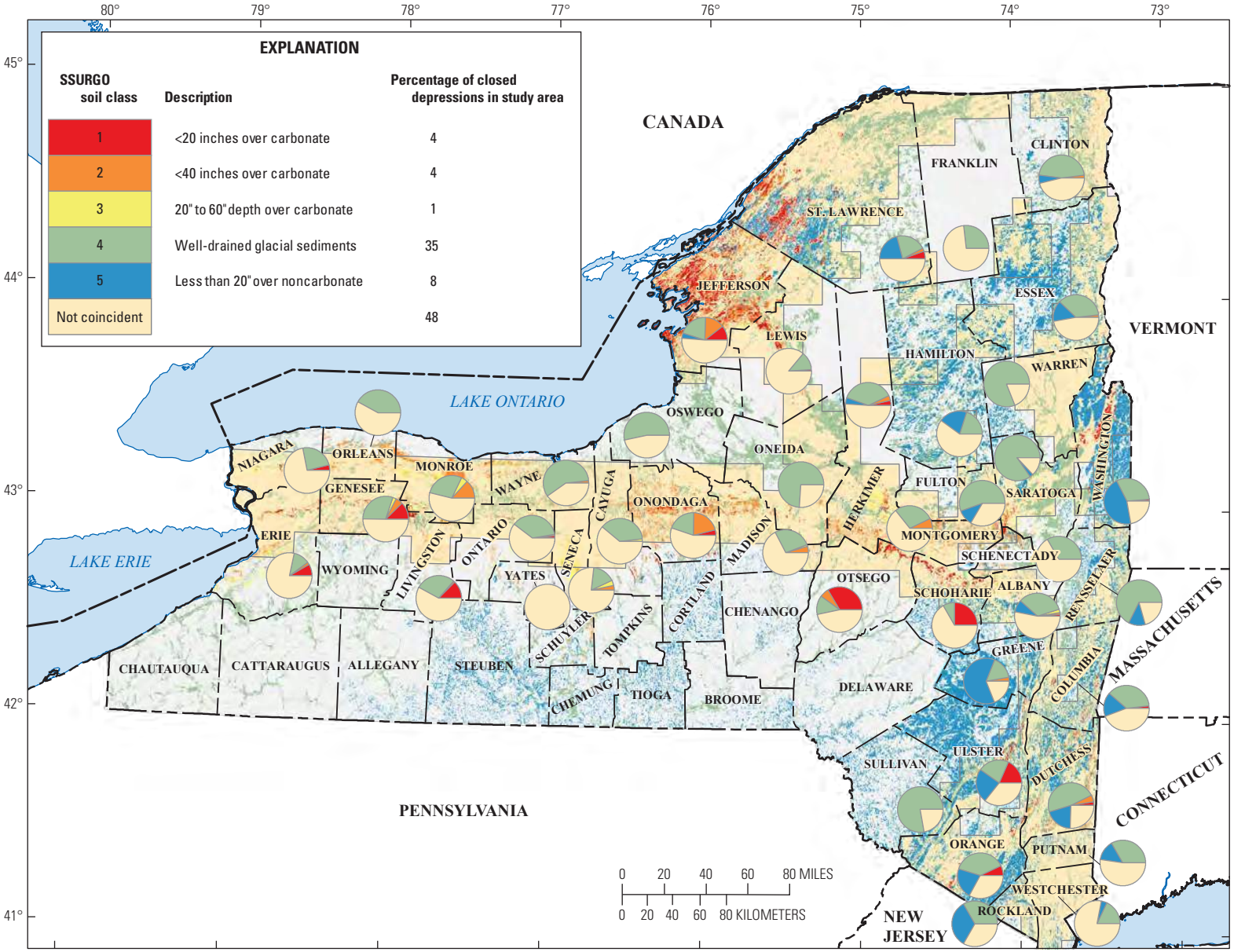


Figure 37. Distribution of soils and closed depressions in New York, by county. SSURGO, Soil Survey Geographic database (Natural Resources Conservation Service, 2019); <, less than.

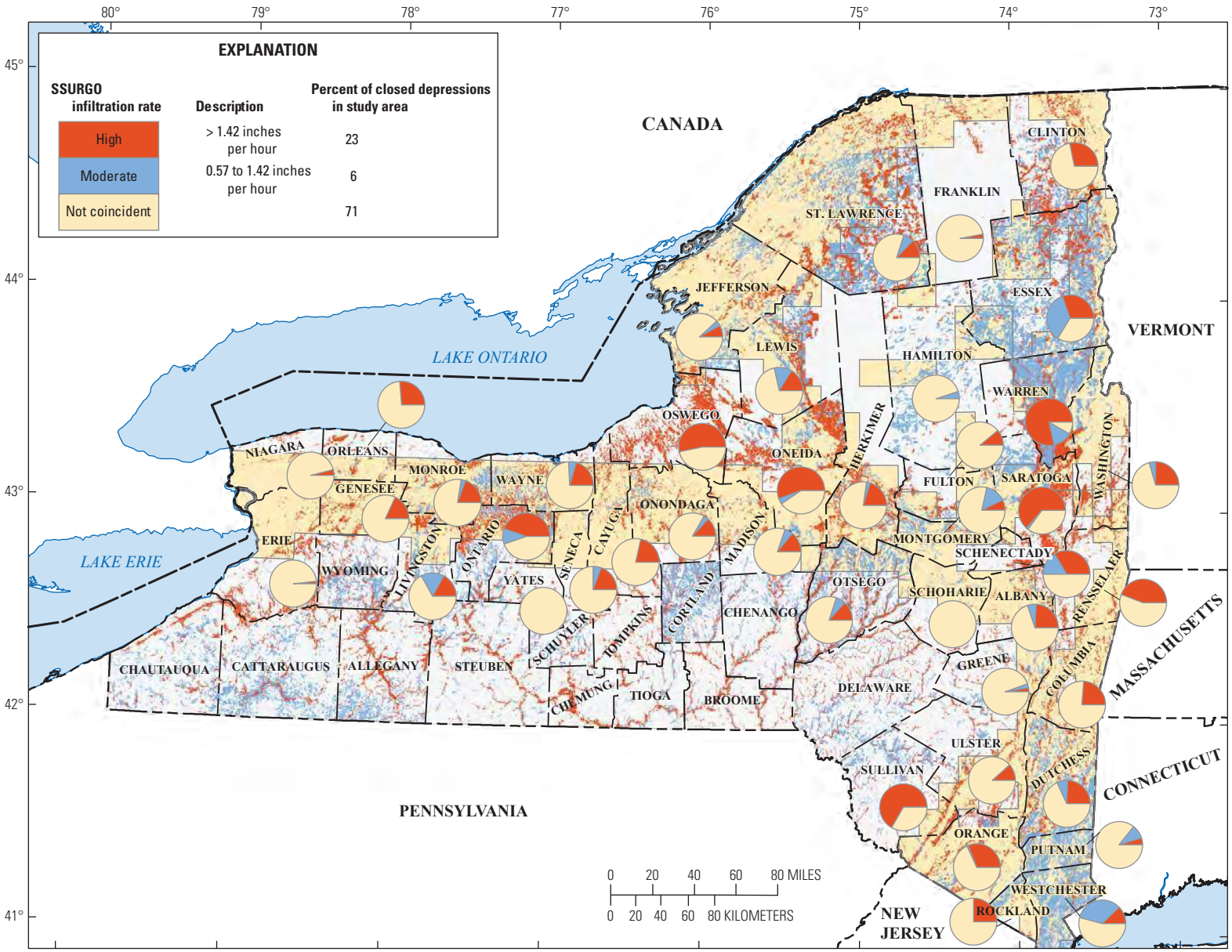


Figure 38. Distribution of soil infiltration rate and closed depressions in New York, by county. SSURGO, Soil Survey Geographic database (Natural Resources Conservation Service, 2019); >, greater than.

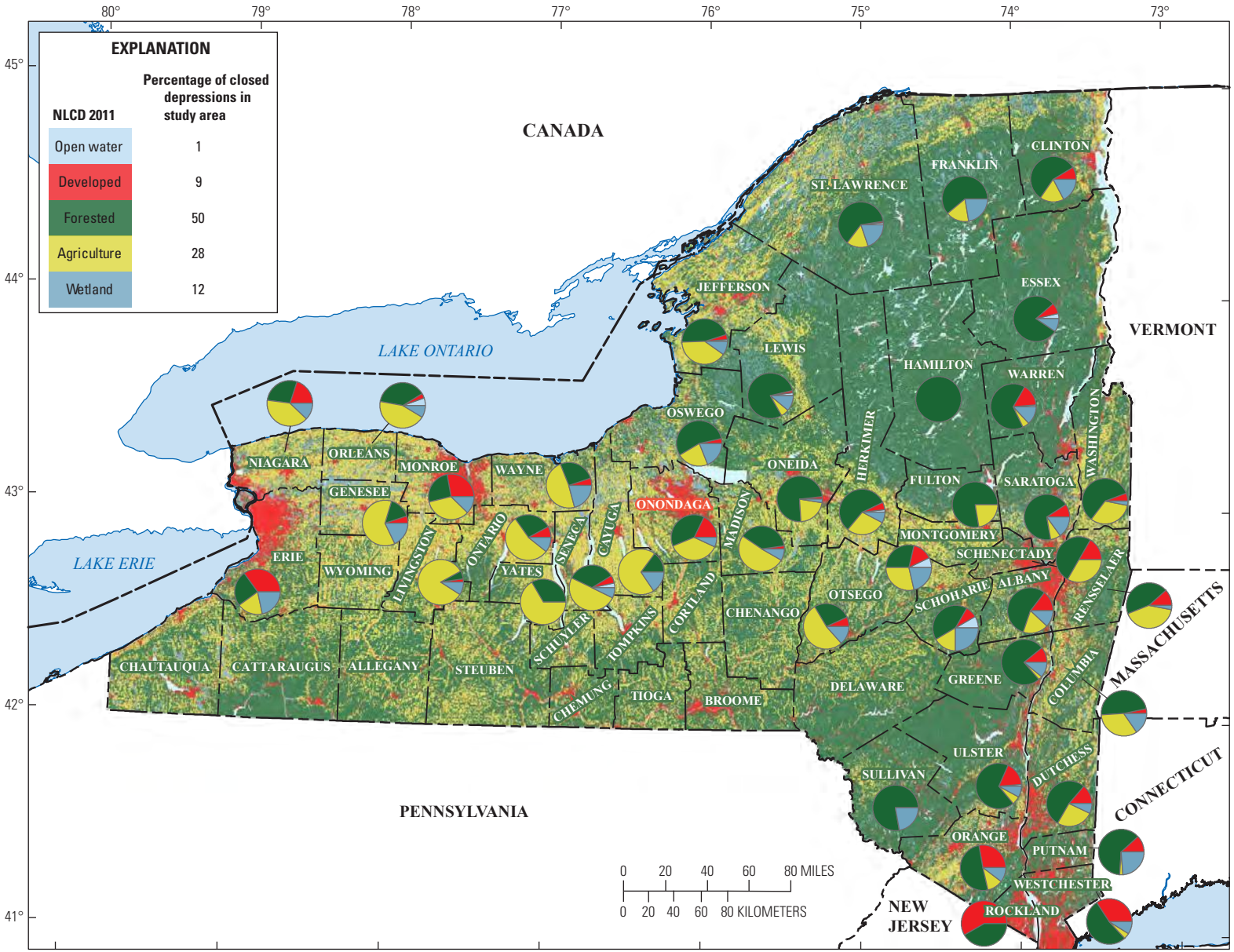


Figure 39. Distribution of land cover and closed depressions in New York, by county. NLCD 2011, National Land Cover Database for 2011 (Homer and others, 2015; U.S. Geological Survey, 2015).

Summary

Karst is a landscape formed from the dissolution of soluble rock or rock containing minerals that are easily dissolved from within the rock. The landscape is characterized by sinkholes, caves, losing streams, springs, and underground drainage systems which rapidly move water through the karst. The two forms of karst in New York State include carbonate karst, which forms in carbonate rock (limestone, marble, and dolostone), and evaporite karst, which forms in rock that contains evaporite minerals (gypsum and halite). Closed depressions that are created at the land surface by karstification of the underlying bedrock or through other natural or anthropogenic processes focus surface-water recharge to underlying bedrock.

Past and recent studies of karst bedrock across the State have shown that areas of focused recharge in karstic carbonate rock allows contaminants to enter aquifer systems with little attenuation. Focused areas of recharge need to be identified to help prevent such contamination from sources on or adjacent to karst. The New York State Department of Environmental Conservation has begun to work with the agricultural community to make farmers and farm-planning advisors more aware of karst and how to manage their daily activities to reduce their impact on surface-water and groundwater resources, especially in karst areas. Where evaporite karst is present, in addition to limited attenuation of any contaminant within a karst system, there is also a greater potential for land-surface subsidence due to the more-aggressive dissolution of evaporite minerals (gypsum or halite) if close to the land surface or as a result of mining of these evaporite minerals.

The U.S. Geological Survey has compiled an inventory of closed depressions from statewide digital contour data, scanned 7.5-minute topographic maps known as a digital raster graphics, and light detection and ranging (lidar) digital elevation models. The identification of where karst rock is present in New York and the location of closed depressions over or near karst rock was completed using publicly available geospatial data and Esri ArcGIS software. Carbonate, evaporite, and marble geologic units were selected from a statewide 1:250,000-scale bedrock geology dataset. The selected geologic units were intersected with an index of 7.5-minute quadrangle maps. Quadrangle maps that overlay the selected geologic units form the basis of the study area.

Analysis of the data resulted in the identification of 5,023 closed depressions. The results are publicly available in three databases, one for each source of elevation data. The inventory was conducted such that there is no duplication of results from analysis of the three data sources. The closed depression features in the digital contour database and the lidar database are represented as polygon features. Points are used to represent the closed depressions in the digital raster graphic database.

A series of overlay analyses were conducted using the closed depressions and thematic data known to be key factors in determining the probability of a closed depression contributing to focused groundwater recharge. The thematic data layers used for the analyses were bedrock geology, soil type, soil infiltration rate, and land cover. Results from the overlay analyses were added as attributes to the data tables associated with the three publicly available databases.

Though the extent of karst development is important in understanding the surface water–groundwater interaction in karst terrains, some of the worst cases of groundwater contamination are in karst where only minor karst features might be present. The presence of karst, be it a short section of a solutioned fracture or an extensive cave system requires careful consideration, forward-looking environmental planning, and consistent water-quality protection to preserve New York State's water resources.

References Cited

Baker, V.R., 1976, Hydrogeology of a cavernous limestone terrain and the hydrochemical mechanisms of its formation, Mohawk River basin, New York: Empire State Geogram, v. 12, no. 2, p. 2–65.

Bernstein, L.M., 1992, A revised lithostratigraphy of the Lower-Middle Ordovician Beekmantown Group, St. Lawrence Lowlands, Quebec and Ontario: Canadian Journal of Earth Sciences, v. 29, no. 12, p. 2677–2694, accessed February 2017 at https://doi.org/10.1139/e92-212.

Braun, B.B., 2000, Karst hydrology of the Cobleskill plateau, Schoharie County, New York: State University of New York at Oneonta, master's thesis, 76 p.

Cooper, M.P., and Mylroie, J.E., 2015, Glaciation and speleogenesis—Interpretations from the northeastern United States: New York, Springer International Publishing, 142 p. [Also available at https://doi.org/10.1007/978-3-319-16534-9.]

Czymmek, K., van Es, H., and Geohring, L., 2004, Manure and groundwater—The case for protective measures and supporting guidelines. Cornell University, 10 p. [Also available at http://nmsp.cals.cornell.edu/publications/files/Groundwater.pdf.]

Czymmek, K.J., Geohring, L., Lendrum, J., Wright, P., Albrecht, G., Brower, B., and Ketterings, Q.M., 2011, Manure management guidelines for limestone bedrock/karst areas of Genesee County, New York—Practices for risk reduction: Cornell University Animal Science Publication Series 240, 9 p. [Also available at http://nmsp.cals.cornell.edu/publications/files/Karst_2_15_2011.pdf.]

Dean, W.E., and Johnson, K.S., eds., 1989, v. 1794. Anhydrite deposits of the United States and characteristics of anhydrite important for storage of radioactive wastes, U.S. Geological Survey Bulletin, 134 p. [Also available at https://doi.org/10.3133/b1794.]

Doctor, D.H., and Young, J.A., 2013, An evaluation of automated GIS tools for delineating karst sinkholes and closed depressions from 1-meter lidar-derived digital elevation data, *in* Land, L., Doctor, D.H., and Stephenson, J.B., eds., Sinkholes and the engineering and environmental impacts of karst *in* Proceedings of the Thirteenth Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst, May 6–10, 2013, Carlsbad, New Mexico: Carlsbad, N. Mex., National Cave and Karst Institute, p. 449–458, accessed June 2019 at https://doi.org/10.5038/9780979542275.1156.

Eckhardt, D.A., Williams, J.H., and Anderson, J.A., 2011, Geophysical, stratigraphic, and flow-zone logs of selected wells in Cayuga County, New York, 2001–2011: U.S. Geological Survey Open-File Report 2011–1319, 13 p. [Also available at https://doi.org/10.3133/ofr20111319.]

Esri, 2016, ArcGIS release 10.5: Redlands, Calif., Esri software, accessed June 2019 at https://www.esri.com/software/arcgis/eval-help/index.html.

Field, M.S., 2002, A lexicon of cave and karst terminology with special reference to environmental karst hydrology: U.S. Environmental Protection Agency EPA/600/R–02/003, 214 p. [Also available at https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=54964.]

Fluhr, T.W., 1973, Construction problems, *in* Fluhr, T.W., and Terenzio, V.G., Geologic record of the work of the Board of Water Supply, City of New York: New York State Geological Survey Open File 06.046, p. 334–473.

Fluhr, T.W., and Terenzio, V.G., 1984, Engineering geology of the New York City water supply system: New York State Geological Survey Open File 05.08.001, 183 p.

Ford, D., and Williams, P., 2007, Karst hydrogeology and geomorphology: West Sussex, United Kingdom, John Wiley & Sons, 562 p. [Also available at https://doi.org/10.1002/9781118684986.]

Forrest Environmental Services, Inc., 2001, Geophysical survey—Oatka Creek Park, Garbutt, New York: Monroe County Parks Department project FES00126, 18 p.

Fullerton, D.S., 1980, Preliminary correlation of post-Erie interstadial events (16,000–10,000 radiocarbon years before present), central and eastern Great Lakes region, and Hudson, Champlain, and St. Lawrence lowlands, United States and Canada: U.S. Geological Survey Professional Paper 1089, 52 p., 2 pls. [Also available at https://doi.org/10.3133/pp1089.]

Goodman, W.M., Gnage, D.J., and Smith, P.H., 2011, The saline water belt marginal to bedded salt deposits of the Silurian Salina Group, western New York State—A possible glacial "pocket" aquifer: Rochester Committee for Scientific Information Bulletin 333, 21 p. [Also available at http://www.server79x.net/rcsi_bulletins/Bulletin%20333_2011.10.31.pdf.]

Google, 2015, Google Earth: Google, accessed 2015 at https://www.google.com/earth/.

Hackett, W.R., Gleason, G.C., and Kappel, W.M., 2009, Land-surface subsidence and open bedrock fractures in the Tully Valley, Onondaga County, New York: U.S. Geological Survey Open-File Report 1188, 16 p. [Also available at https://doi.org/10.3133/ofr20091188.]

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 national land cover database for the conterminous United States—Representing a decade of land cover change information: Photogrammetric Engineering and Remote Sensing, v. 81, no. 5, p. 345–354. [Also available at https://www.mrlc.gov/data/nlcd-2011-land-cover-conus-0.]

Horton, J.D., San Juan, C.A., and Stoeser, D.B., 2017, The state geologic map compilation (SGMC) geodatabase of the conterminous United States (ver. 1.1, August 2017): U.S. Geological Survey Data Series 1052, 46 p., apps. [Also available at https://doi.org/10.3133/ds1052.]

HydroTech Ground Water Consultants, 1989, Evaluation of previous reports concerning the Loch Lea residential development: Town of Clarence, New York, 5 p., supp.

Isachsen, Y.W., 1981, Contemporary doming of the Adirondack mountains—Further evidence from releveling: Tectonophysics, v. 71, nos. 1–4, p. 95–96. [Also available at https://doi.org/10.1016/0040-1951(81)90051-2.]

Johnson, K.S., 2003, Evaporite-karst problems in the United States, *in* Johnson, K.S., and Neal, I.T., eds., Evaporite karst and engineering/environmental problems in the United States—Oklahoma Geological Survey Circular 109 p. 1–20.

Johnson, K.S., 2007, Evaporite-karst problems and studies in the USA: Environmental Geology, International Journal of Geosciences, v. 53, no. 5, p. 937–943. [Also available at https://doi.org/10.1007/s00254-007-0716-8.]

Kappel, W.M., and Jennings, M.B., 2012, Water resources of the Iroquois National Wildlife Refuge, Genesee and Orleans Counties, New York, 2009–2010: U.S. Geological Survey Scientific Investigations Report 2012–5027, 53 p. [Also available at https://doi.org/10.3133/sir20125027.]

Kresic, N., 2007, Hydraulic methods, *in* Goldscheider, N., and Drew, D., eds., Methods in karst hydrogeology: New York, Taylor and Francis Group, p. 65–92.

Lauritzen, S.E., and Mylroie, J.E., 2000, Results of speleotherm U/Th dating reconnaissance from the Helderberg Plateau, New York: Journal of Caves and Karst Studies, v. 62, no. 1, p. 20–26.

Marshak, S., 1990, Structural geology of Silurian and Devonian strata in the mid-Hudson Valley, New York—Fold-thrust belt tectonics in miniature: New York State Museum Map and Chart Series 51, 66 p.

Monroe, W.H., 1970, A glossary of karst terminology: U.S. Geological Survey Water Supply Paper 1899–K, 29 p. [Also available at https://doi.org/10.3133/wsp1899k.]

Natural Resources Conservation Service, 2014, Gridded soil survey geographic (gSSURGO) database for New York: U.S. Department of Agriculture database, accessed August 1, 2015, at https://gdg.sc.egov.usda.gov/.

Natural Resources Conservation Service, 2017, National soil survey handbook: U.S. Department of Agriculture Soil Survey, title 430, parts 600–659, [variously paged], accessed August 1, 2017, at https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_054242.

Natural Resources Conservation Service, 2019, Description of SSURGO database: U.S. Department of Agriculture website, accessed June 2019 at https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_053627.

New York State Department of Environmental Conservation, 2017a, Downloadable mining database: New York State Department of Environmental Conservation database, accessed January 2017 at http://www.dec.ny.gov/lands/5374.html.

New York State Department of Environmental Conservation, 2017b, ECL SPDES general permit for concentrated animal feeding operations (CAFOs): New York State Department of Environmental Conservation permit GP–0–16–001, 52 p., accessed April 13, 2020, at https://www.dec.ny.gov/docs/water_pdf/eclcafopermit(1).pdf.

New York State Department of Environmental Conservation, 2020, Aquifers in New York state: New York State Department of Environmental Conservation web page, accessed January 2020 at http://www.dec.ny.gov/lands/36119.html.

New York State Office of Information Technology Services, 2017, New York state high resolution DEM: New York State Office of Information Technology Services web page, accessed January 2017 at http://gis.ny.gov/elevation/NYS-High-Res-DEM.htm.

Newland, D.H., 1929, The gypsum resources and gypsum industry of New York: New York State Museum Bulletin 28, 191 p.

Northern New York Genealogy, 2001, Caverns of Watertown: Northern New York Genealogy website, accessed 2017 at http://www.usgennet.org/usa/ny/town/watertown/caves.htm.

Olcott, P.G., 1995, Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, segment 12 *of* Ground water atlas of the United States: U.S. Geological Survey Hydrologic Atlas 730–M, 28 p., accessed November 2016 at https://doi.org/10.3133/ha730M.

Palmer, A.N., 1991, Origin and morphology of limestone caves: Geological Society of America Bulletin, v. 103, no. 1, p. 1–21. [Also available at https://doi.org/10.1130/0016-7606(1991)103<0001:OAMOLC>2.3.CO;2.]

Palmer, A.N., Rubin, P.A., and Palmer, M.V., 1991, Interaction between karst and glaciation in the Helderberg Plateau, Schoharie and Albany Counties, New York, *in* New York State Geological Association, 63d annual meeting, October 18–21, 1991, Oneonta, N.Y.: New York State Geological Association, field trip guidebook, p. 161–190.

Palmer, A.N., Rubin, P.A., Palmer, M.V., Engel, T.D., and Morgan, B., 2003, Karst of the Schoharie valley, New York, *in* New York State Geological Association, 75th annual meeting, September 12–14, 2003, Oneonta, N.Y.: New York State Geological Association field trip guidebook, p. 141–176.

Phillips, J.S., 1955, Origin and significance of subsidence structures in carbonate rocks overlying Silurian evaporites in Onondaga County, central New York: Syracuse University, master's thesis, 142 p.

Pictometry International Corp, 2015, Imagery and applications: Rochester, N.Y., Pictometry International Corp. website, accessed 2015 at https://www.eagleview.com/product/pictometry-imagery.

Price, C.V., Nakagaki, N., and Hitt, K.J., 2010, National water-quality assessment (NAWQA) area-characterization toolbox: U.S. Geological Survey Open-File Report 2020–1268, accessed 2015 at https://doi.org/10.3133/ofr20101268.

Proett, B.A., 1978, Hydrology of Marcellus disappearing lake: Syracuse University, master's thesis, 118 p.

Reddy, J.E., and Kappel, W.M., 2010, Compilation of existing hydrogeologic and geospatial data for the assessment of focused recharge to the carbonate-rock aquifer in Genesee County, New York: U.S. Geological Survey Scientific Investigations Map 3132, 17 p., 20 sheets. [Also available at https://doi.org/10.3133/sim3132.]

Reddy, J.E., Kappel, W.M., and Root, J.C., 2020, Data for statewide assessment of New York's karst aquifers with an inventory of closed-depression and focused-recharge features: U.S. Geological Survey data release, https://doi.org/10.5066/P9HGN5IJ.

Robertson, S., 1970, Caves in Onondaga County, New York: The Northeastern Caver, v. 2, no. 4, p. 31–33.

Schmidt, C.F., 1953, History of the town of Wheatland—Scottsville, Mumford, Garbutt, Belcoda, Beulah, Wheatland Center: Rochester, N.Y., Carl F. Schmidt, 296 p. [Also available at https://catalog.hathitrust.org/Record/006106107.]

Schoharie Planning and Development Agency, 2002, Cobleskill small urban area corridor plan, June 2002—New York state routes 7, 10, 145; in the towns of Cobleskill, Richmondville, Seward, Sharon, and the villages of Cobleskill, Richmondville, Sharon Springs: Schoharie, New York, Schoharie Planning and Development Agency, 37 p. [Also available at https://www4.schohariecounty-ny.gov/departments/comdev/corridor-plan/.]

Staubitz, W.W., and Miller, T.S., 1987, Geology and hydrology of the Onondaga aquifer in eastern Erie County, New York; with emphasis on ground-water-level declines since 1982: U.S. Geological Survey Water-Resources Investigations Report 86–4317, 50 p., 4 pls. [Also available at https://doi.org/10.3133/wri864317.]

Stumm, F., Chu, A., Como, M.L., and Noll, M.D., 2012, Preliminary analysis of the hydrologic effects of temporary shutdowns of the Rondout-West Branch water tunnel on the groundwater-flow system in Wawarsing, New York: U.S. Geological Society Scientific Investigation Report 2012–5015, 48 p. [Also available at https://doi.org/10.3133/sir20125015.]

Tennissen, A.C., 1952, The distribution, occurrence, and origin of the gypsum in the Camillus Formation of the Syracuse East quadrangle, New York: Syracuse, Syracuse University, master's thesis, 77 p.

Town of Wheatland, 2015, §130–20. MS mine subsidence hazard district, *in* Article II. Zoning map; district regulations, *in* chap. 30. Zoning: Town of Wheatland [N.Y.] code, accessed April 13, 2020, at https://ecode360.com/print/WH0137?guid=10501484.

Tyler, D.J., and Greenlee, S.K., 2012, Creation of digital contours that approach the characteristics of cartographic contours: U.S. Geological Survey Scientific Investigations Report 2012–5167, 31 p., apps. [Also available at https://doi.org/10.3133/sir20125167.]

U.S. Environmental Protection Agency, 2012, Cayuga County groundwater contamination Superfund site, Cayuga County, New York: U.S. Environmental Protection Agency Superfund proposed plan, 19 p., accessed April 13, 2020, at https://semspub.epa.gov/work/02/123460.pdf.

U.S. Environmental Protection Agency, 2017, Lehigh valley railroad, Le Roy, New York: U.S. Environmental Protection Agency Superfund website, accessed April 13, 2020, at https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0203481.

U.S. Geological Survey, 1950, Le Roy quadrangle, New York, 7.5 minute series (topographic): U.S. Geological Survey topographic map, 1:24,000, accessed May 23, 2019, at https://ngmdb.usgs.gov/topoview/viewer/#15/42.9804/-77.8944.

U.S. Geological Survey, 1966, Brantingham quadrangle, New York, Lewis Co., 7.5 minute series (topographic): U.S. Geological Survey topographic map, 1:24,000, accessed May 23, 2019, at https://catalog.data.gov/dataset/usgs-1-24000-scale-quadrangle-for-brantingham-ny-19661d129.

U.S. Geological Survey, 2013, National hydrography geodatabase: U.S. Geological Survey The National Map viewer, accessed 2017 at https://www.usgs.gov/core-science-systems/ngp/tnm-delivery/.

U.S. Geological Survey, 2014, MAPINDICES New York state or territory FileGDB 10.1: U.S. Geological Survey dataset, accessed 2016 at https://www.sciencebase.gov/catalog/item/53d7cd8ee4b06f0f87b7427b.

U.S. Geological Survey, 2015, USGS water data for the nation: U.S. Geological Survey National Water Information System database, accessed May 8, 2015, at https://doi.org/10.5066/F7P55KJN.

U.S. Geological Survey, 2017a, The national map: U.S. Geological Survey National Geospatial Program website, accessed 2017 at https://www.usgs.gov/core-science-systems/national-geospatial-program/national-map.

U.S. Geological Survey, 2017b, National hydrography dataset: U.S. Geological Survey National Hydrography web page, accessed 2017 at https://www.usgs.gov/core-science-systems/ngp/hydrography/national-hydrography-dataset.

U.S. Geological Survey, 2020, US Topo—Maps for America: U.S. Geological Survey web page, accessed April 2020 at https://www.usgs.gov/core-science-systems/national-geospatial-program/us-topo-maps-america.

van der Hoorne, K., 2010, The Marcellus disappearing lake—The contribution of surface runoff to two flooding events in 2010: State University of New York at Brockport, master's thesis, 62 p.

Veni, G., DuChene, H., Crawford, N.C., Groves, C.G., Huppert, G.N., Kastning, E.H., Olson, R., and Wheeler, B.J., 2001, Living with karst—A fragile foundation: American Geological Institute Environmental Awareness Series 4, 69 p. [Also available at http://www.agiweb.org/environment/publications/karst.pdf.]

Wall, J., Doctor, D.H., and Terziotti, S., 2015, A semi-automated tool for reducing the creation of false closed depressions from a filled lidar-derived digital elevation model, *in* Land, L., Doctor, D.H., and Stephenson, J.B., eds., Proceedings of the 14th Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst, May 6–10, 2015, Carlsbad, N. Mex.: Carlsbad, N. Mex., National Cave and Karst Institute, p. 255–262, accessed 2019 at https://doi.org/https://doi.org/.

Waller, R.M., and Ayer, G.R., 1975, Water resources of the Black River basin, New York: New York State Department of Environmental Conservation Basin Planning Report BRB–1, 205 p. [Also available at https://archive.org/details/usgswaterresourcesnewyork-brb_1.]

Weary, D.R., 2008, Preliminary map of potentially karstic carbonate rocks in the central and southern Appalachian states: U.S. Geological Survey Open-File Report 2008–1154, 1 pl. [Also available at https://doi.org/10.3133/ofr20081154.]

Weremeichik, J.M., and Mylroie, J.E., 2014, Glacial Lake Schoharie—An investigative study of glaciolacustrine lithofacies in caves, Helderberg plateau, central New York: Journal of Caves and Karst Studies, v. 76, no. 2, p. 127–138. [Also available at https://doi.org/10.4311/2013ES0117.]

Yager, R.M., and Kappel, W.M., 1987, Detection and characterization of fractures and their relation to groundwater movement in the Lockport dolomite, Niagara County, New York, *in* Khanbilvardi, R.M., and Philos, J., eds., Pollution, risk assessment, and remediation in groundwater systems: Washington, D.C., Scientific Publication Company, p. 149–195.

Yager, R.M., Miller, T.S., Kappel, W.M., Misut, P.E., Langevin, C.D., Parkhurst, D.L., and deVries, M.P., 2012, Simulated flow of groundwater and brine from a flooded salt mine in Livingston County, New York, and effects of remedial pumping on an overlying aquifer (ver. 1.1, August 23, 2012): U.S. Geological Survey Open-File Report 2011–1286, 16 p. [Also available at https://doi.org/10.3133/ofr20111286.]

Glossary of Selected Karst Terminology

This glossary was adapted from Monroe (1970) and Field (2002). The referenced glossaries are more extensive, as the terms shown here are related to just those used in this report. The etymologic origin for some of the terminology is shown in brackets.

A

allogenic recharge Recharge from adjacent insoluble bedrock into a soluble karst aquifer.

aquifer A groundwater reservoir; pervious rock that is completely saturated and will yield water to a well or spring.

B

bare karst *See* naked karst

bedding plane A plane or surface that separates two strata of differing characteristics.

bicarbonate A salt containing the radical bicarbonate (HCO_3^{-1}), such as calcium bicarbonate [$Ca(HCO_3)_2$].

blowing cave A cave out of which or into which a current of air flows intermittently.

C

calcite A mineral composed of calcium carbonate ($CaCO_3$), such as aragonite, but differing in crystal form; the principal constituent of limestone.

carbonate A salt or ester of carbonic acid; a compound containing the radical carbonate (CO_3^{-2}), such as $CaCO_3$. Also, a rock consisting mainly of carbonate minerals, such as limestone or dolostone.

cave A natural underground room or series of rooms and passages large enough to be entered by a person; generally formed by solution of limestone. Also, a similar artificial opening.

cave system An underground network of passages, chambers, or other cavities. Also, the caves in a given area related to each other hydrologically, whether continuous or discontinuous from a single opening.

chert Light-cream or gray to black rock composed of silica (silicon dioxide [SiO_2]), found occurring as nodules or layers in limestone, or as a replacement of limestone.

clint [country of origin, United Kingdom] Slabs of limestone, parallel to the bedding, forming a fractured limestone pavement. Widened joints, or grikes, isolate individual limestone slabs.

closed depression A general term for any enclosed topographic basin having no external drainage, regardless of origin or size.

conduit A subterranean stream course filled completely with water and always under hydrostatic pressure.

D

doline A basin- or funnel-shaped hollow in limestone, ranging in diameter from a few meters to a kilometer, and in depth from a few to several hundred meters. Some dolines are gentle grassy hollows; others are rocky cliff-bounded basins. Closed depressions receiving a stream are known as swallow holes or stream sinks. In the United States most dolines are referred to as sinks or sinkholes.

dolomite A mineral composed of calcium magnesium carbonate [$CaMg(CO_3)_2$].

dolostone Rock chiefly composed of the mineral dolomite.

dolomitization The process whereby limestone becomes dolomite by the substitution of magnesium carbonate for part of the original calcium carbonate.

E

epiphreatic zone The zone in a cave system, immediately above the phreatic (saturated) zone, affected morphologically and hydrologically by floods too large for the cave to absorb at once. Also known as epiphreas.

exsurgence The point at which an underground stream reaches the surface if the stream has no known surface headwaters.

F

fluorescein A reddish-yellow crystalline compound that imparts a brilliant green fluorescent color to water in very dilute solutions; used to label groundwater for identification of an emergence.

formation The fundamental unit in rock, a stratigraphic classification, consisting of a distinctive mappable body of rock.

G

grike [country of origin, United Kingdom] A vertical or subvertical cleft in a limestone pavement developed by solution along a joint or system of crisscrossing joints. Grikes separate clints from one another.

groundwater The part of the subsurface water that is in the zone of saturation. Used loosely by some to refer to any water beneath the surface. *See also* phreatic water.

gypsum A mineral composed of hydrous calcium sulfate ($CaSO_4 \cdot 2H_2O$).

H

hydraulic conductivity The ability of a rock unit to conduct water under specified conditions.

I

inflow cave Cave into which a stream flows or formerly entered.

influent cave *See* inflow cave

intake or recharge area The surface area in which water is absorbed into an aquifer eventually to reach the zone of saturation.

K

karren [country of origin, Germany] Channels or furrows caused by solution on massive bare limestone surfaces; they vary in depth from a few millimeters to more than 1 meter and are separated by ridges. In modern usage, the terms are general, describing the total complex of superficial solution forms (grikes and clints) found on compact pure limestone.

karst [originally, the German form of the Slavic word kras or krs, meaning a bleak waterless place; the German name for a district east of Trieste having such terrain] A terrain, generally underlain by limestone, in which the topography is chiefly formed by the dissolving of rock, and which is commonly characterized by karren, closed depressions, subterranean drainage, and caves.

karst plain A plain on which closed depressions, subterranean drainage, and other karst features may be developed. Also called a karst plateau.

karst topography Topography dominated by features of solutional origin.

karstic Occasionally used as the adjective form of karst.

karstification Action by water, mainly chemical but also mechanical, that produces features of a karst topography, including such surface features as dolines, karren, and mogotes and such subsurface features as caves and shafts.

L

limestone A sedimentary rock consisting chiefly of calcium carbonate.

limestone pavement A bare plane surface of limestone, parallel to the bedding, commonly divided into blocks (clints, flachkarren) by solutionally widened joints (grikes, kluftkarren), and pitted by solution pans.

M

marble Limestone recrystallized and hardened by heat and pressure. Commercially, any limestone that will take a high polish

marl Unconsolidated sedimentary rock consisting largely of calcium carbonate and clay; usage varies from calcareous clay to earthy limestone; in some parts of the United States, the term has been used for any unconsolidated sedimentary rock containing fossil shells.

N

naked karst Karst topography having much exposed bedrock.

P

paleokarst A karstified rock or area that has been buried by later sediments; in some places, ancient caves have been completely filled by the later sediments.

passage In a cave, the opening between rooms or chambers.

permeability The ability of a rock or soil to permit water or other fluids to pass through it.

phreatic water [from the Greek word φρέαρ, meaning well] Water in the zone of saturation, below the water table.

phreatic zone The region below the water table, in which rock is saturated with water.

piezometric surface The imaginary surface to which water from a given aquifer will rise under its full static head. Also called potentiometric surface.

pipe Small cylindrical hole in unconsolidated sediments caused by removal of fine material by water.

piping Formation of a passage by water under pressure in the form of conduits through permeable materials, when the hydraulic head exceeds a certain critical value.

polje [Slavic word meaning field] In areas of karst topography, a very large closed depression, in some places several kilometers long and wide, having a flat floor either of bare limestone or covered by alluvium, and surrounded by generally steep walls of limestone.

ponor [Slavic] Hole in the bottom or side of a closed depression through which water passes to or from an underground channel. *Compare to* swallet, swallow hole.

porosity The ratio of the aggregate volume of interstices in a rock or soil to its total volume; generally stated as a percentage.

pseudokarst Karstlike terrain produced by a process other than the dissolving of rock, such as the rough surface above a lava field, where the ceilings of lava tubes have collapsed. Features of pseudokarst include lava tunnels, lava tubes, lava stalactites, and lava stalagmites.

R

recharge area *See* intake area

resurgence A point at which an underground stream reaches the surface and becomes a surface stream. In European literature, the term is reserved for the reemergence of a stream that has earlier sunk upstream; the term resurgence is applied to a stream without known surface headwaters.

rhodamine A family of related chemical compounds (fluorone dyes) used to label groundwater to determine the rate and direction of flow and transport. Rhodamine dyes fluoresce and can be detected with a fluorometer.

S

sink *See* sinkhole

sinkhole [country of origin, United States] General terms for closed depressions. May be basin, funnel, or cylindrical shaped. *See also* closed depression; doline; swallet; swallow hole.

solution pipe A vertical cylindrical hole attributable to solution, often without surface expression, filled with debris, such as sand, clay, rock chips, and bones.

solution scarp Escarpment formed by more active solution of lower area or by corrosional undercutting of the base of the escarpment.

solution subsidence Any subsidence caused by solution of underlying rock but particularly the subsidence of parts of a formation into hollows or pockets of an immediately underlying soluble formation.

speleogenesis The varied processes by which caves are formed.

spring Any natural discharge of water from rock or soil onto the surface of the land or into a body of surface water.

subjacent karst Karst landscape in noncarbonate rocks due to presence of karstified rocks beneath the surface formation.

subsidence The lowering of the surface of the ground because of removal of support. Caused in karst areas by subterranean solution or collapse of caves.

swallet [country of origin, United Kingdom] A place where water disappears underground in a limestone region. A swallow hole generally implies water loss in a closed depression or blind valley, whereas a swallet may refer to water loss into alluvium at a streambed, even though there is no depression.

swallow hole *See* swallet

T

travertine Calcium carbonate, light in color and generally concretionary and compact, deposited from solution in ground and surface waters. Extremely porous or cellular varieties are known as calcareous tufa, sinter, or spring deposit. Compact banded varieties, capable of taking a polish, are called onyx marble or cave onyx.

V

vadose water Water in the zone of aeration, above the zone of saturation (water table).

vug A small cavity in rock usually lined with crystals.

W

water table The upper boundary of an unconfined zone of saturation, along which the hydrostatic pressure is equal to the atmospheric pressure.

Z

zone of aeration The zone in permeable soil or rock that is above the zone saturated with water, the zone of vadose water.

zone of saturation The zone in permeable soil or rock that is saturated with water; the phreatic zone.

Appendix 1. Characteristics of Caves in New York

Table 1.1. Characteristics of caves in New York, by county.

[USGS, U.S. Geological Survey; quad, topographic quadrangle; mi, mile; ft, foot; ft3/s, cubic foot per second; TCE, trichloroethene; <, less than]

County	Geology	Karst features present	Cave size	Cave frequency	Cave hydrology	Other solution- or karst-related features	Comments[1]
Albany	Helderberg, Onondaga limestones, and talus	Sinkholes, solution channels, springs, caves, and caverns	Mostly small, some large (long) caverns present	Extensive	Wet and seasonally dry	—	Clarksville 7.5-minute USGS quad has nearly 170 identifiable karst features and this count does not include solutionally-enlarged joints. The overwhelming majority of the county's caves are small. This high number represents many small caves found in isolated knolls and valleys formed as the result of folding and faulting commonly found throughout much of the southern part of the county. In fact, in sheer numbers, most of the county's caves are found from Thacher State Park and south. This is that part of the county that shows increasing structural complexity the farther south one goes, entering what Marshak (1990) calls the Hudson Valley fold-thrust belt.
Allegany	No karst	—	—	—	—	—	
Bronx	Inwood marble	Caves (very small) not verified, possible solution channels	Small	Uncommon	Unknown	—	
Broome	Talus	Caves possible but not verified	Small	Uncommon	Unknown	—	
Cattaraugus	Fractured-rock caves in conglomerates	Fracture caves, unknown solution features	Very small	Uncommon	Dry	—	Olean Rock City, Salamanca Rock City, Thunder Rocks, Bear Cave Ledge
Cayuga	Onondaga Limestone	Sinkholes, solution channels, springs, a few caves (historic reports)	Small	Present	Unknown for caves, solution channels with variable water levels.	—	Robert W. Carroll Jr. reports sinkholes in the Auburn area that during the mid-1960s defied efforts to fill them. [Study of contaminant plume flowing downdip in the Onondaga Limestone, from Auburn area to Union Springs (Cayuga Lake), New York (Eckhardt and others, 2011; U.S. Environmental Protection Agency, 2019)]*
Chautauqua	Fractured-rock caves in conglomerates	Fracture caves	Small	Present	Dry?	—	Panama Rocks There are stories of submerged limestone caves in Lake Erie, but nothing has ever been verified.

Table 1.1. Characteristics of caves in New York, by county.—Continued

[USGS, U.S. Geological Survey; quad, topographic quadrangle; mi, mile; ft, foot; ft3/s, cubic foot per second; TCE, trichloroethene; <, less than]

County	Geology	Karst features present	Cave size	Cave frequency	Cave hydrology	Other solution- or karst-related features	Comments[1]
Chemung	No karst	—	—	—	—	—	
Chenango	No karst	—	—	—	—	—	
Clinton	Talus, fracture caves, limestone of the Chazy Group, Trenton/Black River Group limestone, and Beekmantown Group	Talus caves generally found in gneiss	Small	Present	Mostly dry, Some wet caves adjacent to and in Lake Champlain	—	On Valcour Island there are at least two maze caves each exceeding 400 ft in length. The passages are typically tear-drop in shape. These caves are at lake level with 85 percent or more of the passage below water. Indeed, there is evidence for substantial karstification below water. Whether this represents ongoing processes or are remnants of lower lake levels is not clear at this time. There are also some fracture caves formed in the Potsdam Sandstone in the area of Ausable Chasm.
Columbia	Marble, possibly limestone	Marble caves, unknown solution features	Small	Present	Dry	—	No bottom pond drains to marble karst adjacent to pond.
Cortland	No karst	—	—	—	—	—	
Delaware	No karst	—	—	—	—	—	
Dutchess	Marble	Few caves, some rock shelters, unknown solution features	Small	Present	Unknown	—	
Erie	Onondaga Limestone, Camillus shale (gypsum)	Sinkholes, solution channels, springs, few small caves	Small	Present	Dry caves, solution channels saturated, flow to west	Former gypsum mines north of the Onondaga Limestone escarpment may have caused minimal subsidence issues as mine openings collapse.	Diversion of quarry discharge away from nearby sinkhole caused extensive dewatering of homeowner wells in 1980s along closed depression-solution channel over an approximate 4-mi length (Staubitz and Miller, 1987). Onondaga Limestone is sometimes used to ‘drain wells’ for surface runoff and shallow soil dewatering.*

Table 1.1. Characteristics of caves in New York, by county.—Continued

[USGS, U.S. Geological Survey; quad, topographic quadrangle; mi, mile; ft, foot; ft3/s, cubic foot per second; TCE, trichloroethene; <, less than]

County	Geology	Karst features present	Cave size	Cave frequency	Cave hydrology	Other solution- or karst-related features	Comments[1]
Essex	Talus, marble, fracture caves, limestone?	Talus caves, some solution features	General small talus caves, although a few exceed 1,000 ft in length. Few marble caves, and few fracture caves	Extensive	Dry	—	The longest known solutional caves are Burroughs Cave (2,000+ ft) and Big Loop Cave (1,150 ft). Burroughs Cave is the longest known marble cave in New York. There are some short fracture caves (most are <20 ft long) in the county. Most notable is Pitchoff Mountain Cave formed in anorthosite. There are also a few fracture caves in Potsdam Sandstone in the east part of the county, near Lake Champlain.
Franklin	Talus, fracture caves	Unknown solution features	Small	Present	Dry	—	
Fulton	Talus, Limestone	Some sinkholes, solution channels, springs	Small	Uncommon	Dry	—	The Little Falls Dolomite and Ordovician-aged limestones crop out in the county, but no caves are known.
Genesee	Onondaga Limestone, Camillus shale (gypsum)	Sinkholes, solution channels, springs, a few small caves	Small	Sinkholes, solution channels, and springs present, caves uncommon	Solution channels intermittently wet	The Camillus Shale has a thin bed of gypsum (3 to 5 ft thick) which has been mined north of the Onondaga Escarpment. It has been reported that small solutional conduits drained into these mines and some land-surface subsidence (bulk or sinkhole subsidence features) has also occurred as the mine openings collapse.	One of the largest sinking streams in New York, Oatka Creek, is found there, and has a drainage area of 139 mi. On the east side of the County the Onondaga Limestone and other bedrock units have been displaced to the north by the Clarendon-Linden Fault and there are several karst springs along and near the fault. [Also see Reddy and Kappel (2010) for a study of karst in the Onondaga Limestone in Genesee County.]*

Table 1.1. Characteristics of caves in New York, by county.—Continued

[USGS, U.S. Geological Survey; quad, topographic quadrangle; mi, mile; ft, foot; ft3/s, cubic foot per second; TCE, trichloroethene; <, less than]

County	Geology	Karst features present	Cave size	Cave frequency	Cave hydrology	Other solution- or karst-related features	Comments[1]
Greene	Helderberg and Onondaga Limestones, a few fissure caves in Catskill region in conglomerates	Few sinkholes and solution channels, some caves	Small	Present	Unknown	—	These limestones are all found in the Hudson Valley fold-thrust belt. The rocks are largely folded and faulted and are compressed in an east-west direction. As a result, many of the limestone caves are generally oriented along the strike of the major faults or down locally, in steeply dipping rock.
Hamilton	Marble, talus, and fracture caves. Limestone?	Caves, mostly short, in talus, although some may be solutional.	Small	Present	Unknown	—	
Herkimer	Trenton-Black River Limestone, marble, talus, fracture, and two tufa caves.	Caves, generally small, sinkholes, short solution channels	Small	Present	Unknown	—	Of interest is the chyle hole. This feature, a large occluded sink that takes a stream, has given its name to similar features in parts of Herkimer, Oneida, and Otsego Counties. Thus, locals often refer to sinks as chyle holes. The Van Hornesville Tufa Caves are one of two known groups of caves formed in calcareous tufa in the State.
Jefferson	Trenton-Black River Group Limestone, marble, talus fracture caves and two tufa caves.	Caves, solution channels, sinkholes, losing/gaining streams	Mostly small, a few larger (long) caverns present	Common	Intermittently to nearly always wet	—	All but a few of these caves are formed in the Ordovician-aged Trenton-Black River Group limestones. The exception is Natural Bridge Caverns formed in pre-Cambrian marbles (often called the Grenville Marble). At 2,000 ft, this is the longest known marble cave in New York.
Kings	No karst	—	—	—	—	—	
Lewis	Trenton-Black River Group limestone, marble	Solution channels, some caves	Small cases mostly	Present	Unknown	—	There is one known large cave—Drought Cave (2,000 ft)—close to the Oneida County line just north of Boonville. This low number may be because few people are looking. The Sugar River sinks into the its limestone channel.

Table 1.1. Characteristics of caves in New York, by county.—Continued

[USGS, U.S. Geological Survey; quad, topographic quadrangle; mi, mile; ft, foot; ft3/s, cubic foot per second; TCE, trichloroethene; <, less than]

County	Geology	Karst features present	Cave size	Cave frequency	Cave hydrology	Other solution- or karst-related features	Comments[1]
Livingston	Onondaga Limestone	Solution channels, sinkholes, springs, losing/gaining streams	Unknown	Uncommon	Unknown	A few phantom lakes and ponds occur in the Onondaga Limestone where it crops out near land surface - variable solution channel capacities cause these intermittent water bodies to quickly appear and disappear.	Karst is found near Caledonia where one of the State's largest karst springs, Big Spring, is located. It has a low flow of 5 ft^3/s. [A railroad tank car derailment in 1970 caused a large amount of TCE to flow into the Onondaga Limestone and flowed eastward, but it was never detected (at any level of concern) in Big Spring which feeds a fish hatchery (U.S. Environmental Protection Agency, 2017).]*
Madison	Helderberg and Onondaga Limestone	Solution channels, springs, cascading water in wells, losing/gaining streams	None known	Uncommon	Unknown	—	Some caves are reported near Chittenango/Chittenango Falls State Park. [Cascading water in drinking water wells has caused groundwater/surface water interaction, causing drinking-water well, water-quality issues.]*
Monroe	Onondaga Limestone, Camillus shale (gypsum)	Solution channels, sinkholes, springs	None known	Uncommon	Unknown	Gypsum mines north of the Onondaga Limestone escarpment have caused subsidence issues, such as in Monroe County's Oatka Creek Park.	
Montgomery	Dolostone, limestone	Fractured (faulted) rock	Small	Uncommon	Unknown	—	
Nassau	No karst	—	—	—	—	—	
New York (Manhattan)	Inwood marble	Very small caves, unknown karst features	Small	Uncommon	Unknown	The type locality of the Inwood Marble is Inwood Park at the north end of Manhattan Island. There are three small caves here and two in Central Park.	

Table 1.1. Characteristics of caves in New York, by county.—Continued

[USGS, U.S. Geological Survey; quad, topographic quadrangle; mi, mile; ft, foot; ft3/s, cubic foot per second; TCE, trichloroethene; <, less than]

County	Geology	Karst features present	Cave size	Cave frequency	Cave hydrology	Other solution- or karst-related features	Comments[1]
Niagara	Lockport Dolostone	Some sinkholes, solution channels, and springs known, a few caves	Small	Uncommon	Dry?	The few karst features that are found in the upper weathered Lockport Dolostone are usually associated with solution channels: some vertical, some flowing along discrete bedding planes in the Lockport Dolostone. The large caves appear to be found near the Lockport Escarpment.	Lockport Dolostone unit has some large caves on either side of the Niagara River gorge and along its escarpment. Lockport Cave may have had as much as 2 mi of passage, but the cave has not been found in recent times. Of the approximately 40 caves, 7 are historically well documented, but have since been destroyed. Five other caves are rumored or lost.
Oneida	Trenton Limestone (north) Helderberg-Onondaga Limestone (south) and tufa	Sinkholes, solution channels and springs, but few caves	Small	Uncommon	Unknown	There is a calcareous tufa deposit northwest of Waterville at Forge Hollow that contains one of two known groups of New York caves formed in such material. The Unadilla River rises from a limestone spring. There are reports of caves upstream from Pixley Falls State Park, where the Lansing Kill apparently sinks into a fissure resurging 0.5 mi downstream.	

Table 1.1. Characteristics of caves in New York, by county.—Continued

[USGS, U.S. Geological Survey; quad, topographic quadrangle; mi, mile; ft, foot; ft3/s, cubic foot per second; TCE, trichloroethene; <, less than]

County	Geology	Karst features present	Cave size	Cave frequency	Cave hydrology	Other solution- or karst-related features	Comments[1]
Onondaga	Onondaga and Manlius Limestone, Camillus Shale (gypsum)	Few sinkholes, minor caves, fracture-openings, evaporite subsidence	Very small	Uncommon	Unknown	One small cave under I-81 in south Syracuse documented by New York State Department of Transportation, and several fracture-opening caves adjacent to Rock Cut Road quarry escarpment.	See Robertson (1970) for information on caves in Onondaga County. [Subsidence of about 30 ft attributed to gypsum dissolution (Phillips, 1955). City infrastructure study also looked at water main breaks in relation to several anthropogenic factors and gypsum. Engineering studies have documented infrastructure subsidence in the Camillus region of the City.]* French (1860) suggests gypsum caves near Jamesville.
Ontario	Onondaga Limestone	Few sinkholes, solution channels noted	None known	Uncommon	Unknown		
Orange	Marble, Helderberg and Onondaga Limestone	Some solution features may be present	Small	Uncommon	Unknown		The best-known caves are probably Dutchess Quarry Caves 1 through 9. These are actually only four small caves, but all have great archeological significance.
Orleans	No karst	—	—	—	—	—	
Oswego	No karst	—	—	—	—	—	
Otsego	Helderberg and Onondaga Limestone, and facture openings in shale	Sinkholes, solution channels, springs, possible losing/gaining streams	Generally small	Present	Mixed	—	The Helderberg and Onondaga limestones are exposed in irregular bands along the northern edge of the county. There is much karst to be explored and one suspects that the lack of caves is from a lack of looking and nothing more. Summit Lake is fed by some large karst springs to the east which resurge at the base of the Onondaga limestone. Two fracture caves formed in shale near Cooperstown.
Putnam	Marble	Unknown solution features	Very small	Uncommon	Unknown	—	A scattering of marble slivers in the Taconic mélange are found throughout Putnam County though they are more common in the eastern half of the county. None of the 10 or so small caves are notable.
Queens	No karst	—	—	—	—	—	

Table 1.1. Characteristics of caves in New York, by county.—Continued

[USGS, U.S. Geological Survey; quad, topographic quadrangle; mi, mile; ft, foot; ft3/s, cubic foot per second; TCE, trichloroethene; <, less than]

County	Geology	Karst features present	Cave size	Cave frequency	Cave hydrology	Other solution- or karst-related features	Comments[1]
Rensselaer	Marble, tectonic fracture	Unknown solution features	Very small	Uncommon	Unknown	—	Snow Hole is a small tectonic cave formed in slate and phyllite. It generally contains snow and ice well into summer. Country Club Cave is a gravity-slip block cave formed in shale.
Richmond	No karst	—	—	—	—	—	
Rockland	Marble, fracture caves	Unknown solution features	Very small	Uncommon	Unknown	—	Rockland includes some marble outcrops and a few small caves. The best-known caves in the county, however, are small fissure caves formed in igneous and other metamorphic rocks.
Saint Lawrence	Talus, marble, Potsdam sandstone (fracture) caves	Sinkholes, some solution channels, springs	Small	Common	Unknown	—	The predominant cave type in the county is talus, with about 70 known solutional caves, and there are fracture caves in the Potsdam Sandstone in the northern part of the county.
Saratoga	Beekmantown Group Limestone, dolostone	Few sinkholes, some solution features	Very small	Uncommon	Unknown	—	All known karst lie in the Ordovician-aged limestones that ring the Adirondacks. There is karst in Saratoga Springs and stories about caves in Congress Park and under the new Skidmore Campus. Two new cave discoveries have come to light between Saratoga and Glens Falls, and others west of Saratoga.
Schenectady	Dolostone, limestone	Fractured (faulted) rock	Small	Uncommon	Unknown	—	

Table 1.1. Characteristics of caves in New York, by county.—Continued

[USGS, U.S. Geological Survey; quad, topographic quadrangle; mi, mile; ft, foot; ft3/s, cubic foot per second; TCE, trichloroethene; <, less than]

County	Geology	Karst features present	Cave size	Cave frequency	Cave hydrology	Other solution- or karst-related features	Comments[1]
Schoharie	Helderberg and Onondaga Limestone	Many sinkholes, solution channels, springs, caves and caverns, losing/gaining streams	Many lengths	Extensive	Mixed	—	There are three major cave areas in the county: the Cobleskill Plateau, Terrace Mountain, and Barton Hill. The Cobleskill Plateau is bounded on the south by the Cobleskill Creek, on the east by the Schoharie Creek, on the north by the Helderberg escarpment, and on the west by the younger Devonian formations, most notably the Esopus Shale. There is a fourth area that will likely yield large caves in the future, but now has only a few small caves. The area is bounded on the north and west by Kings Creek, on the south by the Fox Creek, and on the east by the Albany County line. In the northwest corner of the county are sinkholes thousands of feet across that have yet to be checked out.
Schuyler	No karst	—	—	—	—	—	
Seneca	No karst	—	—	—	—	—	
Steuben	No karst	—	—	—	—	—	
Suffolk	No karst	—	—	—	—	—	
Sullivan	Limestone	Unknown solution features	One long cave	Uncommon	Unknown	—	Limestone is found only along the southeast edge of Sullivan County. In that relatively small, steeply dipping exposure there is one large cave: Surprise or Mystery Cave with 9,975 ft of passage.
Tioga	No karst	—	—	—	—	—	
Tompkins	Tully Limestone/ Moscow shale	Solution channels at base of Tully Limestone	Small	Uncommon	Seasonally wet	—	The Tully Limestone crops out north of Ithaca. The caves, which are generally joint-controlled, are formed at the contact between the Tully limestone and the underlying Moscow shale with the majority of the passage in the shale. [Likely other Tully/Moscow caves are present where this contact is exposed along the edges of the Finger Lakes.]*

Table 1.1. Characteristics of caves in New York, by county.—Continued

[USGS, U.S. Geological Survey; quad, topographic quadrangle; mi, mile; ft, foot; ft3/s, cubic foot per second; TCE, trichloroethene; <, less than]

County	Geology	Karst features present	Cave size	Cave frequency	Cave hydrology	Other solution- or karst-related features	Comments[1]
Ulster	Helderberg and Onondaga Limestone, talus, fracture caves	Unknown solution features	Mostly small	Present	Seasonally wet	—	The Helderberg and Onondaga limestones crop out as bands that run south to Kingston and then southwest until they leave the county near Ellenville. In the area from Saugerties through Kingston and down beyond Hurley, the beds are highly folded and faulted. To the southwest the severe deformation ceases, but the beds are still steeply dip to the northwest. The talus and fissure caves are formed in the Shawangunk Grit.
Warren	Marble, talus	Unknown solution features	Small	Present	Unknown	—	Warren County's caves are half solutional and half talus. As with the counties east of the Hudson, Warren County has isolated lenses of marble in which caves have formed. In the southeast corner of the county there is limestone, but no caves are reported.
Washington	Marble, talus, limestone(?)	Unknown solution features	Small	Uncommon	Unknown	—	
Wayne	No karst	—	—	—	—	—	
Westchester	Marble, talus	Unknown solution features	Small	Uncommon	Unknown	—	A scattering of marble slivers in the Taconic mélange are found throughout Westchester County though they are more common in the eastern half of the county.
Wyoming	No karst	—	—	—	—	—	
Yates	No karst	—	—	—	—	—	

[1]Comments are from Thom Engle of the Northeastern Cave Conservancy and the National Speleological Society, except where indicated by an asterisk; comments with an asterisk are by William M. Kappel.

References Cited

Eckhardt, D.A., Williams, J.H., and Anderson, J.A., 2011, Geophysical, stratigraphic, and flow-zone logs of selected wells in Cayuga County, New York, 2001–2011: U.S. Geological Survey Open-File Report 2011–1319, 13 p. [Also available at https://doi.org/10.3133/ofr20111319.]

French, J.H., 1860, Historical and statistical gazetteer of New York State—A comprehensive view of the geography, geology, and general history of the state: Syracuse, N.Y., R.P. Smith Publisher, 810 p.

Marshak, S., 1990, Structural geology of Silurian and Devonian strata in the mid-Hudson Valley, New York—Fold-thrust belt tectonics in miniature: New York State Museum Map and Chart Series 51, 66 p.

Phillips, J.S., 1955, Origin and significance of subsidence structures in carbonate rocks overlying Silurian evaporites in Onondaga County, central New York: Syracuse, Syracuse University, master's thesis, 142 p.

Reddy, J.E., and Kappel, W.M., 2010, Compilation of existing hydrogeologic and geospatial data for the assessment of focused recharge to the carbonate-rock aquifer in Genesee County, New York: U.S. Geological Survey Scientific Investigations Map 3132, 17 p., 20 sheets. [Also available at https://doi.org/10.3133/sim3132.]

Robertson, S., 1970, Caves in Onondaga County, New York: The Northeastern Caver, v. 2, no. 4, p. 31–33.

Staubitz, W.W., and Miller, T.S., 1987, Geology and hydrology of the Onondaga aquifer in eastern Erie County, New York; with emphasis on ground-water-level declines since 1982: U.S. Geological Survey Water-Resources Investigations Report 86–4317, 50 p., 4 pls. [Also available at https://doi.org/10.3133/wri864317.]

U.S. Environmental Protection Agency, 2017, Lehigh valley railroad, Le Roy, New York: U.S. Environmental Protection Agency Superfund website, accessed April 13, 2020, at https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0203481.

U.S. Environmental Protection Agency, 2019, Cayuga groundwater contamination site, Union Springs, NY: U.S. Environmental Protection Agency Superfund website, accessed June 2019 at https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0204289.

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U.S. Geological Survey
425 Jordan Road
Troy, NY 12180–8349
dc_ny@usgs.gov
(518) 285–5602
or visit our website at
https://www.usgs.gov/centers/ny-water

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Central New York's Water Authority
www.ocwa.org

200 NORTHERN CONCOURSE
PO BOX 4949
SYRACUSE, NY 13221-4949

PHONE: (315) 455-7061
FAX: (315) 455-8510

August 10, 2023

Town of Manlius
Town Clerks Office

AUG 14 2023

Received and Filed

Allison Weber, Town Clerk
Town of Manlius
301 Brooklea Drive
Fayetteville, NY 13066

Re: OCWA Project No. 4230071 & 9004144
8" Extension to 6436 Hoad Road
Town of Manlius

Dear Ms. Weber,

Enclosed please find Map File No. 1161, sheets 3 and 4 showing proposed hydrant #15240 in the existing O550 Pools Brook Water District for your review.

If the above hydrant meets with your approval, we request that the Town Board duly approve it. Sign and insert date on the enclosed three (3) Applications for Fire Hydrants. Return two (2) copies to our office and retain one (1) copy for your files.

The Developer, 6436 Hoag Road, will pay for the hydrant installation in conjunction with the 8" Water Main Extension. The Town will be notified when the hydrant is in service, and they will be billed the annual hydrant maintenance rate, which is currently $82.11 per hydrant per annum.

Thank you for your attention to this matter.

Very truly yours,

OCWA

Patrick Sherlock, P.E.
Engineering Manager

PS:ng
cc: Project # 9004144
Accounting 9004144
D. Hughes
Hyd File #13
Enc. M.F.1161 Sheets 3 & 4
3 Applications for Fire Hydrant
Billing Symbol – GOMR

OCWA

APPLICATION FOR FIRE HYDRANTS

Project No. 9004144

Name of Municipality: _____

Billing Address: _____

Billing Name (Indicate District, if applicable): _____

WD/WSD CODE # O550- Poolsbrook Water District

Date Resolution Approved by Municipal Board: _____

Fire District/Department Service this location: _____

LOCATION OF HYDRANTS:

1. Hydrant #15240- Hoag Road- ± 225' East of Pools Brook Road

Application is hereby made to OCWA for the above installation(s), in order to provide fire hydrant service at the property locations as listed above.

It is understood and agreed that fire hydrant service shall be supplied and used only in accordance with Customer Rules of OCWA as now on file at OCWA's office and any modifications, alterations or amendments thereof, which may be hereafter adopted by OCWA.

It is understood and agreed that failure of the Applicant to give prompt written notice to have the fire hydrant service discontinued will make the Applicant liable for all charges until the time of written notification.

Type name: _____

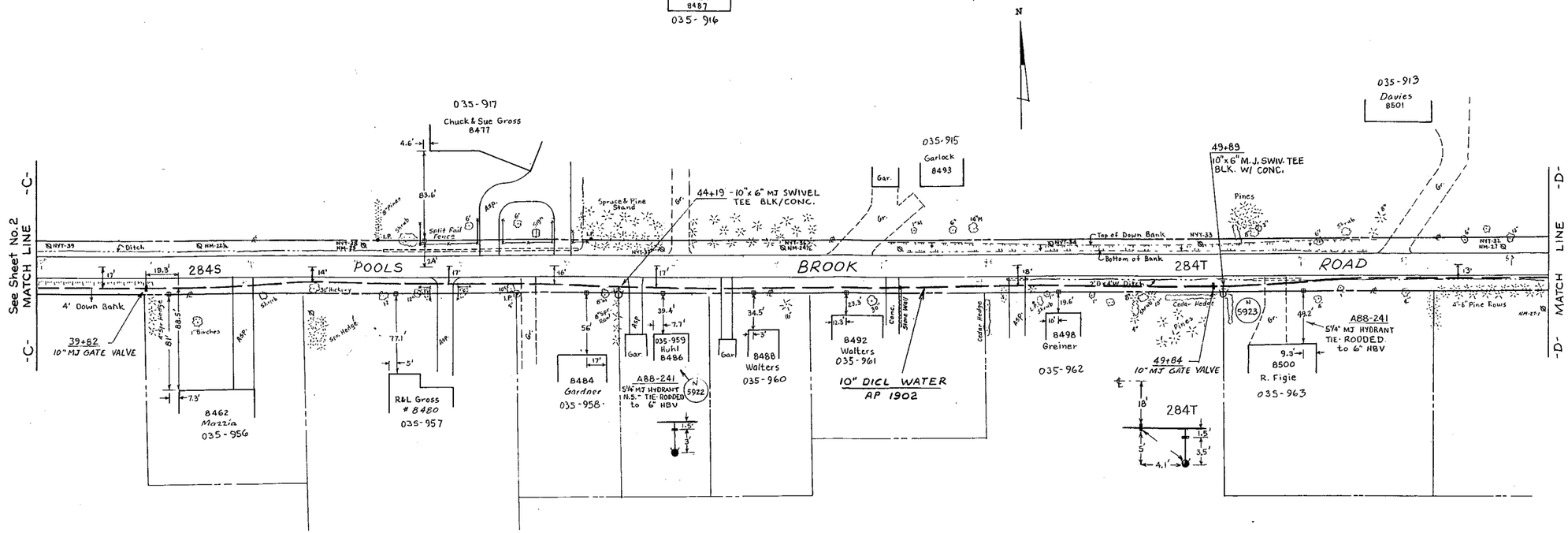
Sign name: _____

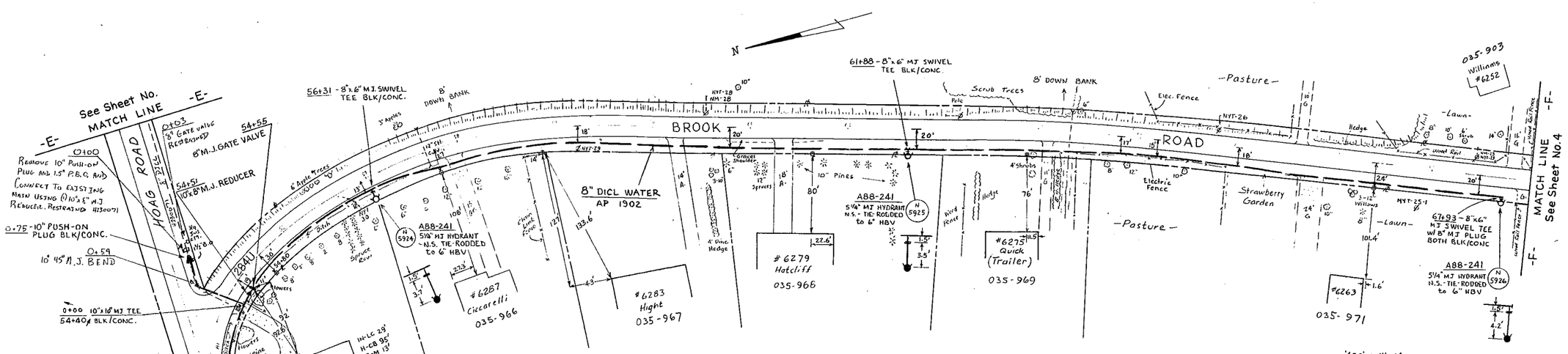
Title: _____ Date: _____

Sign and Return 2 forms

Distribution: 1 signed copy Municipality retains
2 signed copies OCWA
Account File
Engineering Project File

LOCATION OF UTILITIES ARE APPROXIMATE AND SHOULD BE VERIFIED BY CONTRACTOR IN FIELD.





AS BUILT

REVISION	DATE	BY
PLAN APPROVED	7/11/88	JW
Acc. #s Added	7/12/88	EH
As Built AP1902 A88-241	7/25/89	RAC
#1230071 Added	8/4/92	PS

ONONDAGA COUNTY WATER AUTHORITY
NORTHERN CONCOURSE P.O. BOX 9 —— SYRACUSE, N.Y. 13211

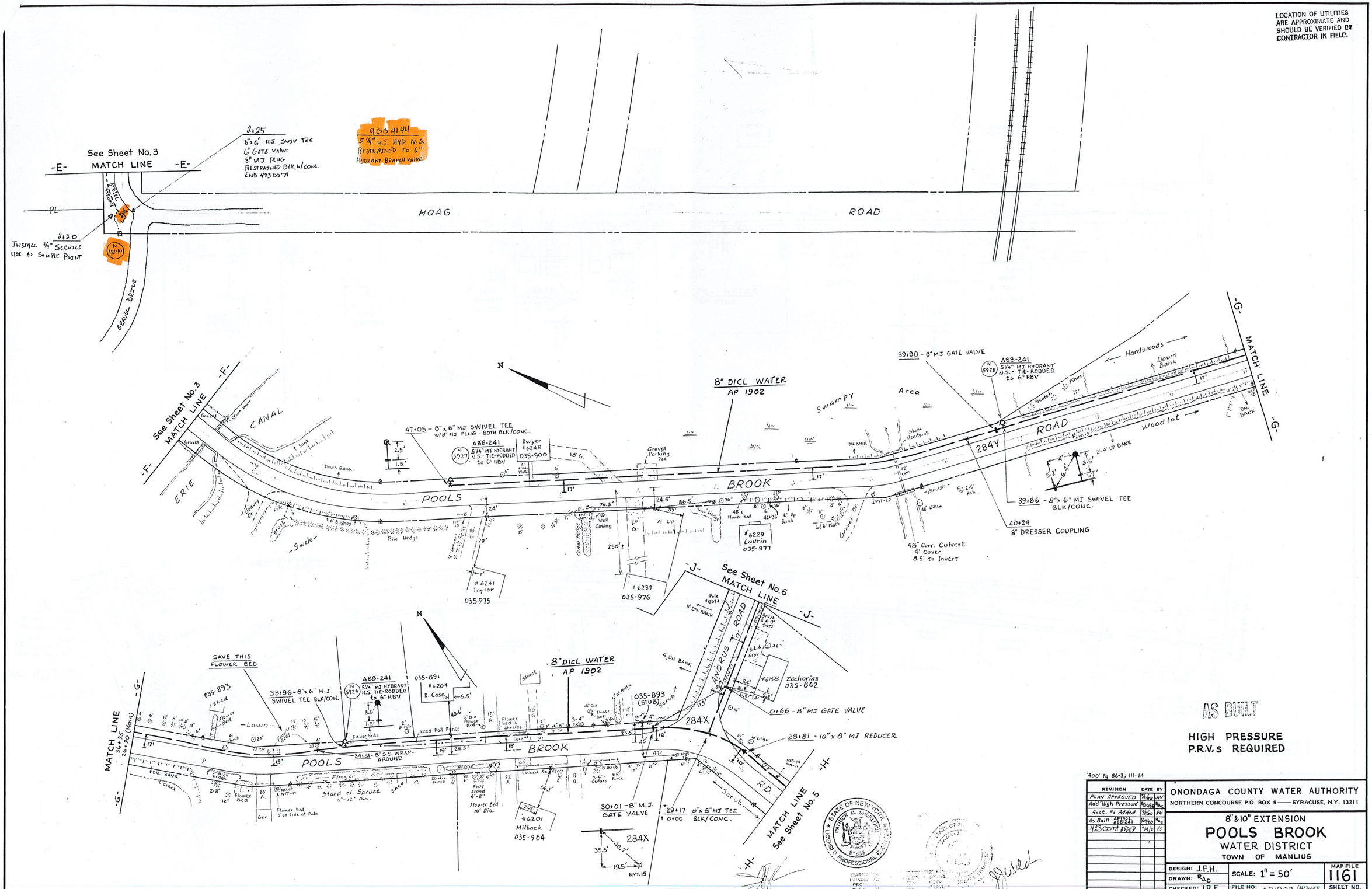
8"&10" EXTENSION
POOLS BROOK
WATER DISTRICT
TOWN OF MANLIUS

DESIGN: J.F.H.	SCALE: 1" = 50'	MAP FILE 1161
DRAWN: RAC		
CHECKED: J.R.E.	FILE NO: AP1902 / #1230071 A88-241/900-4149	SHEET NO. 3
DATE: 6-29-88		

WARNING: IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER IN ANY WAY A PLAN PROVIDED FOR THE EXECUTION OF WORK. SECTION 7209, EDUCATION LAW OF THE STATE OF NEW YORK.

PATRICK H. SHERLOCK NYS P.E. LIC# 076836

LOCATION OF UTILITIES ARE APPROXIMATE AND SHOULD BE VERIFIED BY CONTRACTOR IN FIELD.



PATRICK M. SHERLOCK N.Y.S. P.E. LIC# 041836

'400' Pg. 86-3; 111-14

REVISION	DATE	BY
PLAN APPROVED	12/28/88	JW
Add "High Pressure"	8/30/89	RAc
Acct. #s Added	6/16/89	RH
As Built AP1902 A88-241	12/13/89	RAc
423001 ADDED	5/19/12	RS

ONONDAGA COUNTY WATER AUTHORITY
NORTHERN CONCOURSE P.O. BOX 9 —— SYRACUSE, N.Y. 13211

8" & 10" EXTENSION
POOLS BROOK
WATER DISTRICT
TOWN OF MANLIUS

DESIGN: J.F.H.	SCALE: 1" = 50'	MAP FILE 1161
DRAWN: RAc		
CHECKED: J.R.E.	FILE NO: AP1902 (423001) A88-241 (90-41-49)	SHEET NO. 4
DATE: 6-29-88		

TOSHIBA
BUSINESS SOLUTIONS

LEASE WITH MAINTENANCE AGREEMENT

TOSHIBA
FINANCIAL SERVICES

APPLICATION NUMBER	AGREEMENT NUMBER

The words **you** and **your**, refer to the **Customer**. The words **Lessor**, **we**, **us**, and **our**, refer to **Toshiba Financial Services**. The Toshiba Equipment is covered by the terms of the Toshiba Quality Commitment, a copy of which may be obtained from your service provider. We own the Equipment, as defined below, (excluding software) and you have the right to use it under the terms of this Agreement.

CUSTOMER CONTACT INFORMATION

Legal Company Name: Town of Manlius — Fed. Tax ID#:
Contact Person: Jeffrey Slater — Bill-To Phone: (315) 682-2212 — Bill-To Fax:
Billing Address: 1 ARKIE ALBANESE AVENUE — City, State - Zip: MANLIUS, NY 13104
Equipment Location: (if different than above) — City, State - Zip:

TBS LOCATION

Contact Name: Sara Bird — Location:

EQUIPMENT WITH CONSOLIDATED MINIMUMS

ITEM DESCRIPTION	MODEL NO.	SERIAL NO.	STARTING METER
Toshiba e-STUDIO3525AC	ESTUDIO3525AC		
RADF Document Feeder	MR3033		
Large Capacity Feeder	KD1073LT		
50-sheet Inner Finisher	MJ1048		
Fax Unit / 2nd Line Fax Unit	GD1370N		
Toshiba e-STUDIO330AC	ESTUDIO330AC		
Copier Stand	STAND400		
Paper Feed Unit	MY1050		

☐ See attached form (Schedule "A") for Additional Equipment ☐ See attached form (Billing Schedule) for Additional Equipment/Payment Schedule

LEASE TERM & PAYMENT SCHEDULE

Number of Payments: 48 of $ 320.00 * Security Deposit**: $ 0.00 ☐ Received *plus applicable taxes*

Payments includes:	7,000	B&W Images per Month	Excess Images at: $ 0.00700	* per B&W Image
Payments includes:	1,000	Color Images per Month	Excess Images at: $ 0.05500	* per Color Image
Payments includes:		Scan Images per Month	Excess Images at: $	* per Scan Image
Payments includes:		B&W Print Images per Month	Excess Images at: $	* per B&W Print Image
Payments includes:		Color Print Images per Month	Excess Images at: $	* per Color Print Image

Origination Fee: Up to $99.00 *(included in First Invoice)* Lease payment period is monthly unless otherwise indicated.

Excess Images billed: ☒ Monthly ☐ Quarterly ☐ Semi-Annually ☐ Annually

End-of-Lease Options:
You will have the following options at the end of your original term, provided the Agreement has not terminated early and no event of default under the Agreement has occurred and is continuing.
1. Purchase the Equipment at Fair Market Value per section 16.
2. Renew the Agreement per section 17.
3. Return Equipment.

** Security Deposit: The security deposit is non interest bearing and is to secure your performance under this Agreement. Any security deposit made may be applied by us to satisfy any amount owed by you in, in which event you will promptly restore the security deposit to its full amount as set forth above. If all conditions are fully complied with and provided you have not ever been in default of the Agreement in the Default section, the security deposit will be refunded to you after the return of the equipment in accordance with the Return of Equipment section.

THIS IS A NONCANCELABLE / IRREVOCABLE AGREEMENT. THIS AGREEMENT CANNOT BE CANCELLED OR TERMINATED.

LESSOR ACCEPTANCE

Toshiba Financial Services	Signature:	Title:	Date:

CUSTOMER ACCEPTANCE

You hereby acknowledge and agree that your original or electronic signature below shall constitute an enforceable and original signature for all purposes. This Agreement may be executed in counterparts. The executed counterpart which has Lessor's original signature and/or is in Lessor's possession shall constitute chattel paper as that term is defined in the Uniform Commercial Code ("UCC") and shall constitute the original agreement for all purposes, including, without limitation, (i) any hearing, trial or proceeding with respect to this Agreement, and (ii) any determination as to which version of this Agreement constitutes the single true original item of chattel paper under the UCC. If Customer signs and transmits this Agreement to Lessor by facsimile or other electronic transmission, the transmitted copy, upon execution by Lessor, shall be binding upon the parties. Customer agrees that the facsimile or other electronic transmission of this Agreement manually signed by Lessor, when attached to the facsimile or other electronic copy signed by Customer, shall constitute the original agreement for all purposes, including, without limitation, those outlined above in this Section. Without limiting and subject to the foregoing, the parties further agree that, for purposes of executing this Agreement, (a) a document signed and transmitted by facsimile or other electronic transmission shall be treated as an original document, (b) the signature of any party on such document shall be considered as an original signature, (c) the document transmitted shall have the same effect as a counterpart thereof containing original signatures, and (d) at the request of Lessor, Customer, who executed this Agreement and transmitted its signature by facsimile, or other electronic transmission shall provide the counterpart of this Agreement containing Customer's original manual signature to Lessor. No party may raise as a defense to the enforcement of this Agreement that a facsimile or other electronic transmission was used to transmit any signature of a party to this Agreement. **BY SIGNING THIS PAGE, YOU REPRESENT TO US THAT YOU HAVE RECEIVED AND READ THE ADDITIONAL TERMS AND CONDITIONS APPEARING ON THE SECOND PAGE OF THIS AGREEMENT. THIS AGREEMENT IS BINDING UPON OUR ACCEPTANCE HEREOF.**

Name:	Signature: X	Title:	Date:

SEE PAGE 2 FOR ADDITIONAL TERMS AND CONDITIONS

TERMS AND CONDITIONS

1. **Lease Agreement:** You agree to lease from us the equipment described under "ITEM DESCRIPTION" and on any attached Schedule (hereinafter, with all replacement parts, repairs, additions and accessories, referred to as the "Equipment") and as modified by Supplements to this Agreement from time to time signed by you and us. You authorize us to insert or correct missing information on this Agreement, including your accurate legal name, serial numbers and any other information describing the Equipment. You authorize us to change the amount of each Payment (set forth on page 1 of this Agreement) by not more than 15% due to changes in the equipment configuration which may occur prior to our acceptance of this Agreement or adjustments to reflect applicable sales taxes. We will send you copies of any changes. You agree to provide updated annual and/or quarterly financial statements to us upon request. You authorize us or our assignee to obtain credit reports and make credit inquiries regarding you and your financial condition and to provide your information, including payment history, to our assignees or third parties having an economic interest in this Agreement or the Equipment. Toshiba Financial Services (TFS) is not responsible for service or maintenance of the Equipment and is not party to any service maintenance agreement.
2. **Lease Commencement:** This Agreement will commence upon your acceptance of the applicable Equipment. When you receive the Equipment, you agree to inspect it and verify your acceptance by telephone or, at our request, by delivery of written evidence of acceptance satisfactory to us. Upon acceptance, your obligations under this Agreement will become absolute and unconditional, and are not subject to cancellation, reduction or setoff for any reason whatsoever. You agree to pay us the amounts payable under the terms of this Agreement each period by the due date in accordance with the Term and Payment schedule set forth on page 1 of this Agreement. Payments shall be delivered to our address or to such other address as we may designate in writing. For any payment that is not received by its due date, you agree to pay a late charge equal to the higher of 10% of the amount due or $22 (not to exceed the maximum allowed by law).
3. **Image Charges:** Each month during the term of this Agreement, you agree to remit to us the Payment and all other sums when due and payable to the address we provide to you from time to time. In return for the Payment, you are entitled to produce the Images (set forth on page 1 of this Agreement) included for each applicable image type each month. You also agree to pay us the Excess Image charge (set forth on page 1 of this Agreement) for each metered image that exceeds the applicable Images Included. We reserve the right to estimate the number of images used if you do not provide us with meter readings within seven days of request. We will adjust the estimated charge for excess images upon receipt of actual meter readings. Notwithstanding any adjustments, you will never remit to us less than the Minimum Payment each month. You agree that we reserve the right to increase the maintenance and supplies portion of the Lease Payment and/or the Excess Image charge each year during the Term of the Schedule by an amount not to exceed fifteen percent (15%) of the Payment and/or the Excess Image charge in effect at the end of the prior annual period. At our option, you will: (a) provide meter readings via an automated website when requested by us. We may charge a fee to recover the cost of meter collections if meters are requested but not submitted through the automated website. (b) Provide us by telephone or facsimile the actual meter readings when requested by us. (c) Allow us (or our agent) access to the Equipment to obtain meter readings. (d) Allow us (or our agent) to attach an automatic meter reading device to the Equipment. We may audit the automatic meter reading device periodically. If you have a dispute with your service provider, you continue to pay us all Payments and Excess Image charges without deductions or withholding deductions. Images made on Equipment marked as "Customer Owned" will be included in determining your image and excess charges.
4. **WARRANTY DISCLAIMER: WE MAKE NO WARRANTY EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THAT THE EQUIPMENT IS FIT FOR A PARTICULAR PURPOSE OR THAT THE EQUIPMENT IS MERCHANTABLE. YOU AGREE THAT YOU HAVE SELECTED EACH ITEM OF EQUIPMENT BASED UPON YOUR OWN JUDGMENT AND DISCLAIM ANY RELIANCE UPON ANY STATEMENTS OR REPRESENTATIONS MADE BY US. YOU LEASE THE EQUIPMENT "AS IS". NO REPRESENTATION OR WARRANTY WITH RESPECT TO THE EQUIPMENT WILL BIND US, NOR WILL ANY BREACH THEREOF RELIEVE YOU OF ANY OF YOUR OBLIGATIONS HEREUNDER. YOU AGREE THAT WE WILL NOT BE RESPONSIBLE TO PAY YOU ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR ANY DEFAULT BY US UNDER THIS AGREEMENT.**
5. **Statutory Finance Lease:** You agree that this Agreement qualifies as a statutory Finance Lease under Article 2A of the Uniform Commercial Code. To the extent you are permitted by applicable law, you waive all rights and remedies provided by Article 2A (sections 508-522) of the Uniform Commercial Code.
6. **Security Interest:** You authorize us to file a financing statement with respect to the Equipment. If this Agreement is deemed to be a secured transaction, you grant us a security interest in the Equipment to secure all amounts you owe us under any agreement with us.
7. **Use Maintenance and Repair of Equipment:** YOU WILL USE THE EQUIPMENT ONLY IN THE LAWFUL CONDUCT OF YOUR BUSINESS AND NOT FOR PERSONAL, HOUSEHOLD OR FAMILY PURPOSES. You will not move the Equipment from the equipment location listed on page 1 without our advance written consent. You will give us reasonable access to the Equipment so that we can check the Equipment's existence, condition and proper maintenance. At your cost, you will keep the Equipment in good repair, condition and working order, ordinary wear and tear excepted. You will not make any permanent alterations to the Equipment. You will keep the Equipment free and clear of all liens. You assign to us all of your rights, but none of your obligations, under any purchase agreement for the Equipment. We assign to you all our rights under any warranties, so long as you are not in default.
8. **Software:** Except as provided in this paragraph, references to "Equipment" include any software referenced above or installed on the Equipment. We do not own the software and cannot transfer any interest in it to you. You are responsible for entering into any license and/or other agreement (each a "License Agreement") required by the applicable software supplier or software licensor no later than the effective date of this Agreement and you will fully comply with such License, if any, throughout the applicable term. We are not responsible for the software or the obligations of you or the software licensor under any License Agreement. If any items are listed with the Equipment and denoted as "(Software as a Service)" you understand the Payment set forth on page 1 includes the periodic amount you have agreed to pay for the software/subscription services described in your Master Software and Services Agreement and/or your Statement of Services relating to such software/subscription services ("SaaS") with Toshiba America Business Solutions Inc. ("TBS"). Please reference your SaaS for a description of your rights and obligations with respect to such software/subscription services. You acknowledge the SaaS is separate from this Agreement, it shall not affect your obligations under this Agreement in any way, and TBS is solely responsible for the performance obligations related to SaaS.
9. **Taxes and Lease Charges:** You agree to pay all taxes, costs and expenses incurred by us as a consequence of the ownership, sale, lease or use of the Equipment, including all sales, use and documentary stamp taxes. Any fee charged under this Agreement may include a profit and is subject to applicable taxes. In addition, you agree to pay us a UCC filing fee of $35.00.
10. **Indemnity:** You will indemnify and hold us harmless from any and all liability, damages, losses or injuries including reasonable attorney's fees, arising out of the ownership, use, condition or possession of the Equipment, except to the extent directly caused by our gross negligence or willful misconduct. We reserve the right to control the defense and to select or approve defense counsel. This indemnity will survive the termination of this Agreement.
11. **Risk of Loss; Insurance:** You are responsible for risk of loss or for any destruction of or damage to the Equipment. No such loss or damage shall relieve you from the payment obligations under this Agreement. You agree to keep the Equipment fully insured against loss until this Agreement is paid in full and to have us and our assigns named as lender's loss payee. You also agree to maintain public liability insurance covering both personal injury and property damage and you shall name us and our assigns as additional insured. Upon request, you agree to provide us certificates or evidence of insurance acceptable to us. If you fail to comply with this requirement within 30 days after the start of this Agreement: (a) we have the right but no obligation to obtain insurance covering our interest (and only our interest) in the Equipment for the lease term, and renewals. Any insurance we obtain will not insure you against third party or liability claims and may be cancelled by us at any time. You will be required to pay us an additional amount each month for the insurance and administrative fee. The cost may be more than the cost of obtaining your own insurance and we may make a profit. You agree to cooperate with us, our insurer and our agent in the placement of coverage and with claims; or (b) we may charge you a monthly property damage surcharge of up to .0035 of the Equipment cost as a result of our credit risk and administrative and other costs, as would be further described on a letter from us to you. We may make a profit on this program. Once an acceptable certificate or evidence of insurance is submitted, any such fees will be discontinued. If any of the Equipment is lost, stolen or damaged you will at your option and cost, either (a) repair the item or replace the item with a comparable item reasonably acceptable to us, or (b) pay us the sum set forth in the Remedies section.
12. **Right to Perform:** If you fail to comply with any provision of this Agreement, we may, at our option, perform such obligations on your behalf. Upon invoice you will reimburse us for all costs incurred by us to perform such obligations.
13. **Representations:** (a) You represent and warrant to us that (1) you have the lawful power and authority to enter into this Agreement, and (2) the individuals signing this Agreement have been duly authorized to do so on your behalf, (3) you will provide us such financial information as we may reasonably request from time to time, (4) all financial information provided (or to be provided) is (or will be) accurate and complete in all material respects, (5) you will promptly notify us in writing if you move your principal place of business or there is a change in your name, state of formation, or ownership, and (6) you will take any action we reasonably request to protect our rights in the Equipment. (b) We represent and warrant to you that (1) we have the lawful power and authority to enter into this Agreement, and (2) the individuals signing this Agreement have been duly authorized to do so on our behalf.
14. **Default:** You will be in default under this Agreement if: (a) we do not receive any Payment due under this Agreement within five (5) days after its due date, (b) you fail to meet any of your obligations in the Agreement (other than payment obligations) and do not correct such default within 10 days after we send you written notice of such default, (c) you or your guarantor become insolvent, are liquidated or dissolved, merge, transfer a material portion of your ownership interest or assets, stop doing business, or assign rights or property for the benefit of creditors, (d) a petition is filed by or against you or your guarantor under any bankruptcy or insolvency law, (e) any representation made by you is false or misleading in any material respect, (f) you default on any other agreement with us or our assigns or any material agreement with any entity, or (g) there has been a material adverse change in your or any guarantor's financial, business or operating condition.
15. **Remedies:** If you are in default, we may, at our option, do any or all of the following: (a) retain your security deposit, if any, (b) terminate this Agreement, (c) require that you pay, as compensation for loss of our bargain and not as a penalty, the sum of (1) all amounts due and payable by you or accrued under this Agreement, plus (2) the present value of all remaining Payments to become due under this Agreement (discounted at 2% or the lowest rate allowed by law), and (3)(i) the amount of any purchase option and, if none is specified, 20% of the original equipment cost, which represents our anticipated residual value in the Equipment or (ii) return the Equipment to a location designated by us and pay to us the excess, if any, of the amount payable under clause (3)(i) over the Fair Market Value of the returned Equipment as determined by us in our reasonable discretion, (d) recover interest on any unpaid balance at the rate of 12% per annum, and (e) exercise any other remedies available to us at law or in equity, including requiring you to immediately stop using any financed software. You agree to pay our reasonable attorney's fees and actual court costs including any cost of appeal. If we have to take possession of the Equipment, you agree to pay the cost of repossession and we may sell or re-rent the Equipment at terms we determine, at one or more public or private sales, with or without notice to you. You may remain liable for any deficiency with any excess being retained by us.
16. **Purchase Option:** At the end of the Term provided you are not in default, and upon 30 days prior written notice from you, you will either (a) return all the Equipment, or (b) purchase all the Equipment as is, without any warranty to condition, value or title for the Fair Market Value of the Equipment as determined by us in our reasonable discretion plus applicable sales and other taxes.
17. **Automatic Renewal:** Except as set forth in Section 16, this Agreement will automatically renew on a month-to-month basis after the Term, and you shall pay us the same Payments and lease charges as applied during the Term (and be subject to the terms and conditions of this Agreement) until the Equipment is returned to us or you pay us the applicable purchase price (and taxes).
18. **Return of Equipment:** If (a) a default occurs, or (b) you do not purchase the Equipment at the end of the Term pursuant to a stated purchase option, you will immediately return the equipment to any location(s) we may designate in the continental United States. The Equipment must be returned in "Average Saleable Condition" and properly packed for shipment in accordance with our recommendations or specifications, freight prepaid and insured. "Average Saleable Condition" means that all of the Equipment is immediately available for use by a third party, other than you, without the need for any repair or refurbishment. All Equipment must be free of markings. You will pay us for any missing or defective parts or accessories.
19. **Assignment:** We may, without your consent, assign or transfer any Equipment or this Agreement, or any rights arising under this Agreement, and in such event our assignee or transferee will have the rights, power, privileges and remedies of Lessor hereunder, but none of the obligations. Upon such assignment you agree not to assert, as against our assignee, any defense, setoff, recoupment, claim or counterclaim that you may have against us. You will not assign, transfer or sublease this Agreement or any rights thereunder or any Equipment subject to this Agreement without our prior written consent.
20. **Personal Property Tax (PPT):** You agree at our discretion to (a) reimburse us annually for all personal property and similar taxes associated with the ownership, possession or use of the Equipment or (b) remit to us each billing period our estimate of the prorated equivalent of such taxes. You agree to pay us an administrative fee for the processing of such taxes. We may make a profit on such a fee.
21. **Tax Indemnity:** You agree to indemnify us for the loss of any income tax benefit caused by your acts or omissions inconsistent with our entitlement to certain tax benefits as owner of the Equipment.
22. **Governing Law:** BOTH PARTIES AGREE TO WAIVE ALL RIGHTS TO A JURY TRIAL. This Agreement and any supplement shall be deemed fully executed and performed in the state in which our (or, if we assign this Agreement, our assignee's) principal place of business is located and shall be governed by and construed in accordance with its laws. Any dispute concerning this Agreement will be adjudicated in a federal or state court in such state. You hereby consent to personal jurisdiction and venue in such courts and waive transfer of venue.
23. **Transition Billing:** In order to facilitate an orderly transition, the start date of this Agreement will be the date the Equipment is delivered to you or a date designated by us, as shown on the first invoice. If a later start date is designated, in addition to all Payments and other amounts due hereunder, you agree to pay us a transitional payment equal to 1/30th of the Payment, multiplied by the number of days between the date the Equipment is delivered to you and the designated start date. The first Payment is due 30 days after the start of this Agreement and each Payment thereafter shall be due on the same day of each month.
24. **Miscellaneous:** This Agreement contains the entire agreement between you and us and may not be modified except as provided therein or in writing signed by you and us, and supersedes any purchase orders. We will not accept payment in cash. If you so request, and we permit the early termination of this Agreement, you agree to pay a fee for such privilege. Notices must be in writing and will be deemed given five days after mailing to your or our mailing address. If a court finds any provision of this Agreement to be unenforceable, all other terms of that Agreement will remain in effect and enforceable. You agree that any delay or failure to enforce our rights under this Agreement does not prevent us from enforcing any rights at a later time. In no event will we charge or collect any amounts in excess of those allowed by applicable law. Time is of the essence. You hereby acknowledge and confirm that you have not received any tax, financial, accounting or legal advice from us, or the manufacturer of the Equipment. It is the Customer's sole and exclusive responsibility to ensure that all data from all disk drives or magnetic media are erased of any customer data and information. You hereby consent to receive electronic marketing communication on Toshiba products and services. TO HELP THE GOVERNMENT FIGHT THE FUNDING OF TERRORISM AND MONEY LAUNDERING ACTIVITIES, FEDERAL LAW REQUIRES ALL FINANCIAL INSTITUTIONS TO OBTAIN, VERIFY AND RECORD INFORMATION THAT IDENTIFIES EACH PERSON WHO OPENS AN ACCOUNT. WHAT THIS MEANS TO YOU: WHEN YOU OPEN AN ACCOUNT, WE WILL ASK FOR YOUR NAME, ADDRESS AND OTHER INFORMATION THAT WILL ALLOW US TO IDENTIFY YOU. WE MAY ALSO ASK TO SEE IDENTIFYING DOCUMENTS.
25. **Maintenance and Supplies Agreement ("MSA") with TBS:**

    a) TBS agrees to provide full service maintenance including toner, developer and parts necessary to produce an image. TBS will provide inspections as required, which may be made in conjunction with regular or emergency service calls. If, upon your request, service is provided at a time other than during TBS's normal business hours, you will be charged at TBS's customary rates. TBS will not be obligated to provide service for repairs made necessary as a result of service by personnel not authorized by TBS or the use of supplies other than those provided by TBS. Separate charges for repairs or parts replacement due to the foregoing shall be borne by you.

    b) Except as provided below, TBS will replace parts necessary to produce an image, consumables and supply items without charge. You agree to replace any parts, consumables and supply item as a result of carelessness on the part of the operator, accident, misuse (including failure to follow the manufacturer's published operating manual) abuse, neglect, theft, riot, vandalism, lightning, electrical power failure, fire, water, or other casualty.

    c) If you are in default under the MSA, TBS has the right to deny performing any service and/or supplying any products.

    d) Under the MSA, TBS's liability with respect to any property damage or injury (including death) to persons arising out of or connected with service performed under this Agreement is strictly limited to that imposed by law and there is no contract imposing any greater degree of liability.

    e) Title to all supplies furnished hereunder including toner and toner bags remains with TBS until you consume said supplies to the extent they may not be further utilized in the image making process. We may charge you a supply freight fee to cover the cost of shipping supplies. You agree to use the supplies provided at "no charge" on the Equipment. You will not take designated supplies from Equipment to be used in any other Equipment not covered by this Agreement. You must purchase paper and staples separately.

    f) Stated supply item yields represent 100% of manufacturer stated yields based on standard "letter size" copies with 6% image coverage. At the end of each annual billing period or billing cycle, you will be billed for any toner used in excess of that required based on yields stated above.

TOSHIBA
BUSINESS SOLUTIONS

SALES ORDER

SO-2.0.0

SALES PACKET NUMBER	ORDER DATE

Sales Representative: Sara Bird

CUSTOMER INFORMATION

Customer Name: Town of Manlius

Billing Address: 1 ARKIE ALBANESE AVENUE

Address 2:

City: MANLIUS State: NY Zip: 13104

Phone #: (315) 682-2212 Ext:

Contact: Jeffrey Slater

eMail: jslater@manliuspolice.org

Tax ID#:

Fax#:

Customer PO#:

EQUIPMENT AND SUPPLIES

QTY.	EQUIPMENT & ACCESSORIES	PRODUCT NUMBER	SHIP TO ADDRESS	UNIT PRICE	AMOUNT
1	Toshiba e-STUDIO3525AC	ESTUDIO3525AC	1 ARKIE ALBANESE AVENUE MANLIUS, NY 13104		SEE LEASE
1	RADF Document Feeder	MR3033			
1	Large Capacity Feeder	KD1073LT			
1	50-sheet Inner Finisher	MJ1048			
1	Fax Unit / 2nd Line Fax Unit	GD1370N			
1	Toshiba e-STUDIO330AC	ESTUDIO330AC	1 ARKIE ALBANESE AVENUE MANLIUS, NY 13104		
1	Copier Stand	STAND400			
1	Paper Feed Unit	MY1050			

SPECIAL INSTRUCTIONS

Sub Total	SEE LEASE
Other	
EOL/Security	
Professional Fees	
Connectivity Fees	
Move Fees	
Taxable Total	
Sales Tax %	
Tax Paid	
Advance Paid	
Total	SEE LEASE

CUSTOMER ACCEPTANCE

You hereby acknowledge and agree that your electronic signature above shall constitute an enforceable and original signature for all purposes.

By signing this agreement, the customer acknowledges that he/she has read and understood the terms and conditions of this agreement.

1. Limited Warranty. The seller warrants that the goods to be delivered will be of the kind and quality described in this Agreement and will be free of defects in workmanship or material. Should any failure to conform to this warranty appear within ninety (90) days after the initial date of installation in the case of new goods, or thirty (30) days after the initial date of installation in the case of used or reconditioned goods, the seller at it's option, shall correct such defects by suitable repair or replacement at its own expense, upon notification thereof and substantiation that the goods have been stored, installed, maintained, and operated in accordance with the Seller's recommendations or standard industry practice. The foregoing warranty does not apply to consumable parts such as, but not limited to, drums, cleaning brushes, filters, developer, toner, heat and oilier tubes, pressure pads, lamps, lenses and fuses.

This warranty is exclusive and is in lieu of any warranty of merchantability, fitness for a particular purpose or other warranty of quality, whether express or implied, except of title and against patent infringement. Correction of non-conformities, in the manner and for the period of time provided above, shall constitute fulfillment of all liabilities of the Seller to the Customer with respect to, or arising out of the goods, whether based on contract, negligence, strict tort liability of otherwise.

Print Name:	Signature: X	Title:	Date:

TBS ACCEPTANCE

Print Name:	Signature: X	Title:	Date:

TOSHIBA
BUSINESS SOLUTIONS

REQUEST FOR CERTIFICATE OF INSURANCE (PROPERTY COVERAGE)

TOSHIBA
FINANCIAL SERVICES

AGREEMENT NUMBER

CUSTOMER: PLEASE FILL IN YOUR INSURANCE INFORMATION AND SEND TO YOUR INSURANCE AGENT

To: Customer's Insurance Agent	Description of Item(s) to be Insured:
Name of Agency:	Toshiba e-STUDIO3525AC
Agent:	Toshiba e-STUDIO330AC
Address:	
Phone:	
Fax:	
E-mail:	

Insurable Value: $36,226.00

The below-stated Customer intends to or has entered into a financing agreement ("Agreement") with Toshiba Financial Services ("Creditor") for the above-referenced item(s) ("Equipment"). Creditor requires proof in the form of Certificates of Insurance that Customer's insurable interest in the Equipment meets Creditor's requirements as follows:

1. **Certificate of Property Coverage: Customer must carry PROPERTY insurance in an amount no less than the Insurable Value (with deductibles no more than $25,000). Creditor AND/OR ITS ASSIGNS shall be listed as LENDER'S LOSS PAYEE on such policy.**

2. **The Certificate Holder on the above-referenced policies shall be listed as follows:**

   Toshiba Financial Services and/or its assigns
   1310 Madrid Street, Suite 101
   Marshall, MN 56258

3. Please e-mail a copy of the above-referenced Certificates of Insurance to Town of Manlius, and ef.insurance.group@onlinecomment.com, referencing Application #_____ on the cover sheet, as soon as possible. If you have any questions, please contact us at: 1-800-828-8246.

By signing below, Customer authorizes the above-named Insurance Agent to immediately endorse the insurance policies and subsequent renewals to reflect the required coverage, as outlined above. In addition to providing Creditor with a copy of the Certificates of Insurance, as stated above, Customer hereby requests Insurance Agent to send to Creditor any subsequent renewals of such insurance policies, by mail, at the address listed above.

Town of Manlius ,
Customer

X
Signature

Title Date

Customer: THIS FORM IS PROVIDED FOR YOU TO APPROVE, COMPLETE AND SEND TO YOUR INSURANCE AGENT.

TOSHIBA
BUSINESS SOLUTIONS

AUTOMATED METER READ PROGRAM OPTIONS

AM-2.0.0

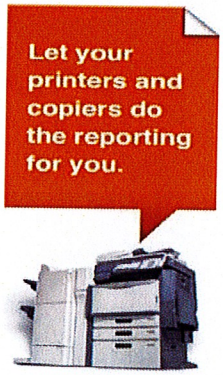
SALES PACKET NUMBER	DATE

Sales Representative: Sara Bird

CUSTOMER INFORMATION

Customer Name: Town of Manlius	Customer Contact: Jeffrey Slater
Billing Address: 1 ARKIE ALBANESE AVENUE	Phone #: (315) 682-2212 Ext. / Customer PO #:
Suite #:	Meter Contact: Jeffrey Slater / Meter Phone: (315) 682-2212
City: MANLIUS State: NY Zip: 13104	Meter Email: jslater@manliuspolice.org

METER COLLECTION CHOICES:



What is Toshiba's Automated Meter Read Program (AMR)? As part of your service contract with TBS, you are required to report usage data for all your printers, copiers, and multifunction devices. With manual reporting, you must go to each device, record the serial numbers and meter readings, and submit this information via email, fax or phone. Toshiba's AMR program automatically gathers usage data for each device and sends it securely to TBS at scheduled intervals. The result is more accurate and timely reporting, fewer billing errors, and less busy work for you.

How much does Toshiba AMR cost me?

Nothing. Ever.

What information does AMR gather?

The automated meter reading system captures all required information for billing purposes; Machine model, Serial number, and usage information.

Is the transmission secure?

Yes. Data is completely secure.

Toshiba Business Solutions IT Team will work with you to set up equipment meter collections in the priority listed below:

1 Automated Meter Read (e-Bridge CloudConnect)

Your Toshiba system will be equipped with two-way communication capabilities. TBS will provide updates, system back ups, and meter collection automatically. Equipment MUST be connected to your network.

2 Automated Meter Read (On Site Software)

TBS will provide free AMR software that will automatically pull meter information and input into TBS billing system. Equipment MUST be connected to your network.

3 Meters Online (MOL)

An automatic meter request is sent to the End User directly from the TBS billing system.
End User collects the meter readings and goes to http://meters.toshiba.com and enters the meters online manually.
All meters submitted via online are electronically imported into the TBS billing with no manual entry or interaction by TBS.

TBS may charge a fee to recover the cost of meter collections if meters are not submitted through the automated website. TBS reserves the right to convert Customer to a flat fee, based upon the greater of a specific unit's historical average volume or the device type's midpoint manufacturer recommended volume, if meters are not made available for the device(s) after 3 consecutive billing periods.

ELECTRONIC INVOICING CHOICE:

Toshiba is committed to the environment through its worldwide green initiatives. One of the primary goals of Toshiba's green initiatives is environmental management through corporate social responsibility. One of TBS's Eco-Innovation initiatives is to convert to electronic invoicing whenever possible. Converting to electronic invoicing will enable TBS to decrease its consumption of environmental resources tremendously.

Please select if you will accept Electronic Invoices when possible: ☐ Yes ☒ No

Upon receipt of first TFS Lease invoice, visit www.financing.eportaldirect.com **or call** 1-800-328-9092 **to register.**

Please select preferred Electronic Invoice Method (TBS Invoices Only):

Email Attachment Only: ☐
PDF copy of invoice sent to email listed below

Invoice Portal Access: ☐
Link to web portal allowing invoicing viewing and E-Pay option. Email will be sent with link when new invoices generate.

Email Address for invoice notifications: jslater@manliuspolice.org

CUSTOMER ACCEPTANCE:

Print Name: Signature: Title: Date:

AMR 0119

TOSHIBA
BUSINESS SOLUTIONS

CONNECTIVITY OPTIONS AGREEMENT

CA-1.0.0

SALES PACKET NUMBER	EFFECTIVE DATE

Sales Representative: Sara Bird

CUSTOMER INFORMATION

Customer Name: Town of Manlius	Customer Contact: Jeffrey Slater
Billing Address: 1 ARKIE ALBANESE AVENUE	Phone #: (315) 682-2212 Ext. / Customer PO #:
Address 2:	IT Contact: Jeffrey Slater / IT Phone #: (315) 682-2212
City: MANLIUS State: NY Zip: 13104	eMail: jslater@manliuspolice.org

CONNECTIVITY OPTIONS (Check All That Apply)

☒ **OPTION A: Network Administrator Integration and Training** FREE ($400 VALUE) (Remote)

Includes basic device configuration, print driver installation on up to three workstations and administrator training. Additional Professional Services will be billed at published TBS Professional Services rates. Includes Remote Orientation of an Administrator to controller on their network, installation of 3 workstations for printing, scanning, and PC faxing. Connection Project not to exceed 2 hours. Any additional time required beyond 2 hours will be billed at current Professional Services Rates. If less than 2 hours is required, no time is banked for future use. Includes installation of Re-Rite on client server, configuration of 6 advanced scanning workflows; Word, Excel, Text Searchable PDF, PDF Form, Slim PDF, Secure PDF. Workflows include one Advanced Scanning Template Group, 6 Templates, and 4 Re-Rite workflows, all delivered to a common output folder. One hour of MFP Training - No more than 5 users per session - Training covers basic copier functions, printing, and scanning.

☐ **OPTION B: Custom Network Integration - Variable / Additional Charges**	Qty	Charge	Unit Description
• Base Device Configuration - Setup of Network Protocols on Device			Device
• Print Driver Installation			Workstation
• PC Fax Driver Installation			Workstation
• Print Driver and PC Fax Driver on same Workstation			Workstation
• Scan to Copier Controller			Scanning Template
• Scan to Network Folder			Scanning Template
• Scan to Email - Initial Setup of communication to local SMTP server			Initial Setup
- Additional Setup per Scanning Template			Scanning Template
- Off-site SMTP Server			Hour Until Completion
- Additional Setup per Scanning Template			Scanning Template
• Incoming Fax Routing to Copier Controller			Fax Destination
• Incoming Fax Routing to Network Folder Location			Fax Destination
• Incoming Fax Routing to Email - Initial Setup of SMTP Server			Initial Setup
Communication to a Local SMTP Server			
- Additional Setup per Destination			Destination
- Off-site SMTP Server			Hour Until Completion
- Additional Setup per Destination			Destination
• User Code Enforcement			10 User Codes
• Copier Configuration Backup and Restore			Backup/Restore Event

Total Connectivity Fee:

Note: Any Additional Connectivity Services performed not specified above will be billed at a rate of: $200.00 per hour.
Connectivity support may be completed remotely or on-site at the discretion of TBS. Support covers initial installation only.

CUSTOMER ACCEPTANCE

You hereby acknowledge and agree that your electronic signature above shall constitute an enforceable and original signature for all purposes.
By signing this agreement, the customer acknowledges that he/she has read and understood the statement of work and terms and conditions of this agreement.

Print Name:	Signature: X	Title:	Date:

DECLINATION

☐ Customer certifies that they have read the statement of work and that they have decided to decline all assistance from TBS regarding the installation of their copier/printer. TBS is under no obligation and has no liability concerning any aspect of the installation process.

Print Name:	Signature: X	Title:	Date:

TBS ACCEPTANCE

Print Name:	Signature: X	Title:	Date:

STATEMENT OF WORK

This Statement of Work for Connectivity & Security Options outlines the services and deliverables for the planned implementation. This Statement of Work is intended to detail the obligations of Toshiba Business Solutions (TBS) and the Customer.

CONNECTIVITY OPTIONS - WORK TO BE PERFORMED

Option B: Covers the selected work only. Additional Professional Services fees apply for any additional work at the current TBS Professional Services rates.

Base Device Configuration Includes:

1. Verify proper network settings, i.e., print queue configuration, TCP/IP address, etc.
2. Connect base unit to customer's network via customer supplied/installed cabling.
3. Perform color calibration on base unit and RIP device.

Print Driver Installation Includes:

1. Install print drivers onto designated workstations (up to three – Option A or as specified in Option B.)
2. Confirm print capabilities via standard print driver test page.

Administrator Training Includes:

1. Training on base unit, print driver and RIP software.
2. Orientation of the administrator to the print controller on the network.

While Toshiba print drivers are compatible with most common office applications, TBS does not provide training on specific printing applications.

STATEMENT OF WORK ASSUMPTIONS

The following are the assumptions on which this Statement of Work is based. If any of these assumptions either change or are incorrect, changes to the Statement of Work may be required, which may result in changes to the Connectivity Services fee. Please review this section to make sure these assumptions are correct.

1. Client is responsible for ensuring that all applications and data are successfully backed up prior to TBS beginning work. TBS is not responsible for any lost information.
2. Building environmental conditions are within equipment specifications for airflow, temperature, humidity, and electrical quality.
3. Cabling and WAN Data Communication Lines are properly installed and tested. TBS is not responsible for any improper cabling or issues involving telecommunications lines. All troubleshooting and corrective action will be billed outside of this SOW on a time and materials basis.
4. TBS is not responsible for any conflicts with existing hardware that is no longer supported by the manufacturer.
5. TBS is only responsible for integration tasks outlined in this Statement of Work. Any work outside of this SOW will be handled through a Change Order Request Process, which may require additional billable time and materials. Customer will be informed before any out of scope work is performed.
6. Customer will provide systems personnel for the project familiar with all aspects of Customer's enterprise configuration – security, remote access, domain structure, WAN/LAN connectivity, applications used for this particular project – to work in conjunction with TBS on this implementation. Additionally, a desktop technician may be required to perform client-side duties.
7. All software being utilized is registered and authentic.
8. Equipment is connected to a dedicated power source per product specifications furnished by TBS.
9. All network addresses, print queue names and printer names, etc. are available upon request.

TERMS AND CONDITIONS

The following Terms and Conditions are an amendment to the TBS Maintenance contract. In the event that the Customer has declined a Maintenance contract, the following Terms and Conditions do not apply to this agreement.

Toshiba products and software are warranted to be compatible with hardware and operating systems listed on product specification sheet at time of installation. TBS does not guarantee compatibility with future operating systems or hardware.

Inclusions – Hardware: Service calls, replacement parts for connected devices that allow the equipment to interface with PC's and networks, e.g. printer interface cards, NIC cards, print controllers, print/scan enablers or any other items that enhance the functionality of these products.

Diagnosis of device failures will be limited to confirmation of print capabilities with a laptop computer connected via a crossover cable using a standard print driver test page.

Inclusions – Software: Service calls required as a result of the failure of Toshiba software. Upgrades to Toshiba software are included.

Service Availability: Service calls performed during normal business hours, Monday through Friday, 8:00am to 5:00pm, excluding company holidays.

Exclusions:

1. Electrical work external to the equipment.
2. Charges to install or improve telephone lines.
3. Charges to improve electrical service and/or network lines.
4. Network wiring to improve or connect the hardware to a computer or network.
5. Service necessitated as a result of malfunction of equipment when unauthorized parts, attachments, or conflicting software is used with the equipment.
6. Service necessitated as a result of alterations, malfunctioning computer or network hardware and/or operating systems.

In such event, TBS reserves the right to terminate the maintenance contract if it is determined that such changes, alterations or malfunctions make it impractical to continue to service the equipment.

7. Reinstallation of drivers and/or installation of connected devices due to changes in computer and/or network operating systems, system configuration, addition/upgrades to application software or malfunction of devices.
8. Reinstallation/service required due to the relocation of equipment.

Excluded services will be invoiced to the Customer at TBS's normal hourly labor rate then in effect for Digital Systems Integration Services.

TOSHIBA
BUSINESS SOLUTIONS

REMOVAL REPORT

RR-2.0.0

SALES PACKET NUMBER	DATE

Sales Representative: Sara Bird

Customer Name: Town of Manlius

This document must be completed and signed by both the customer and a Toshiba Business Solutions (TBS) representative prior to any removal and disposition of equipment from the customer's premises.

EQUIPMENT DETAILS

Physical Location: SGT'S OFFICE					
Address: 1 ARKIE ALBANESE AVENUE			Phone #: (315) 682-2212	Ext.	Fax #:
Address 2:			Contact: Jeffrey Slater		
City: MANLIUS	State: NY	Zip: 13104	email: jslater@manliuspolice.org		
Leasing Company: Toshiba Financial Services	Lease #: 500-0609538-000		Make/Model: Toshiba e-STUDIO3018A	EOL Option: Declined	
Removal Type: Upgrade	Disposition: Return to Lease Company		Serial #: SSZJJ70486	EOL Charge:	
Buyout Type: Upgrade to Return	Paid By:		Replaced By: Toshiba e-STUDIO330AC		

Physical Location: FRONT OFFICE					
Address: 1 ARKIE ALBANESE AVENUE			Phone #: (315) 682-2212	Ext.	Fax #:
Address 2:			Contact: Jeffrey Slater		
City: MANLIUS	State: NY	Zip: 13104	email: jslater@manliuspolice.org		
Leasing Company: Toshiba Financial Services	Lease #: 500-0609538-000		Make/Model: Toshiba e-STUDIO4515AC	EOL Option: Declined	
Removal Type: Upgrade	Disposition: Return to Lease Company		Serial #: SCNLJ56156	EOL Charge:	
Buyout Type: Upgrade to Return	Paid By:		Replaced By: Toshiba e-STUDIO3525AC		

Physical Location:					
Address:			Phone #:	Ext.	Fax #:
Address 2:			Contact:		
City:	State:	Zip:	email:		
Leasing Company:	Lease #:		Make/Model:	EOL Option:	
Removal Type:	Disposition:		Serial #:	EOL Charge:	
Buyout Type:	Paid By:		Replaced By:		

Physical Location:					
Address:			Phone #:	Ext.	Fax #:
Address 2:			Contact:		
City:	State:	Zip:	email:		
Leasing Company:	Lease #:		Make/Model:	EOL Option:	
Removal Type:	Disposition:		Serial #:	EOL Charge:	
Buyout Type:	Paid By:		Replaced By:		

Special Instructions:	

☐ **SEE ATTACHED REMOVAL REPORT SCHEDULE FOR ADDITIONAL REMOVED DEVICES**

Total End of Life Security Option Charges: $0.00

DECLINATION

☒ Customer certifies that they have read the Security Options and that they have decided to decline all assistance from TBS regarding enhanced security on their copier/printer. TBS is under no obligation and has no liability concerning data security on said device. It is the Customer's sole and exclusive responsibility to assure that all data from all disk drives or magnetic media are erased prior to disposition of equipment.

Print Name:	Signature: X	Title:	Date:

CUSTOMER ACCEPTANCE

You hereby acknowledge and agree that your electronic signature above shall constitute an enforceable and original signature for all purposes.

By signing this agreement, the customer acknowledges that he/she has read and understood the statement of work and terms and conditions of this agreement.

Print Name:	Signature: X	Title:	Date:

TBS ACCEPTANCE

Print Name:	Signature: X	Title:	Date:

TERMS AND CONDITIONS

FOR ALL ITEMS WITH REMOVAL TYPE OF: CUSTOMER OWNED

The customer representative signed below attests that the above equipment is owned by the customer and is free and clear of any liens or encumbrances. Upon completion of the associated sale, the title and ownership of this equipment is transferred to TBS.

FOR ALL ITEMS WITH A BUYOUT TYPE: PAID BY TBS TO CUSTOMER-AMOUNT TO BE PAID TO CUSTOMER $0.00

The customer representative acknowledges that said equipment is leased and that the amount paid to customer and disposition, as indicated, of said equipment and its condition will fulfill its contractual obligations under the lease. If for any reason the amount paid to customer does not satisfy the contractual obligations, the customer assumes any remaining liability with the Leasing Company. It is the responsibility of the customer to provide return instructions. If said equipment cannot be returned until the end of the lease term, the customer must notify the Leasing Company in writing in accordance to the terms of the agreement prior to the end of the lease term. Failure to follow this disposition process could result in additional charges. Toshiba Business Solutions does not assume and will not be financially responsible for any lease renewal payments or additional fees or penalties incurred on the lease referenced above for any reason.

EOL OPTION DEFINITIONS

Basic Security: Includes HDD data scrub to DOD standards (5220-22m), NVRAM and Fax Data Scrub, Reloading System Firmware.

Advanced Security: Includes removing and returning uncleansed HDD to customer, Installing new HDD, NVRAM and Fax Data Scrub, Reloading System Firmware.

Remove and Return: Includes removing and returning uncleansed HDD to customer. This option is only available on customer owned devices.

Optimal Security: Includes removal and destruction of HDD, Installing new HDD, NVRAM and Fax Data Scrub, Reloading System Firmware.

Declined: Customer has declined any assistance from TBS regarding their data and is solely responsible for data security.

No Hard Drive: The device has no hard drive.

Has Secure HDD: Removed device has built in data overwrite and Customer does not require scrubbing or removal

TOSHIBA
BUSINESS SOLUTIONS

STATE AND LOCAL GOVERNMENT ADDENDUM

TOSHIBA
FINANCIAL SERVICES

AGREEMENT NUMBER

Addendum to Agreement # _____ and any future supplements/schedules thereto, between Town of Manlius, as Customer and **Toshiba Financial Services**, as Lessor. The words "you" and "your" refer to Customer. The words "we" and "us" refer to Lessor.

1. The parties wish to amend the above-referenced Agreement by adding the following language:

REPRESENTATIONS AND WARRANTIES OF CUSTOMER: You hereby represent and warrant to us that: (i) you have been duly authorized under the Constitution and laws of the applicable jurisdiction and by a resolution or other authority of your governing body to execute and deliver this Agreement and to carry out your obligations hereunder; (ii) all legal requirements have been met, and procedures have been followed, including public bidding, in order to ensure the enforceability of this Agreement; (iii) this Agreement is in compliance with all laws applicable to you, including any debt limitations or limitations on interest rates or finance charges; (iv) the Equipment will be used by you only for essential governmental or proprietary functions of you consistent with the scope of your authority, will not be used in a trade or business of any person or entity, by the federal government or for any personal, family or household use, and your need for the Equipment is not expected to diminish during the term of this Agreement; (v) you have funds available to pay Payments until the end of your current appropriation period, and you intend to request funds to make Payments in each appropriation period, from now until the end of the term of this Agreement; and (vi) your exact legal name is as set forth on page one of this Agreement.

INITIAL TERM AND RENEWAL TERM(S): The term of the Agreement consists of an initial term beginning on the date we pay Supplier and ending at the end of your fiscal year in which we pay Supplier, and a series of renewal terms, each co-extensive with your fiscal year. Except to the extent required by applicable law, if you do not exercise your right to terminate the Agreement under the Non-Appropriation or Renewal paragraph as of the end of any fiscal year, the Agreement will be deemed automatically renewed for the next succeeding renewal term.

An election by you to terminate the Agreement under the Non-Appropriation or Renewal paragraph is not a default.

Notwithstanding anything to the contrary set forth in the Agreement, if we cancel the Agreement following a default by you, we may require that you pay the unpaid balance of Payments under the Agreement through the end of your then-current fiscal year, but we may not require you to pay future Payments due beyond that fiscal year or the anticipated residual value of the Equipment. If we sell the Equipment following a default by you, you will not be responsible for a deficiency, except to the extent of our costs of repossession, moving, storage, repair and sale, and our attorneys' fees and costs.

NON-APPROPRIATION OR RENEWAL: If either sufficient funds are not appropriated to make Payments or any other amounts due under this Agreement or (to the extent required by applicable law) this Agreement is not renewed either automatically or by mutual ratification, this Agreement shall terminate and you shall not be obligated to make Payments under this Agreement beyond the then-current fiscal year for which funds have been appropriated. Upon such an event, you shall, no later than the end of the fiscal year for which Payments have been appropriated or the term of this Agreement has been renewed, deliver possession of the Equipment to us. If you fail to deliver possession of the Equipment to us, the termination shall nevertheless be effective but you shall be responsible, to the extent permitted by law and legally available funds, for the payment of damages in an amount equal to the portion of Payments thereafter coming due that is attributable to the number of days after the termination during which you fail to deliver possession and for any other loss suffered by us as a result of your failure to deliver possession as required. You shall notify us in writing within seven days after (i) your failure to appropriate funds sufficient for the payment of the Payments or (ii) to the extent required by applicable law, (a) this Agreement is not renewed or (b) this Agreement is renewed by you (in which event this Agreement shall be mutually ratified and renewed), provided that your failure to give any such notice under clause (i) or (ii) of this sentence shall not operate to extend this Agreement or result in any liability to you.

SUPPLEMENTS; SEPARATE FINANCINGS: To the extent applicable, in the event that the parties hereafter mutually agree to execute and deliver any supplement or schedule ("Supplement") under the above-referenced Agreement, such Supplement, as it incorporates the terms and conditions of the Agreement, shall be a separate financing distinct from the Agreement or other Supplements thereto. Without limiting the foregoing, upon the occurrence of an event of default or a non-appropriation event with respect to the Agreement or a Supplement (each, a separate "Contract"), as applicable, we shall have the rights and remedies specified in the Agreement with respect to the Equipment financed and the Payments payable under such Contract, and we shall have no rights or remedies with respect to Equipment financed or Payments payable under any other Contract unless an event of default or non-appropriation event has also occurred under such other Contract.

2. The parties wish to amend the above-referenced Agreement by restating certain language as follows:

Any provision in the Agreement stating that you shall indemnify and hold us harmless is hereby amended and restated as follows: "You shall not be required to indemnify or hold us harmless against liabilities arising from this Agreement. However, as between you and us, and to the extent permitted by law and legally available funds, you are responsible for and shall bear the risk of loss for, shall pay directly, and shall defend against any and all claims, liabilities, proceedings, actions, expenses, damages or losses arising under or related to the Equipment, including, but not limited to, the possession, ownership, lease, use or operation thereof, except that you shall not bear the risk of loss of, nor pay for, any claims, liabilities, proceedings, actions, expenses, damages or losses that arise directly from events occurring after you have surrendered possession of the Equipment in accordance with the terms of this Agreement to us or that arise directly from our gross negligence or willful misconduct."

Any provision in the Agreement stating that the Agreement is governed by a particular state's laws and you consent to such jurisdiction and venue is hereby amended and restated as follows: "This Agreement will be governed by and construed in accordance with the laws of the state where you are located. You consent to jurisdiction and venue of any state or federal court in such state and waive the defense of inconvenient forum."

Any provision in the Agreement stating this Agreement supersedes any invoice and/or purchase order is hereby amended and restated as follows: "You agree that the terms and conditions contained in this Agreement, which, with the acceptance certification, is the entire agreement between you and us regarding the Equipment and which supersedes any purchase order, invoice, request for proposal, response or other related document."

Any provision in the Agreement stating that this Agreement shall automatically renew unless the Equipment is purchased, returned or a notice requirement is satisfied is hereby amended and restated as follows: "Unless the purchase option is $1.00 or $101.00, you agree to send us written notice at least 30 days before the end of the final renewal term that you want to purchase or return the Equipment, and you agree to so purchase or return the Equipment not later than the end of the final renewal term. If you fail to so purchase or return the Equipment at or before the end of the final renewal term, you shall be a holdover tenant with respect to this Agreement and the Equipment, and this Agreement shall renew on a month-to-month basis under the same terms hereof until the Equipment has been purchased or returned."

Any provision in the Agreement stating that we may assign this Agreement is hereby amended and restated as follows: "We may sell, assign, or transfer this Agreement without notice to or consent from you, and you waive any right you may have to such notice or consent."

Any provision in the Agreement stating that you grant us a security interest in the Equipment to secure all amounts owed to us under any agreement is hereby amended and restated as follows: "To the extent permitted by law, you grant us a security interest in the Equipment to secure all amounts you owe us under this Agreement and any

NOTE: CAPITALIZED TERMS IN THIS DOCUMENT ARE DEFINED AS IN THE AGREEMENT, UNLESS SPECIFICALLY STATED OTHERWISE.

supplements hereto. You authorize and ratify our filing of any financing statement(s) and the naming of us on any vehicle title(s) to show our interest."

Any provision in the Agreement stating that a default by you under any agreement with our affiliates or other lenders shall be an event of default under the Agreement is hereby amended and restated as follows: "You will be in default if: (i) you do not pay any Payment or other sum due to us under this Agreement when due or you fail to perform in accordance with the covenants, terms and conditions of this Agreement; (ii) you make or have made any false statement or misrepresentation to us; or (iii) you dissolve, liquidate, terminate your existence or are in bankruptcy.

Any provision in the Agreement stating that you shall pay our attorneys' fees is hereby amended and restated as follows: "In the event of any dispute or enforcement of rights under this Agreement or any related agreement, you agree to pay, to the extent permitted by law and to the extent of legally available funds, our reasonable attorneys' fees (including any incurred before or at trial, on appeal or in any other proceeding), actual court costs and any other collection costs, including any collection agency fee."

Any provision in the Agreement requiring you to pay amounts due under the Agreement upon the occurrence of a default, failure to appropriate funds or failure to renew the Agreement is hereby amended to limit such requirement to the extent permitted by law and legally available funds.

3. If your end-of-term option is the purchase of all Equipment for $1.00 or $101.00, the following applies: Unless otherwise required by law, upon your acceptance of the Equipment, title to the Equipment shall be in your name, subject to our interest under this Agreement.

4. With respect to any "Financed Items," the following provisions shall be applicable to such Financed Items:

This Addendum concerns the granting to you of certain software and/or software license(s) ("Licensed Software"), the purchase by you of certain software components, including but not limited to, software maintenance and/or support ("Products") and/or the purchase by you of certain implementation, integration, training, technical consulting and/or professional services in connection with software ("Services") (collectively, the "Financed Items") from software licensor(s) and/or supplier(s) (collectively, the "Supplier"), all as further described in the agreement(s) between you and Supplier (collectively, the "Product Agreement"). For essential governmental purposes only, you have requested and we have agreed that instead of you paying the fees pursuant to the Product Agreement to Supplier for the Financed Items, we will satisfy your obligation to pay such fees to Supplier, and in consideration thereof, you shall repay the sums advanced by us to Supplier by promptly making certain installment payments to us, which are included in the Payments set forth in the Agreement.

To the extent permitted by law, you grant us a security interest in the license(s), including without limitation, all of your rights in the Licensed Software granted thereunder, the Products, all rights to payment under the Product Agreement, the Financed Items, and all proceeds of the foregoing to secure all amounts you owe us under this Agreement. You authorize and ratify our filing of any financing statement(s) to show our interest.

Ownership of any Licensed Software shall remain with Supplier thereof. All Financed Items shall be provided by a Supplier unrelated to us, and your rights with respect to such Financed Items shall be governed by the Product Agreement between you and Supplier, which shall not be affected by this Agreement. IN NO EVENT SHALL WE HAVE ANY OBLIGATION TO PROVIDE ANY FINANCED ITEMS, AND ANY FAILURE OF SUPPLIER TO PROVIDE ANY FINANCED ITEMS SHALL NOT EXCUSE YOUR OBLIGATIONS TO US IN ANY WAY. YOU HAVE SELECTED SUPPLIER AND THE FINANCED ITEMS BASED UPON YOUR OWN JUDGMENT. WE DO NOT TAKE RESPONSIBILITY FOR THE INSTALLATION OR PERFORMANCE OF THE FINANCED ITEMS. SUPPLIER IS NOT AN AGENT OF OURS AND WE ARE NOT AN AGENT OF SUPPLIER, AND NOTHING SUPPLIER STATES OR DOES CAN AFFECT YOUR OBLIGATIONS HEREUNDER. **YOU WILL MAKE ALL PAYMENTS UNDER THIS AGREEMENT REGARDLESS OF ANY CLAIM OR COMPLAINT AGAINST ANY SUPPLIER, LICENSOR OR MANUFACTURER, AND ANY FAILURE OF A SERVICE PROVIDER TO PROVIDE SERVICES WILL NOT EXCUSE YOUR OBLIGATIONS TO US UNDER THIS AGREEMENT. WE MAKE NO WARRANTIES, EXPRESS OR IMPLIED, AS TO THE FINANCED ITEMS COVERED BY THE PRODUCT AGREEMENT AND TAKE ABSOLUTELY NO RESPONSIBILITY FOR MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR AS TO ANY PATENT, TRADEMARK OR COPYRIGHT INFRINGEMENT, CONDITION, QUALITY, ADEQUACY, TITLE, DATA ACCURACY, SYSTEM INTEGRATION, FUNCTION, DEFECTS OR ANY OTHER ISSUE IN REGARD TO THE FINANCED ITEMS.** YOU HEREBY WAIVE ANY CLAIM (INCLUDING ANY CLAIM BASED ON STRICT LIABILITY OR ABSOLUTE LIABILITY IN TORT) THAT YOU MAY HAVE AGAINST US FOR ANY LOSS, DAMAGE (INCLUDING, WITHOUT LIMITATION, LOSS OF PROFITS, LOSS OF DATA OR ANY OTHER DAMAGES) OR EXPENSE CAUSED BY THE FINANCED ITEMS COVERED BY THE PRODUCT AGREEMENT OR A TERMINATION OF THE FINANCED ITEMS PURSUANT TO AN EVENT OF DEFAULT, EVEN IF WE HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE, LOSS, EXPENSE OR COST.

The following shall be additional events of default under the Agreement: (i) you fail to perform in accordance with the covenants, terms and conditions of the Product Agreement, or (ii) the Product Agreement is terminated, suspended, materially restricted or limited.

The following shall be additional remedies we have for your default under the Agreement: We shall have the right to: (a) cause the termination of the Financed Items and you irrevocably consent to such termination of the Financed Items by Supplier; and (b) require you to immediately stop using the Financed Items (regardless of whether you are in default under the Product Agreement) and you shall, at our option, either deliver to us a certification executed by a duly authorized officer certifying that you have ceased use of the Financed Items or deliver the Financed Items to a location designated by us. In the event you are entitled to transfer the right to use the Financed Items to any third party, you hereby agree to transfer any such right to use the Financed Items to any third party selected by us and acknowledge that you shall have no right to fees payable by any third party in connection with such transfer. However, we shall not be required to mitigate our damages caused by a default by transferring any Financed Items to a third party.

By signing this Addendum, Customer acknowledges the applicable changes noted above are incorporated by reference into the Agreement. In all other respects, the terms and conditions of the Agreement remain in full force and effect and remain binding on Customer. In the event of any conflict between the terms and conditions of the Agreement and this Addendum, the terms and conditions of this Addendum shall control. Customer has caused this Addendum to be executed by its duly authorized officer as of the date below.

Toshiba Financial Services	Town of Manlius
Lessor	Customer
	X
Signature	Signature
Title Date	Title Date

NOTE: CAPITALIZED TERMS IN THIS DOCUMENT ARE DEFINED AS IN THE AGREEMENT, UNLESS SPECIFICALLY STATED OTHERWISE.

Form **W-9**
(Rev. October 2018)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

▶ Go to *www.irs.gov/FormW9* for instructions and the latest information.

Give Form to the requester. Do not send to the IRS.

Print or type. See Specific Instructions on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.
Town of Manlius

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only **one** of the following seven boxes.

☐ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____

Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is **not** disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.

☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any) _____

Exemption from FATCA reporting code (if any) _____

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.) See instructions.
1 ARKIE ALBANESE AVENUE

Requester's name and address (optional)

6 City, state, and ZIP code
MANLIUS, NY 13104

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN,* later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number
☐☐☐ - ☐☐ - ☐☐☐☐

or

Employer identification number
☐☐ - ☐☐☐☐☐☐☐

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here **Signature of U.S. person ▶** **Date ▶**

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to *www.irs.gov/FormW9.*

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, *later.*

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),

2. Certify that you are not subject to backup withholding, or

3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and

4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting,* later, for further information.

Note: If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following person must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States.

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Pub. 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items.

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.

2. The treaty article addressing the income.

3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.

4. The type and amount of income that qualifies for the exemption from tax.

5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 24% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,

2. You do not certify your TIN when required (see the instructions for Part II for details),

3. The IRS tells the requester that you furnished an incorrect TIN,

4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or

5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code,* later, and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships,* earlier.

What is FATCA Reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code,* later, and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of $50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a $500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account (other than an account maintained by a foreign financial institution (FFI)), list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9. If you are providing Form W-9 to an FFI to document a joint account, each holder of the account that is a U.S. person must provide a Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note: ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or "doing business as" (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C corporation, or S corporation.** Enter the entity's name as shown on the entity's tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a "disregarded entity." See Regulations section 301.7701-2(c)(2)(iii). Enter the owner's name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner's name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on line 2, "Business name/disregarded entity name." If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box on line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box on line 3.

IF the entity/person on line 1 is a(n) . . .	THEN check the box for . . .
• Corporation	Corporation
• Individual • Sole proprietorship, or • Single-member limited liability company (LLC) owned by an individual and disregarded for U.S. federal tax purposes.	Individual/sole proprietor or single-member LLC
• LLC treated as a partnership for U.S. federal tax purposes, • LLC that has filed Form 8832 or 2553 to be taxed as a corporation, or • LLC that is disregarded as an entity separate from its owner but the owner is another LLC that is not disregarded for U.S. federal tax purposes.	Limited liability company and enter the appropriate tax classification. (P= Partnership; C= C corporation; or S= S corporation)
• Partnership	Partnership
• Trust/estate	Trust/estate

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space on line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys' fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)

2—The United States or any of its agencies or instrumentalities

3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

4—A foreign government or any of its political subdivisions, agencies, or instrumentalities

5—A corporation

6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession

7—A futures commission merchant registered with the Commodity Futures Trading Commission

8—A real estate investment trust

9—An entity registered at all times during the tax year under the Investment Company Act of 1940

10—A common trust fund operated by a bank under section 584(a)

11—A financial institution

12—A middleman known in the investment community as a nominee or custodian

13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over $600 required to be reported and direct sales over $5,000[1]	Generally, exempt payees 1 through 5[2]
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

[1] See Form 1099-MISC, Miscellaneous Income, and its instructions.

[2] However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note: You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns. If this address differs from the one the requester already has on file, write NEW at the top. If a new address is provided, there is still a chance the old address will be used until the payor changes your address in their records.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN.

If you are a single-member LLC that is disregarded as an entity separate from its owner, enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note: See *What Name and Number To Give the Requester,* later, for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at *www.SSA.gov*. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at *www.irs.gov/Businesses* and clicking on Employer Identification Number (EIN) under Starting a Business. Go to *www.irs.gov/Forms* to view, download, or print Form W-7 and/or Form SS-4. Or, you can go to *www.irs.gov/OrderForms* to place an order and have Form W-7 and/or SS-4 mailed to you within 10 business days.

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note: Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if item 1, 4, or 5 below indicates otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code,* earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983. You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983. You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), ABLE accounts (under section 529A), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account) other than an account maintained by an FFI	The actual owner of the account or, if combined funds, the first individual on the account[1]
3. Two or more U.S. persons (joint account maintained by an FFI)	Each holder of the account
4. Custodial account of a minor (Uniform Gift to Minors Act)	The minor[2]
5. a. The usual revocable savings trust (grantor is also trustee)	The grantor-trustee[1]
b. So-called trust account that is not a legal or valid trust under state law	The actual owner[1]
6. Sole proprietorship or disregarded entity owned by an individual	The owner[3]
7. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A))	The grantor*
For this type of account:	**Give name and EIN of:**
8. Disregarded entity not owned by an individual	The owner
9. A valid trust, estate, or pension trust	Legal entity[4]
10. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
11. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
12. Partnership or multi-member LLC	The partnership
13. A broker or registered nominee	The broker or nominee
14. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
15. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B))	The trust

[1] List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

[2] Circle the minor's name and furnish the minor's SSN.

[3] You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

[4] List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships,* earlier.

***Note:** The grantor also must provide a Form W-9 to trustee of trust.

Note: If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records From Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Pub. 5027, Identity Theft Information for Taxpayers.

Victims of identity theft who are experiencing economic harm or a systemic problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes. Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to *phishing@irs.gov*. You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at *spam@uce.gov* or report them at *www.ftc.gov/complaint*. You can contact the FTC at *www.ftc.gov/idtheft* or 877-IDTHEFT (877-438-4338). If you have been the victim of identity theft, see *www.IdentityTheft.gov* and Pub. 5027.

Visit *www.irs.gov/IdentityTheft* to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

MINUTES
TOWN BOARD
July 26, 2023

The Town of Manlius Town Board held a hybrid meeting with in-person attendees and virtual attendees. The meeting was live streamed on the Town Facebook page and the Town YouTube Channel. The recording of the meeting can be viewed here;
https://www.youtube.com/channel/UC3pS9-uTiX4l7aEgciGEVSA

Supervisor Deer presided, and the following Board members were present:

	Sara Bollinger, Councilor
Absent	Elaine Denton, Councilor
	Heather Waters, Councilor
	Alissa Italiano, Councilor
	William Nicholson, Councilor
	Katelyn M. Kriesel, Councilor

The following Town Officers were present: Tim Frateschi, Attorney for the Town. Ann Oot, Town Manager. Kay Blythe, Deputy Town Manager. Allison Weber, Town Clerk. Jeffrey Slater, Police Captain. Maria Lenway, Comptroller. Rob Cushing, Highway Superintendent.

The following Town Officers Attending Virtually: None

1. Attendees

In-Person Meeting Attendees: Tim Kelly, Fayetteville. Karen Abyoub, Manlius. Mark & Cheryl Matt, Fayetteville. Joe Messineo, Manlius. Ken Kuntsen, Fayetteville, Amanda Mazzoni, CNYRPDB. Craig Dudczak, Fayetteville. Mike Friend, Manlius. Erin Trojan, Manlius. Nevaeh Foster, Kirkville. Callie DeForest, Chittenango. Haley Foster, Kirkville. Carlie Gill, E. Syracuse. Hollie Meehan, Minoa. Logan Wilson, Minoa. Ken Knutsen, Fayetteville. Phil Berrigan, Manlius. Shawn Foster, Kirkville. Barb Wilson, Manlius. Alex Behm, Chittenango. Mary Karpinski, Manlius. Steve Hoefer, Manlius. John & Andrea Belton, Manlius. Lisa Chapman, Fayetteville. Katherine & Craig Polhamus, Fayetteville. Pete Wirth, Fayetteville. Roseann Lorefice, Manlius. Annette Patterson, Manlius. Deb Tooker, Manlius. Rick & Mary Minoski, Chittenango. Madeleine Boart, Fayetteville. Chris Flaherty (Clear Path), Manlius. Robert DeForest, Manlius. Donna Edgar, Chittenango. Kimberly Edgar, Chittenango. Ingrid McCurdy, E. Syracuse. Marlene Denney, Manlius. Tom Oot, Manlius. John Cayenne, Manlius.

Virtual Meeting Attendees: RuthAnn Winschel, Manlius. Janice (no last name given). Jeff Storch. Marley (no last name given). Andrea Scamehorn. Maggie Neuhierl. Warren Linhart. Faith Binder. Ronald Bort.

2. 6:34 PM The Pledge of Allegiance

Supervisor Deer called the meeting to order at 6:30 PM. Boy Scout Troop 210 of Kirkville, N.Y. led the Pledge of Allegiance. Supervisor Deer welcomed everyone and thanked all for attending.

3. 6:36 PM Open Podium – None

4. 6:36 PM Proclamation Recognizing July 26th to be National Americans with Disabilities Act Awareness Day in the Town of Manlius.

Councilor Italiano read a proclamation recognizing July 26th as National Americans with Disabilities Act Awareness Day.

Councilor Italiano made a motion, seconded by Councilor Bollinger, to adopt the proclamation recognizing July 26th as National Americans with Disabilities Act Awareness Day.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Waters, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

5. 6:39 PM 7:21 PM Public Hearing - Skyridge Water District Improvement Project

Town Attorney Frateschi reviewed the SEQR part two that was completed at the last meeting.

Councilor Bollinger made a motion, seconded by Councilor Nicholson, to issue a negative declaration for SEQR purposes pursuant to the resolution prepared by the Attorney for the Town in the matter of the Skyridge Water District 202b Project and the Skyridge Water District Extension Number 1.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Waters, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

The Town Board re-opened the continued public hearing from the July 12th town board meeting.

Mary Karpinski, Manlius, stated there are historic stone walls near the excavation area and mature trees along the excavation site. Ms. Karpinski stated that none of the councilors have visited Salt Springs Road area or responded to the residents' questions that were previously submitted. Ms. Karpinski reviewed questions and asked that the public hearing stay open and the Town Board take no further action until the questions are answered.

Erin Trojan, Manlius stated that she is speaking on behalf of the Skyridge Water District. Ms. Trojan stated that all of the residents in the Skyridge Water District were surveyed and the results were unanimous that the residents are in favor of the Town pursuing funding to construct a new water main to provide municipal water to the Skyridge District.

John Cayanne, Manlius, stated that he is a Veteran. Mr. Cayanne asked why the property owned by Clear Path at Skyridge LLC pays no property taxes on 15.79 acres? Mr. Cayanne discussed how the parcel is currently tax-exempt status and asked why the property is tax exempt? Mr. Cayanne stated that the property is not owned by the non-profit so why is it tax exempt?

Councilor Bollinger stated that it is a use variance, and the use is tax exempt.

DRAFT

Mr. Cayanne asked why the Town is in such a rush to dump 13 million into a property when there are very few veterans in the area. Mr. Cayanne stated that this project would be better suited near a military base.

Councilor Italiano stated this water project is also for 29 residential homes.

Kimberly Edgar, Sullivan, stated that she works for comptrollers' office and her office is not aware of the $800,00 dollars in funding from Onondaga County. Ms. Edgar asked The Town Board who the contact would be for the county funding. Councilor Bollinger stated that Legislator Mark Olson is the contact for the county funding.

Ms. Edgar asked about the two million dollars in funding that Al Stirpe promised and asked if the town has that promise of funding in writing? Councilor Bollinger answered yes, it is a DASNY grant.

Ms. Edgar asked why Sleepy Hollow was mentioned? Ms. Edgar asked how much money the Town of Sullivan has put into this project and the project has never moved forward. Ms. Edgar asked why the Town of Sullivan has been allowed to work in the Town of Manlius?

Rick Minoski, Chittenango (Town of Sullivan), recently moved to Chittenango in October. He stated this directly affects his property and they were never given notice.

Joe Messineo, Manlius, stated that OCWA paid the initial expense for the Barton and Loguidice report on this project and the last time the town spent $40,000 out of the general fund. Mr. Messineo asked who is paying for these current expenses on this project that are accruing now?

Supervisor Deer stated if the larger project does not go through the costs will be paid for by the district.

With there being no further comments from the public, Councilor Italiano made a motion, seconded by Councilor Waters, to close the public hearing at 6:57 PM in the matter of the resolution of the Town Board pursuant to Section 202-b of the Town Law determining that it is in the public interest to undertake certain improvements to the Town's Skyridge Water District as outlined in the resolution prepared by the Attorney for the town.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Waters, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

6. 6:42 PM Public Hearing – Skyridge Water District Extension # 1 (Clear Path for Veterans)

The Town Board re-opened the continued public hearing from the July 12th town board meeting.

Mary Karpinski, Manlius, made comments about the revised Map, Plan and Report. Ms. Karpinski stated that the Skyridge Water District project is being pushed forward based on assumptions about possible funding. Ms. Karpinski asked why the Town of Manlius is named as lead agency and why would so many dollars are being spent to provide water to twenty-nine homes and a non-profit?

Chris Flaherty, CEO of Clear Path for Veterans, asked for continued support for the Skyridge Water District and stated that this is both a town and veteran issue.

Donna Edgar, Manlius, stated that she went through this in 2017, she has a well and has all the water she needs.

Phil Berrigan, Manlius, stated that everyone is concerned about putting a utility down the road and the that is something that happens every day. Mr. Berrigan stated that the town would be responsible for creating the funds for either option 1 or option 2 (Options in the Map Plan and Report . He stated this issue has been going on for fifteen years and he hopes the board can come up with a solution.

Joe Messineo, Manlius, stated that he fully supports helping Horseshoe Lane. Mr. Messineo stated further that Clear Path is offering support with their clout and the organization should also be offering money.

Stephen Benson, Manlius, stated he reviewed what looked like a strong Comprehensive Plan until he got to the land use issue. Mr. Benson stated that it is tied to Micron and the influx of people it will bring to the area. Mr. Benson further stated that if everyone thinks this water supply issue is about the veterans (ClearPath), it is not.

Maggie Neuhierl, Manlius, stated that Clear Path professes to serve lots of veterans which they may but she does not see that much activity. Ms. Neuhierl stated that Clear Path has not been a good neighbor unless it has been to their advantage.

The Board offered their responses to any new questions that were presented in this meeting.

Supervisor Deer stated that:

- Unless a resident lives in in the Skyridge Water District or in Skyridge Extension #1 they will not be forced to connect to public water, and residents outside the district will not be charged. Any residents who will be given access to the public water line have signed a letter stating that they would like to connect.
- The Town Engineer has reviewed the proposals. There is a substantial public benefit to a loop system.
- The intention is not to spend 13.7 million dollars, but so that a WIIA application can be submitted for additional funding. The merit of the project will be decided by the people who oversee the WIIA. If the Town does not get additional funding, this project doesn’t happen. There will be other agencies deciding if this project has merit.
- The town has a responsibility to make sure the residents in the water district have clean water. This has been ongoing and looked at by other boards and this is the last shot the people in the water district have.

Councilor Italiano stated that she did visit the Salt Springs Road area several times. Councilor Italiano stated that she did find that there are two fire hydrants on Horseshoe Lane.

Ken Knutsen, Barton and Loguidice, stated that the existing tank does not have the capacity or the flow to handle a residential structure fire.

Councilor Waters discussed the compromise of having to remove mature trees for this project. Councilor Waters stated that should the project move forward there will be attention paid to making sure that as many mature trees as possible are preserved.

Councilor Nicholson stated that he does understand the impact that construction will have on property while a project like this is undertaken.

Councilor Italiano stated that it is very expensive, and disruptive but there are 29 homes that do not have access to clean water on demand that they have a right to. Councilor Italiano stated that this option, while costly makes the most sense long term and prior boards did not handle this.

Supervisor Deer discussed the notification process for the Town of Manlius.

Councilor Kriesel stated that inflation is driving the higher costs associated with this project.

With there being no further comments from the public, Councilor Bollinger made a motion, seconded by Councilor Waters, to close the public hearing at 7:15 PM in the matter of the resolution and order for Skyridge Water District Extension No. 1 as prepared by the Attorney for the Town

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Waters, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

Jeff Storch, Bond Counsel, stated that authorizations are subject to grants. Mr. Storch further stated that this action should not affect the Towns credit rating and likely to be exempt from the Towns debt limit.

Councilor Bollinger made a motion, seconded by Councilor Italiano, to adopt the resolution of the Town Board pursuant to Section 202-b of the Town Law determining that it is in the public interest to undertake certain improvements to the Town's Skyridge Water District as outlined in the resolution prepared by the Attorney for the town.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Waters, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

Councilor Bollinger made a motion, seconded by Councilor Waters, to adopt the resolution and order for Skyridge Water District Extension No. 1 as prepared by the Attorney for the Town

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Waters, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

Councilor Bollinger made a motion, seconded by Councilor Kriesel, to adopt the Memorandum of Understanding for the Skyridge Water District Improvement Project between the Town of Manlius, Town of Sullivan, Onondaga County Water Authority and ClearPath for Veterans as presented.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Waters, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

Councilor Bollinger made a motion, seconded by Councilor Waters, to adopt the bond resolution of the Town Board authorizing the issuance of up to $13,693,000 in serial bonds of the Town to finance certain improvements to the Town's Skyridge Water District as prepared by bond counsel.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Waters, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

7. 7:39 PM Public Hearing – Climate Action Plan

Councilor Kriesel made a motion, seconded by Councilor Waters, to waive the reading of the public notice in the matter of the Climate Action Plan for the Town of Manlius as outlined in the resolution presented.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Waters, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

Councilor Kriesel made a motion, seconded by Councilor Waters, to open the public hearing at 7:39 PM in the matter of the Climate Action Plan for the Town of Manlius as outlined in the resolution presented.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Waters, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

Pete Wirth, Fayetteville, stated he is in support of the Climate Action Plan and believes the plan should be more aggressive in terms of emissions. Mr. Wirth discussed impacts of climate change.

Robert DeForest, CNY Home Builder, stated that housing affordability is a much greater problem than climate change. Mr. DeForest stated that he is against the Town and State Climate Action Plans due to costs for builders. Mr. DeForest discussed the building cost differences if the Town adopts the Climate Action Plan and New York Stretch Code. He discussed his cost to build houses based on these plans.

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The Town Board had a discussion with Mr. DeForest regarding the parts of the Climate Action Plan that he is opposed to.

Tom Oot, President of Home Builders and Remodelers Association of Central New York. Mr. Oot stated that the board should consider existing homes when it comes to energy loss and conservation. Mr. Oot stated that builders are building homes at the highest standard ever. Mr. Oot discussed new technologies and asked that the board use common sense when looking at the new technologies mentioned in these plans.

Ingrid McCurdy, E. Syracuse spoke about her research done on EVs concerning the batteries, life expectancy and the cost. Ms. McCurdy stated that the number of EV vehicles in the Town of Manlius has tripled and thanked the Town Board for being mindful of climate change.

Town Clerk Weber read aloud a letter submitted by Brad Schwab. Mr. Schwab is in strong support of the Climate Action Plan proposed by the Town of Manlius.

Amanda Mazzoni from the Central New York Regional Planning and Development Board (CNY RPDB) spoke about the NYS Stretch Code and heart pumps. Ms. Mazzoni stated that the plan states that the town will consider adopting the stretch code, but does not require the town to adopt the stretch code.

Councilor Kriesel made a motion, seconded by Councilor Waters, to close the public hearing at 7:59 PM in the matter of the Climate Action Plan for the Town of Manlius as outlined in the resolution presented.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Waters, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

Councilor Kriesel made a motion, seconded by Councilor Waters, to adopt the Climate Action Plan for the Town of Manlius as outlined in the resolution presented.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Waters, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

8. 8:09 PM Comprehensive Plan – Adopt Plan

Councilor Bollinger reviewed the comprehensive planning process and what the comprehensive plan is.

Councilor Bollinger made a motion, seconded by Councilor Waters, to adopt the 2023 Comprehensive Plan for the Town of Manlius as presented.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Waters, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

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9. 8:15 PM Recreation Department New Hire

Councilor Italiano made a motion, seconded by Councilor Bollinger, to hire Taylor Buffum, Recreation Attendant (Pinegrove Playground) at $15.75 per hour.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Nicholson, Councilor Italiano, Councilor Waters, Councilor Kriesel.

Nays: 0 All in Favor. Motion Carries.

Councilor Italiano congratulated the Recreation Department for their hard work on the Summer Musical and stated that there was great turnout with over 735 attendees.

10. 8:16 PM Resolution to Hire Harris Beach as the Attorney for the Town

Councilor Bollinger made a motion, seconded by Councilor Italiano, to retain Harris Beach PLLC as the Attorney for the Town as outlined in the resolution presented.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Nicholson, Councilor Italiano, Councilor Waters, Councilor Kriesel.

Nays: 0 All in Favor. Motion Carries.

11. 8:46 PM Petition for a Permissive Referendum to Establish a Ward District

Town Clerk Weber stated that a Petition for a Permissive Referendum was submitted in her office on July 14th to establish a ward system in the Town of Manlius. Clerk Weber stated she also received an objection on July 19th.

Clerk Weber and Attorney Frateschi discussed the petitions, the clerk's role in the acceptance of the petitions and the ward system.

12. Approval of Minutes – July 12, 2023 - Tabled

13. 8:46 PM Approval of Abstract # 14 - Tabled

Councilor Bollinger made a motion, seconded by Councilor Nicholson, to approve Abstract # 14 in the amount of $420,963.95 as submitted by Comptroller Lenway.

TOWN OF MANLIUS
Fund Summary
Abstract # 13 - 2023

CODE	FUND	TOTALS
A	General Fund Townwide	$94,478.35
B	General Fund Part Town	$1,689.63
DA	Highway Fund Townwide	$21,159.17
DB	Highway Fund Part Town	$67,044.76
SD1	Consolidated Drainage #1	$2,508.00
SR1	Trash	$205,581.50

SR2	Brush	$25,187.50
SW3	Skyridge Water District	$3,315.00
	Total	$420,963.95

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Nicholson, Councilor Italiano, Councilor Waters, Councilor Kriesel.

Nays: 0 All in Favor. Motion Carries.

14. 8:41 P.M. Resolution Authorizing the Supervisor to Sign the WIAA Grant Application

Councilor Bollinger made a motion, seconded by Councilor Waters, to authorize the Supervisor to sign the WIAA grant application.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Nicholson, Councilor Italiano, Councilor Waters, Councilor Kriesel.

Nays: 0 All in Favor. Motion Carries.

15. 8:42 PM Adjournment

By motion made by Councilor Kriesel and seconded by Councilor Italiano, the Board voted unanimously to at 8:42 PM

Ayes: Supervisor Deer, Councilor Nicholson, Councilor Bollinger, Councilor Italiano, Councilor Waters, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

Respectfully Submitted by:

Allison A. Weber
Town Clerk

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MINUTES
TOWN BOARD
August 9, 2023

The Town of Manlius Town Board held a hybrid meeting with in-person attendees and virtual attendees. The meeting was live streamed on the Town Facebook page and the Town YouTube Channel. The recording of the meeting can be viewed here;
https://www.youtube.com/channel/UC3pS9-uTiX4l7aEgciGEVSA

Supervisor Deer presided, and the following Board members were present:

Sara Bollinger, Councilor
Elaine Denton, Councilor
Heather Waters, Councilor
Alissa Italiano, Councilor
William Nicholson, Councilor
Katelyn M. Kriesel, Councilor

The following Town Officers were present: Tim Frateschi, Attorney for the Town. Ann Oot, Town Manager. Allison Weber, Town Clerk. Jason Cassalia, Police Chief, Tom Poitras, Code Officer. Maria Lenway, Comptroller. Kayandra Blythe, Deputy Town Manager.

The following Town Officers Attending Virtually: Councilor Waters (In attendance but not voting)

1. Attendees

In-Person Meeting Attendees: Tim Kelly, Fayetteville. Dave Barnwell, Manlius. Michael Nesci, E. Syracuse. Casey Cleary, Fayetteville. Craig Dudczak, Fayetteville. Charles Bruer, Fayetteville. Brody Smith, Syracuse. Joe Messineo, Manlius. Cheryl & Mark Matt, Fayetteville. Stephen Benson, Manlius. Tom Bassett, Manlius. Mike Friend, Manlius. Mary Teska. Barb Wilson, Manlius. John Boyd, Fayetteville. Brad Sauve, Manlius.

Virtual Meeting Attendees: Arnold Poltenson, Jane Elizabeth Brown, Andrea Scamehorn, Warren Linhart, Peggy Kurtz.

2. The Pledge of Allegiance

Supervisor Deer called the meeting to order at 6:30 PM. Councilor Italiano led the Pledge of Allegiance. Supervisor Deer welcomed everyone and thanked all for attending.

3. 6:31 PM Open Podium

Town Clerk Weber read aloud a statement from Robert Wheeler. Mr. Wheeler submitted a letter in opposition to the petition for the ward system. Mr. Wheeler's letter discussed the cost of the special election, the GOP forcing the election at this time to get lower turnout and the GOP causing increased costs to the taxpayers. Mr. Wheeler stated that the Chair of the GOP in Manlius was concerned with the cost of the comprehensive plan and is costing the taxpayers the expense of a special election. Mr. Wheeler discussed why the ward system is not a good system for the town.

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Jospeh Messineo, Manlius, asked the Town Board to submit responses to the questions submitted to the Town Board regarding the Skyridge Water District.

Mr. Messineo stated that state law and the town code require that the Town should have a Board of Ethics and asked the Town Board to form a Board of Ethics.

Tom Bassett, Manlius, spoke about the petition submitted for the ward system. Mr. Bassett discussed the cost of a special election, the poor timing of the petition and further stated that the merits of a ward system should be discussed.

Mike Nesci, E. Syracuse, stated that he is disappointed that there was not more discussion around the issue (the ward system & the petition). Mr. Nesci stated that there should have been more public involvement with the petition and if inclusivity matters it would have been put on the ballot in the general election.

Casey Cleary-Hammarstedt, Fayetteville, stated that she views these petitions as a divisive political action by Tim Kelly Chair of the Manlius Republican Committee and candidate for Town Supervisor. Ms. Cleary Hammarstedt stated that studying the viability of a ward system was in the comprehensive plan. Ms. Cleary Hammarstedt stated that she does not agree with this approach and this style of leadership. Ms. Cleary Hammarstedt encouraged the Town Board to study and improve the petition process.

John Boyd, Fayetteville, spoke in opposition to the ward system. Mr. Boyd stated that the ward system could give a dangerous platform to radical individuals and discussed how the ward system would make that possible, Mr. Boyd stated that we cannot allow this in our community.

Barb Wilson, Manlius, stated that Tim Kelly's statement in Syracuse.com stating that it has nothing to do with political affiliation and that it has to do with fair representation. Ms. Wilson stated that as a voter she does not think this petition is fair. Ms. Wilson discussed why the petition submitted is not fair and further stated that no one seems to understand what the petition means. Ms. Wilson stated that the petition is not fiscally responsible.

Craig Dudczak, Fayetteville, asked questions about the petition and the validation of the signatures.

4. 6:58 PM Joule Community Energy – Clean Energy Program

Peggy Kurtz, Joule Energy, gave a presentation on community based clean energy programs.

The Town Board asked questions and discussed community based solar. The Town Board tabled the matter for further consideration.

5. 7:28 PM Twin Ponds – Planned Unit Development (PUD) Request – 5440 N Burdick Street

Brody Smith, Attorney for the Applicant, gave a presentation on the Planned Use Development Request for 5440 N Burdick Street, Fayetteville and reviewed the district language.

The Town Board and the applicant discussed affordable housing and how it relates to the PUD.

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Councilor Italiano asked questions about the affordable housing proposed in the application. The Town Board will submit an appendix to the applicant for more clarity.

Brian Bouchard, Engineer for the Applicant, presented the district map and discussed proposed uses.

The Town Board discussed the proposed town roadway and right of way.

Councilor Italiano made a motion, seconded by Councilor Kriesel, to refer the PUD request made by Twin Ponds Housing for the project known as Twin Ponds for the parcel located at 5440 Burdick St. to the Town of Manlius Planning Board and the Onondaga County Planning Board

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Denton, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

6. 8:09 PM Garden Park Senior Apartments – Planned Unit Development (PUD) Request – Highbridge Street - Tabled

7. 8:10 PM Cemetery Budget Line Item

Councilor Bollinger made a motion, seconded by Councilor Denton, to create expenditure account A00.5.8810.100 Cemeteries – Personal Services.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Denton, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

Councilor Bollinger made a motion, seconded by Councilor Denton, to approve a budget transfer in the amount of $495.00 from A00.5.8810.400 Cemeteries Contractual to A00.5.8810.100 Cemeteries Personal Services.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Denton, Councilor Italiano, Councilor Nicholson, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

8. 8:11 PM Humana Group Medicare Advantage Plan Renewal

Councilor Bollinger made a motion, seconded by Councilor Kriesel, to authorize the Supervisor to sign the 2024 Humana Group Medicare Advantage Plan Renewal as presented.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Nicholson, Councilor Denton, Councilor Italiano, Councilor Kriesel.

Nays: 0 All in Favor. Motion Carries.

9. 8:13 PM Petition for a Permissive Referendum to Establish a Ward District

Town Clerk Weber stated that she has accepted the petitions and submitted a letter outlining her decision.

Supervisor Deer reviewed what will be required for the Town Board to hold a special election,

Supervisor Deer outlined the following:

1. The Town Board will set an exact date for the election.
2. The Town Board will work with the Board of Elections for the use of their voting machines.
3. The Town Board must find and employ election inspectors for the day of the election.
4. The law requires an eight-hour continuous time between 8AM and 8PM for the election.
5. The default polling place will be Town Hall. The Town could have additional polling locations and extend to more than eight hours.
6. The Town Board is reviewing options and understanding that each addition (time & place) will add to the cost.
7. If the Town Board does not set up a board of registrars, there will be no early voting and no absentee ballots. Without the Board of Registrars, you must be in town to vote.
8. You must be able to appear at Town Hall for either the Board of Registrars and election day or election day only if there is no Board of Registrars. There is no options for residents that are unable to travel to the Town Hall or for residents who are out of town.
9. The Town Board does not have the option of moving this to the November ballot because of when the petitions were filed.
10. If the ward system is approved the Board of Elections would be charged with drawing the maps and every town councilor will have their terms expire at the end of 2025.

The Town Board discussed the different options of running a special election as the Onondaga County Board of Elections is not allowed to run this election. It was also discussed what the ward system would change for the town.

Councilor Italiano stated that she feels that the way this is happening is voter suppression.

Councilor Nicholson stated that exploring the option of the ward system was identified in the Comprehensive Plan and it would be better to do this in a way where the Town could explore all of the contingencies instead of having to make abrupt decisions.

Supervisor Deer and Town Clerk Weber discussed the notification process for the special election. Town Clerk Weber stated that she was advised that the Town cannot send out a townwide mailing because the Town could be open to liability if even one residence is missed. Town Clerk Weber stated that she will be sending out notifications through all of the other channels.

Councilor Italiano stated that she believes this is a calculated move by the people who submitted the petitions as the people who submitted the petitions speak at every meeting.

Supervisor Deer stated that the Town Board will work towards having a resolution prepared for the next meeting to set the date and parameters for the special election.

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10. 8:30 PM Recreation Department New Hire

Councilor Italiano made a motion, seconded by Councilor Bollinger, to hire Tyler Delaney at a rate of $15.75 per hour as a recreation attendant.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Nicholson, Councilor Denton, Councilor Italiano, Councilor Kriesel.

Nays: 0 All in Favor. Motion Carries.

11. 8:31 PM Approval of Minutes – June 28, 2023, and (July 12, 2023, Tabled)

Councilor Denton made a motion, seconded by Councilor Italiano, to approve the June 28, 2023, minutes as presented by Town Clerk Weber.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Nicholson, Councilor Denton, Councilor Italiano, Councilor Kriesel.

Nays: 0 All in Favor. Motion Carries.

12. 8:32 LaBella Associates Engineering Consultants – Engagement Letter

Councilor Bollinger made a motion, seconded by Councilor Nicholson, to authorize the Supervisor to sign the engagement letter with LaBella Associates contingent upon legal review.

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Nicholson, Councilor Denton, Councilor Italiano, Councilor Kriesel.

Nays: 0 All in Favor. Motion Carries.

16. 8:32 PM Approval of Abstract # 15

Councilor Bollinger made a motion, seconded by Councilor Nicholson, to approve Abstract # 15 in the amount of $561,974.99 as submitted by Town Clerk Weber.

TOWN OF MANLIUS
Fund Summary
Abstract # 15 - 2023

CODE	FUND	TOTALS
A	General Fund Townwide	$300,319.51
B	General Fund Part Town	$5,823.03
DA	Highway Fund Townwide	$71,920.82
DB	Highway Fund Part Town	$174,092.28
CM3	Sustainable Manlius	$625.00
SL1	Overhead Lighting District	$1,608.89
SL2	Underground Lighting	$2,227.31
SL3	Entry Lighting	$106.64
SL4	Garden Park Lighting	$677.86
SL5	Ratnour Bridge Lighting	$2,439.26
SR1	Trash	$185.87
SR2	Brush	$185.87

SW3	Skyridge Water District	$1,762.65
	Total	$561,974.99

Ayes: Supervisor Deer, Councilor Bollinger, Councilor Nicholson, Councilor Denton, Councilor Italiano, Councilor Kriesel.

Nays: 0 All in Favor. Motion Carries.

17. Adjournment

By motion made by Councilor Italiano and seconded by Councilor Bollinger, the Board voted unanimously to adjourn the regular session at 8:36 PM.

Ayes: Supervisor Deer, Councilor Nicholson, Councilor Bollinger, Councilor Denton, Councilor Italiano, Councilor Kriesel.

Nayes: 0 All in Favor. Motion Carries.

Respectfully Submitted by:

Allison A. Weber
Town Clerk

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** G/L ACCOUNT TOTALS **

				=========LINE ITEM=========			=======GROUP BUDGET=======		
EAR	ACCOUNT	NAME	AMOUNT	ANNUAL BUDGET	BUDGET AVAILABLE	OVER BUDG	ANNUAL BUDGET	BUDGET AVAILABLE	OVER BUDG
023	A00-5.1220.405	Supervisor - Information T	525.00	8,000	6,618.29		71,600	12,387.24	
	A00-5.1220.480	Supervisor - Payroll	2,831.06	37,500	12,470.73		71,600	10,081.18	
	A00-5.1420.481	Attorney - Litigation	1,470.60	25,000	929.00-	Y	116,000	21,443.06	
	A00-5.1420.482	Attorney - Employment Matt	617.40	25,000	4,029.51		116,000	22,296.26	
	A00-5.1440.400	Engineer - Contractual	165.00	325,000	326,010.00		343,000	343,226.00	
	A00-5.1620.405	Buildings - Information Te	16,948.43	389,763	226,044.19		477,873	271,202.49	
	A00-5.1620.421	Buildings - Phone	1,313.48	14,000	4,268.85		477,873	286,837.44	
	A00-5.1620.423	Buildings - Security Servi	66.95	900	314.40		477,873	288,083.97	
	A00-5.1620.424	Buildings - Internet	129.00	2,500	864.84		477,873	288,021.92	
	A00-5.1620.430	Buildings - Cleaning	126.25	16,560	5,362.22		477,873	288,024.67	
	A00-5.1640.410	Central Garage - Gasoline	4,299.46	100,000	33,850.49		104,500	37,320.24	
	A00-5.1670.409	Central Printing - Postage	64.82	35,000	12,356.88		64,100	27,399.39	
	A00-5.1930.400	Judgments & Claims	2,307.17	15,000	1,487.47-	Y	15,000	1,487.47-	Y
	A00-5.5132.425	Garage - Garage/Bldg Maint	1,200.00	295,500	257,148.05		409,431	348,628.80	
	A00-5.9045.800	Life Insurance	425.50	5,000	1,166.80		5,000	1,166.80	
	A00-5.9061.800	Health Insurance Opt-Out	1,450.00	35,000	12,087.86		35,000	12,087.86	
	B00-5.3620.410	P & D - Engineer	716.00	30,000	18,132.24		57,550	9,405.53	
	B00-5.3620.421	P & D - Phone	117.79	1,500	558.73		57,550	10,003.74	
	B00-5.8020.410	Planning - Engineer	743.26	15,000	8,434.20		37,020	21,510.10	
	SR1-5.8160.400	Refuse - Contractual	205,581.50	2,472,726	828,074.00		2,472,726	828,074.00	
	SR2-5.8160.400	Refuse - Contractual	25,187.50	302,437	100,937.50		302,437	100,937.50	
	TA2-2.851	Engineering Deposits	2,148.00						
		** 2023 YEAR TOTALS	268,434.17						

** G/L ACCOUNT TOTALS **

				=========LINE ITEM=========			=======GROUP BUDGET=======		
EAR	ACCOUNT	NAME	AMOUNT	ANNUAL BUDGET	BUDGET AVAILABLE	OVER BUDG	ANNUAL BUDGET	BUDGET AVAILABLE	OVER BUDG
023-2024	A00-1.380	Accounts Receivable	127.50						
	A00-2.700	Rec Dept Clearing Acct	32,181.00						
	A00-5.1110.401	Justices - Office Supplies	98.72	2,800	979.98		9,903	7,867.98	
	A00-5.1330.405	Receiver of Taxes - IT	1,500.00	3,000	0.00		7,787	3,756.75	
	A00-5.1460.400	Record Managemnt - Contrac	8,851.50	5,027	1,234.54		5,027	1,234.54	
	A00-5.1620.400	Buildings - Contractual	114.00	6,500	1,292.38		477,873	288,150.92	
	A00-5.1620.405	Buildings - Information Te	420.25	389,763	242,992.62		477,873	288,150.92	
	A00-5.1640.410	Central Garage - Gasoline	574.60	100,000	38,149.95		104,500	41,619.70	
	A00-5.3120.400	Police - Contractual	990.98	46,781	30,594.29		669,227	426,920.32	
	A00-5.3120.401	Police - Office Supplies	1,090.97	15,285	8,611.78		669,227	426,920.32	
	A00-5.3120.412	Police - Vehicle Repair	2,671.00	119,236	66,002.79		669,227	426,920.32	
	A00-5.3120.421	Police - Phone	4,509.56	31,820	14,361.72		669,227	426,920.32	
	A00-5.3120.423	Police - Security Service	30.00	420	299.90		669,227	426,920.32	
	A00-5.3120.425	Police - Building Maintena	128.00	2,650	7,295.14-	Y	669,227	426,920.32	
	A00-5.3120.430	Police - Cleaning Supplies	300.58	3,500	2,452.67		669,227	426,920.32	
	A00-5.3120.446	Police - Maintenance Contr	5,870.50	63,651	21,214.79		669,227	426,920.32	
	A00-5.3120.448	Police - Uniforms & Cleani	6,589.28	68,879	47,297.04		669,227	426,920.32	
	A00-5.3120.462	Police - Community Relatio	2,000.21	4,550	1,167.95		669,227	426,920.32	
	A00-5.5132.423	Garage - Fire Monitoring	390.00	700	500.98-	Y	409,431	349,828.80	
	A00-5.5132.425	Garage - Garage/Bldg Maint	66.44-	295,500	258,348.05		409,431	349,828.80	
	A00-5.7310.410	Recreation - Program Expen	114.00	66,650	17,713.10		91,419	27,961.05	
	A00-5.7310.415	Recreation - Mileage	57.64	1,845	743.43		91,419	27,961.05	
	B00-4.2555	Building & Alte*NON-EXPENS	65.00	65,000-	244,135.36				
	B00-5.3620.401	P & D - Office Supplies	31.86	2,000	770.36		57,550	10,121.53	
	B00-5.8010.408	Zoning - Advertising	77.01	800	114.45-	Y	5,650	1,012.55	
	DA0-5.5130.411	Machinery - Vehicle Expens	12,530.74	140,000	49,846.13		231,591	100,653.12	
	DA0-5.5130.440	Machinery - Equipment Expe	1,224.97	70,000	46,980.18		231,591	100,653.12	
	DA0-5.5130.447	Machinery - Shop Supply/St	1,253.33	10,200	2,309.69-	Y	231,591	100,653.12	
	DA0-5.5130.473	Machinery - Shop Tools	27.00	7,000	1,745.50		231,591	100,653.12	
	DA0-5.5140.490	Brush & Weeds - Contractu	4,416.00	65,000	54,488.00		73,625	59,364.29	
	DA0-5.5142.421	Snow Removal - Phones/Page	120.84	1,700	782.48		744,920	737,067.46	
	DA0-5.5142.447	Snow Removal - Shop Suppli	611.40	37,891	29,203.43		744,920	737,067.46	
	DA0-5.5142.448	Snow Removal - Uniforms/Cl	196.18	15,000	6,938.78		744,920	737,067.46	
	DA0-5.5142.472	Snow Removal - Plow/Sand E	7,606.00	34,000	36,706.05		744,920	737,067.46	
	DB0-5.5110.400	General Repairs - Miscella	3.85	500	285.58		1,452,190	372,371.27	
	DB0-5.5110.430	General Repairs - Stop Che	2,565.00	7,500	1,837.00		1,452,190	372,371.27	
	DB0-5.5110.472	General Repairs - Signs	1,450.00	13,500	11,269.19		1,452,190	372,371.27	
	DB0-5.5110.474	General Repairs - Tires	1,570.20	5,500	553.88		1,452,190	372,371.27	
	DB0-5.5110.475	General Repairs - Road Rep	82,997.57	855,832	290,171.18		1,452,190	372,371.27	
	DB0-5.5110.476	General Repairs - Road Pai	4,755.30	34,240	18,494.10		1,452,190	372,371.27	
	DB0-5.5110.478	General Repairs - Drainage	1,572.21	43,575	10,693.90		1,452,190	372,371.27	
	** 2023-2024 YEAR TOTALS **		191,618.31						