JNM Engineering, LLC
Civil Engineering, Surveying, Land Planning, Environmental Planning, Arboriculture

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6412 Damascus Road, Gaithersburg, MD

Hydrology and Hydraulics Calculations

Property Address: 6412 Damascus Road, Gaithersburg, MD 20882
Plat Number: 19212
Lot: 2

Prepared for:

Jeff Juneau
6412 Damascus Road
Gaithersburg, Maryland 20882

Lerch, Early, & Brewer, Chtd.
Christopher Ruhlen
7600 Wisconsin Avenue, suite 700
Bethesda, MD 20814

Professional Certification:

I hereby certify that these documents were prepared or approved by me and that I am a duly licensed professional engineer under the laws of the State of Maryland, Licensed No. 46791, Expiration Date: 06/07/2025

Prepared: March 28, 2024

Exhibit 34(a)
OZAH Case No: CU 24-10

1.0 Project Scope / Goals:

JNM Engineering has prepared this report at the request of Jeff Juneau "hereon referred to client" who is the current property owner of 6412 Damascus Road. This report has been prepared in response to complaints from Mr. Charles Lyles "hereon referred to neighbor" who is the property owner of 6340 Damascus Road. The neighbor's complaints being evaluated within this report include apparent direct runoff, poor drainage, basement flooding/saturated yard areas, and mosquitos. The neighbor has indicated that the drainage problems noted above are due to improvements made on the client's property which include a gravel drive and parking area, mulch bins, a concrete garage apron (neighbor referred to this as a concrete swale), a garage, and storage building. Due to the concerns raised by the neighbor, the client has requested that an evaluation be prepared. The purpose of this study is to analyze existing drainage conditions utilizing standard hydraulic and hydrology methodology in order to identify drainage deficiencies which could be mitigated to offer relief to the claims noted by the neighbor. This report provides our findings and also potential mitigation measures which could be utilized to address apparent drainage concerns.

2.0 Project Background:

The clients 4.62 acre property is located on the south side of Damascus Road and consists of one lot of a three lot subdivision known as Etchison Acres recorded in 1991 as plat number 19212. Prior to this subdivision, the clients property (as well as the adjoining lots) consisted of farmland as shown in figure 1 below.

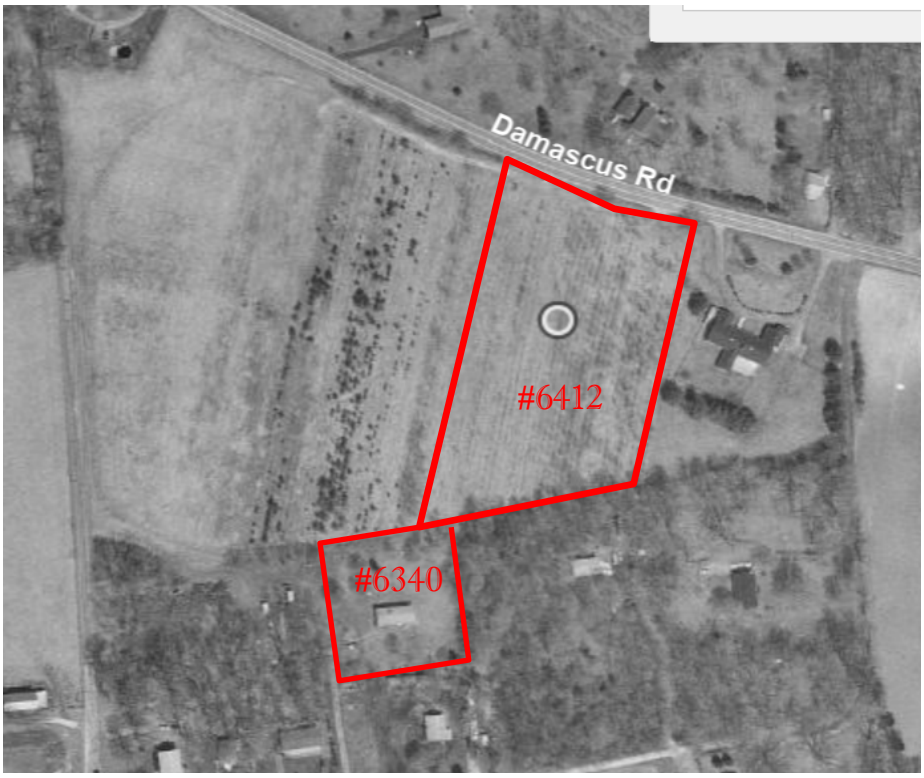


Figure 1: 1993 Aerial of client's property and neighbor's property.

Shortly after the plat was recorded the three lots were sold and developed as single family residential dwellings. The farmland/grassland shown above was improved into lawn areas, driveways, and houses. Figure

two below is a satellite imagery from 1998 showing the progression and development of the client's property and adjoining properties. Please note the client's property as improved with the house, rear garage, and associated driveway.

Figure 2: 1998 image of client's property and neighbors property.

Based on available aerial images we can confirm the following additional improvements to the client's property.

a. Around 2002, the existing gravel driveway was improved to include a loop and storage area next to building.
b. Around 2004, it appears that the neighbor constructed a drainage berm along their northern property line which is the shared property line with the client.
c. Around 2008, the material storage bin was installed on the client's property.
d. Around 2012, the second storage building was constructed on the client's property and the existing garage was expanded to include a lean-to.
e. Around 2015, the storage building was expanded.

The neighbor claims that the improvements (noted above) on the client's property has created a drainage and runoff problem. We will utilize this information to evaluate pre vs. post runoff conditions within the subject drainage basin. In addition, we will analyze the entire contributing drainage area to the neighbor's property.

2.0 Drainage Area Evaluation and Delineation:

In order to evaluate the drainage to the neighboring property we had to establish a point, or location, where the drainage from the client's property discharges into the neighbor's property. As shown on the attached Site Drainage Area Map, a study point has been located just off the client's property along the southwest side of the property. This study point location is the point of convergence for all offsite runoff. Additionally, this study point is located on the northern edge of a drainage berm constructed by the neighbor (as noted above). Utilizing this study point we established the contributing drainage areas, soil types, and ground slopes. Using WinTR-55 and WinTR-20 we evaluated the drainage areas as follows:

A. Existing conditions drainage for the client's property (Three Conditions Studied)

This analysis evaluated the property as it exists today. As shown on the attached drainage area map, there are two primary drainage areas (Da 1 and DA 2). We have analyzed site runoff conditions, from only the client's property, for the 1yr, 2yr, and 10yr storm events. We have chosen the 1-yr storm event as this is the current target event for stormwater management through Montgomery County and Maryland Department of the Environment for all new developments. The 2-yr event was chosen as an intermediate evaluation of drainage. The 10-year was chosen to analyze "safe conveyance" as required by Montgomery County and Maryland Department of the Environment for all new developments. By utilizing WinTR-55 and WinTR-20 modeling we have calculated the following:

1. Analysis One: 1993 drainage conditions for onsite drainage areas 1 and 2. This analysis assumes the same drainage area as currently exists with a cover type of crop residue (>20%) as it appears that row crops may have existed within the site area. To be conservative we have also analyzed the cover type as pasture/grassland to establish an estimated range of runoff.
   1-yr peak discharge= 1.28cfs - 3.13cfs
   2-yr peak discharge= 2.51cfs - 4.90cfs
   10-yr peak discharge=7.65cfs - 11.29cfs

2. Analysis Two: Drainage conditions for drainage areas 1 and 2 without accounting for any onsite impervious area associated with the commercial use.
   1-yr peak discharge= 1.19cfs
   2-yr peak discharge=2.46cfs
   10yr peak discharge=7.78cfs

3. Analysis Three: Drainage conditions for drainage areas 1 and 2 accounting for all existing impervious areas onsite.
   1-yr peak discharge= 1.91cfs
   2-yr peak discharge=3.33cfs
   10yr peak discharge=8.93cfs

Runoff Summary (Site only generated runoff from clients lot)

Storm Event	1993 Peak Discharge (cfs)	Ex. Peak (No Commercial)	Ex. Cond. w/ Commercial
1-Year	1.23 - 3.13cfs	1.19cfs	1.91cfs
2-Year	2.51 - 4.90cfs	2.46cfs	3.33cfs
10-Year	7.65 - 11.29cfs	7.78cfs	8.93cfs

As shown on the table above it can be assumed that between 1993 and 2024 the use/cover types have changed over the property creating changes in runoff conditions. The changes noted above are typical for single family residential developments. It was also noted that no stormwater managements regulations were in place when this subdivision occurred. The construction and development of the 3 lots above the neighbor's property was permitted and developed in compliance at the time of development.

B. Existing conditions drainage, entire drainage area

Our secondary evaluation included the entire drainage area to the study point. This includes drainage areas 1 and 2 noted above as well as 6.24 acres (noted as drainage area 3) to the west of the client's property. It was noted that there has been limited development on the adjoining parcels (DA3) over the years so we will only be analyzing this under existing conditions. Please refer to the plan titled "Full Drainage Area Map". The calculated discharges are as follow:

Runoff Summary (Full Drainage Area to Study Point) (See full drainage area map)

Storm Event	Drainage Area 1 and 2	Drainage Area 3	Total to Study Point
1-Year	1.91cfs	1.85cfs	3.76cfs
2-Year	3.33cfs	3.88cfs	7.21cfs
10-Year	8.93cfs	12.33cfs	21.21cfs

The table above represents the total flow to the identified study point. The calculated flow is primarily impacted by the size of the contributing drainage area as the total impervious area within the total drainage area is still fairly low. With existing flows now established, we can discuss the potential causes of the neighbor's claims. The following contributing factors were noted:

a. The neighbor claimed that they receive a significant amount of runoff that has saturated the yard, flooded the basement, and created conditions where use of the property is difficult. As part of our investigation, we noted that the neighbors house lies within a low lying area with contributing drainage from three sides. This does suggest that the drainage concerns claimed by the neighbor may not be the sole result of the client's improvements. Due to this, it is important to look at the contributing drainage areas in entirety. We have completed an additional study that analyzes a secondary study point "study point 2" on the downhill side of the neighbor's property (see full drainage area map). This study point represents the full drainage area to the lowest point within the neighbor's property.
   The flow rates observed, when compared to the flow rates from client's property (DA1 and DA2) indicates that the drainage concerns claimed by the neighbor are not solely due to improvements made on the client's property. The 1-yr runoff from the client's property is 1.91cfs and the 1-yr runoff for the full drainage area is 5.17cfs. The 10-yr runoff from the client's property is 8.93cfs and the 10-yr runoff from the full drainage area is 28.60cfs. The runoff from the client's property appears to only account for a fraction of the drainage the neighbor is claiming to be affecting his property.

b. The neighbor's property is located within a natural drainage course. The surrounding properties drain towards the neighbor's property, continue south through the adjoining property, and ultimately into a stream channel. Any runoff from the uphill properties will convey into and through the neighbors' property.

c. There is a constructed embankment/berm along the northern property line of the neighbors' property. The constructed berm restricts flow from the uphill drainage areas (including the client's property) creating ponding and backwater conditions on the uphill side of the berm. Ponding was observed during our site analysis. We believe this berm has a significant impact on drainage and runoff conveyance. Backwatering and ponding above this berm is likely a significant contributor to the noted mosquito issues. Additionally, water seepage through this berm would create conditions of prolonged saturation and extended periods of runoff. The berm has created a condition negatively affecting natural conveyance of runoff. A clear and proper conveyance system would not restrict flow, but instead, would enhance the efficiency of water conveyance through the site to the natural stream system.

d. Due to topographic location, any uphill development from the neighboring property will cause a potential increase in direct runoff. This is evident from the study provided. Improvements within the client's property, and the other adjoining properties, all contribute to this drainage. We believe that the removal of the berm and an efficient conveyance system would alleviate the drainage problems the neighbor claims to be experiencing. This would likely include a shallow stormdrain and associated shallow inlets.

e. As part of this analysis, we have provided a conceptual stormwater management design that would capture and temporarily detain runoff. This design would only account for drainage from the client's property and would not alleviate other contributing areas. In addition, the stormwater management design does not resolve backwatering and ponding created by the berm. The berm is primarily located offsite on the neighbor's property which the client has no ability to modify or remove. As part of the stormwater management concept, we designed and sized a stormwater management device that would capture and temporarily detain runoff from the client's property. The tables below show the impacts of the stormwater management plan. We analyzed the client's property assuming that no commercial impervious areas existed (ie: gravel drive, storage area, and buildings) and the cover type was grass. The purpose of this analysis is to determine what the flow rates from the property would be without the impervious areas of the commercial use. We then designed a stormwater management device that would capture enough impervious area, and restrict enough flow, to mimic runoff conditions consistent with the study noted above (ie: no commercial impervious areas).

Stormwater Management Runoff Table

Storm Event	Peak flow from client's property (Assuming no commercial impervious area)	Peak flow from client's property with the installation of a stormwater management device
1-Yr	1.19cfs	0.70cfs
2-Yr	2.46cfs	1.17cfs
10-yr	7.78cfs	6.86cfs

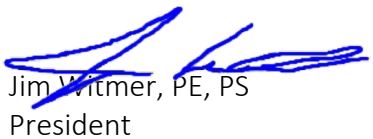
As shown above, the discharge from the client's property could be reduced. For each studies storm event, the stormwater management device would offset any runoff generated from the property impervious commercial use area.

f. We believe that deficiencies in drainage in/around the neighbor's property is mostly related to poor conveyance. A properly designed and constructed conveyance system would be most

effective in lieu of stand alone stormwater management devices that could be installed on the clients property. A stormwater management device could only be used on the client's property to capture a volume of runoff (reducing peak flows) but it will likely not resolve the conveyance deficiencies. The client's property represents roughly 29% of the contributing drainage area that flows into and through the neighbor's property. Any stormwater management devices that could be implemented on the client's property would only address runoff for a portion of the neighbor's drainage area. This would likely result in a solution with little observable change by the neighbor. We recall the neighbor stating that poor drainage has created conditions that have flooded his basement and made it difficult to enjoy/use the property. Due to this, we strongly recommend the neighbor consider a drainage system designed and installed through their property that could capture and convey the majority of the uphill contributing drainage areas. A drainage system would be effective in quickly conveying drainage which would reduce ponding, eliminate mosquito breeding areas, and reduce infiltration that contributes to basement seepage and saturated surface soils.

Thank you again for allowing JNM Engineering to provide you with our analysis of the claimed drainage concerns. Please feel free to contact us should you have any questions or concerns.

Sincerely,



Jim Witmer, PE, PS
President

SOILS DATA TABLE

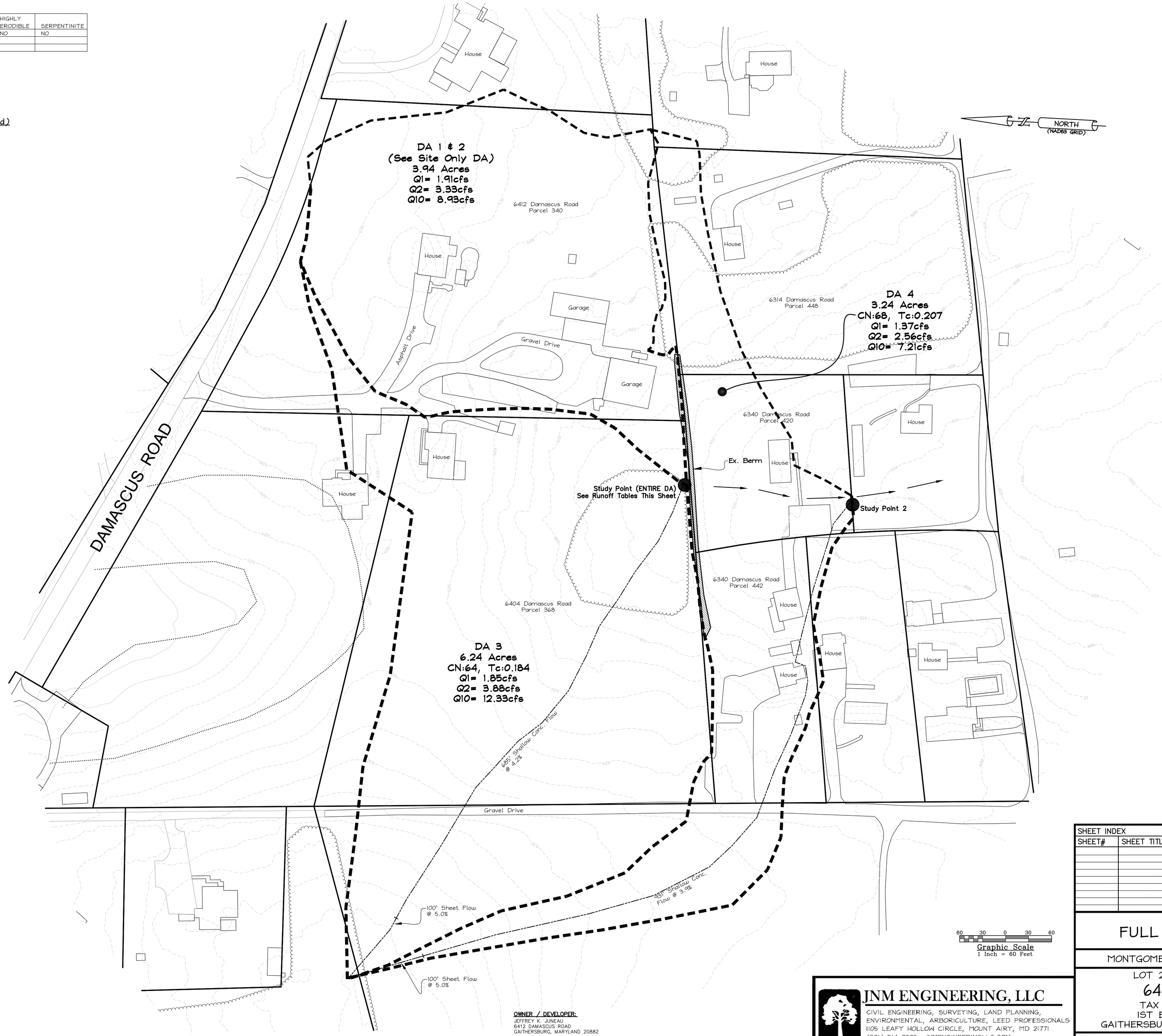
SYMBOL	SOIL	HYDRIC	PRIME FARMLAND	HIGHLY ERODIBLE	SERPENTINITE
2B	GLENELG SILT LOAM, 3%-8%	NO	NO	NO	NO

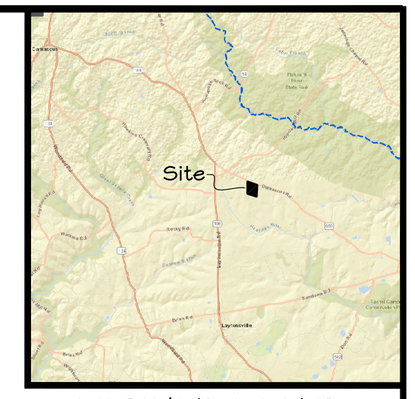
STUDY POINT PEAK FLOW TABLE (Existing)

Ex.DA1 Discharge	Ex.DA2 Discharge	Ex.DA3 Discharge	Study Point Discharge	Storm Event
0.37	1.58	1.85	3.76	1-Year
0.90	2.47	3.88	7.21	2-Year
3.29	5.68	12.33	21.21	10-Year

PROP. STUDY POINT RUNOFF TABLE (With Pond)

Prop. DA1 Discharge	Pr. DA2 Discharge	Ex. DA3 Discharge	Study Point Discharge	Storm Event
0.157	0.705	1.85	2.39	1-Year
1.000	1.014	3.88	4.72	2-Year
6.045	2.061	12.33	18.99	10-Year





VICINITY MAP
SCALE: 1"= 2000'

LEGEND

EXISTING FEATURES

- EXISTING CURB & GUTTER
- EXISTING CONTOUR
- EXISTING PROPERTY LINE
- EXISTING EASEMENT
- EXISTING WATER
- EXISTING SEWER
- EXISTING TREELINE
- EXISTING STORMDRAIN
- EXISTING ELECTRIC
- EXISTING UTILITY POLE (Utility Pole #xxxxx)
- EXISTING SEWER MANHOLE (SMH)
- EXISTING FIRE HYDRANT (HYD)
- EXISTING WATER VALVE (EX. WV)
- EXISTING SPOT ELEVATION (340x2)
- EXISTING SIGNIFICANT TREE
- EXISTING SPECIMEN TREE

OWNER / DEVELOPER:
JEFFREY K. JUNEAU
6412 DAMASCUS ROAD
GAITHERSBURG, MARYLAND 20882

SHEET INDEX

SHEET#	SHEET TITLE

FULL DRAINAGE AREA MAP

MONTGOMERY COUNTY, NRI/FSD PLAN 420231610

LOT 2, PLAT 19212, ETCHISON ACRES

6412 DAMASCUS ROAD

TAX MAP GW52, LOT 2, ZONING: AG
1ST ELECTION DISTRICT, 4.62 ACRES
GAITHERSBURG, MONTGOMERY COUNTY, MARYLAND

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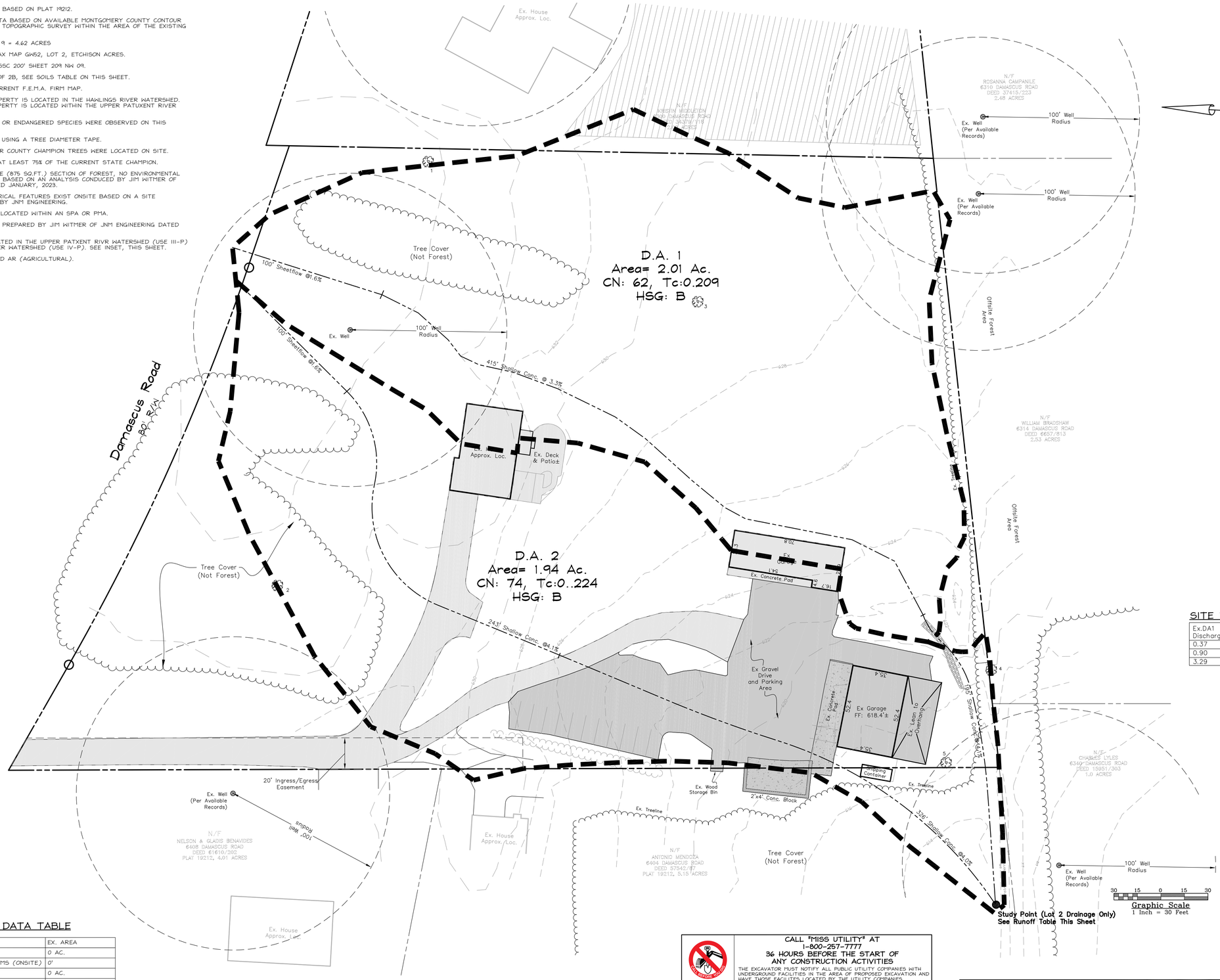
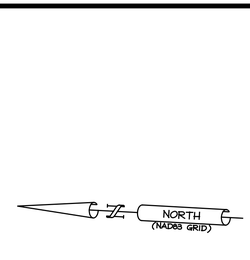
1105 LEAFY HOLLOW CIRCLE, MOUNT AIRY, MD 21771
(301) 514-2808, JNMENGINEERINGLLC.COM

DATE: JAN, 2024 | SCALE: 1"=60' | SHEET 1 OF 1

GENERAL NOTES

1) WATER CATEGORY - 6 SEWER CATEGORY - 6
2) BOUNDARY INFORMATION BASED ON PLAT 19212.
3) TWO-FOOT CONTOUR DATA BASED ON AVAILABLE MONTGOMERY COUNTY CONTOUR MAPS AND A FIELD RUN TOPOGRAPHIC SURVEY WITHIN THE AREA OF THE EXISTING GARAGES.
4) TOTAL LOT AREA: LOT 9 = 4.62 ACRES
5) PROPERTY SHOWN ON TAX MAP GW52, LOT 2, ETCHISON ACRES.
6) PROPERTY SHOWN ON WSSC 200' SHEET 209 NW 09.
7) ONSITE SOILS CONSIST OF 2B, SEE SOILS TABLE ON THIS SHEET.
8) FLOOD ZONE "X" PER CURRENT F.E.M.A. FIRM MAP.
9) LOWER SECTION OF PROPERTY IS LOCATED IN THE HAWLINGS RIVER WATERSHED. UPPER SECTION OF PROPERTY IS LOCATED WITHIN THE UPPER PATUXENT RIVER WATERSHED.
10) NO RARE, THREATENED, OR ENDANGERED SPECIES WERE OBSERVED ON THIS PROPERTY.
11) TREES WERE MEASURED USING A TREE DIAMETER TAPE.
12) NO NATIONAL, STATE, OR COUNTY CHAMPION TREES WERE LOCATED ON SITE.
13) NO TREES ONSITE ARE AT LEAST 75% OF THE CURRENT STATE CHAMPION.
14) ASIDE FROM A 0.02 ACRE (875 SQ.FT.) SECTION OF FOREST, NO ENVIRONMENTAL FEATURES EXIST ONSITE BASED ON AN ANALYSIS CONDUCED BY JIM WITMER OF JNMN ENGINEERING DATED JANUARY, 2023.
15) NO CULTURAL OR HISTORICAL FEATURES EXIST ONSITE BASED ON A SITE INSPCETION CONDUCTED BY JNM ENGINEERING.
16) THIS PROPERTY IS NOT LOCATED WITHIN AN SPA OR PMA.
17) FIELD WORK AND PLANS PREPARED BY JIM WITMER OF JNM ENGINEERING DATED JANUARY, 2023.
18) THIS PROPERTY IS LOCATED IN THE UPPER PATXENT RIVR WATERSHED (USE III-P) AND THE HAWLINGS RIVER WATERSHED (USE IV-P). SEE INSET, THIS SHEET.
19) THIS PROPERTY IS ZONED AR (AGRICULTURAL).





VICINITY MAP
SCALE: 1"= 2000'

NORTH (NAD83 GRID)

LEGEND

EXISTING FEATURES

- EXISTING CURB & GUTTER
- EXISTING CONTOUR
- EXISTING PROPERTY LINE
- EXISTING EASEMENT
- EXISTING WATER
- EXISTING SEWER
- EXISTING TREELINE
- EXISTING STORMDRAIN
- EXISTING ELECTRIC
- EXISTING UTILITY POLE (Utility Pole #xxxxx)
- EXISTING SEWER MANHOLE (SMH)
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE (EX. WV)
- EXISTING SPOT ELEVATION (340x2)
- COMMERCIAL USE AREA
- RESIDENTIAL USE AREA

SITE SWM COMPUTATIONS

STORMWATER MANANAGEMENT

EXISTING IMPVERIOUS SERVING THE COMMERCIAL LANDSCAPE BUSINESS= 19,166SF (0.44 Ac.)
(ie: gravel parking area, garage buildings, mulch bins, and gravel storage area)

EXISTING IMPERVIOUS SERVING THE RESIDENTIAL USE OF THE PROPERTY= 17,365sf (0.39 Ac.)
(ie: storage building, house, driveway, patio area)

SWM target is 1-year peak management (CPv) for all existing impervious surfaces associated with the commercial landscaping business.

Volume Requirement= ((2.6"x0.95x0.44)/12) * 43,560sf= 3,945cf
- Assume 100% Impervious Area
- 2.6" is 1-year storm equivalent rainfall depth
- 0.95 is the Rv number for 100% impervious area

Volume Provided within SWM Detention Pond= 5,280cf

SITE RUNOFF TABLE (EX. CONDITIONS)

Ex.DA1 Discharge	Ex.DA2 Discharge	Study Point Discharge	Storm Event
0.37	1.58	1.91	1-Year
0.90	2.47	3.33	2-Year
3.29	5.68	8.93	10-Year

SOILS DATA TABLE

SYMBOL	SOIL	HYDRIC	PRIME FARMLAND	HIGHLY ERODIBLE	SERPENTINITE
2B	GLENELG SILT LOAM, 3%-8%	NO	NO	NO	NO

ENVIRONMENTAL DATA TABLE

FEATURE	EX. AREA
AREA OF STEEP SLOPES	0 AC.
LINEAR EXTENT OF STREAMS (ONSITE)	0'
STREAM BUFFER	0 AC.
ENV. BUFFER (AVG. LENGTH x WIDTH)	NONE ONSITE
TOTAL ONSITE FORESTED AREA	0.02 AC.
FORESTED STREAM BUFFER AREA	0 AC.
100 YEAR FLOODPLAIN	0 AC.
PRIORITY AREAS	0 AC.
WETLANDS	0 AC.
FORESTED WETLANDS	0 AC.

TREE LIST

NO.	COMMON NAME	SCIENTIFIC NAME	DIA.	CONDITION	NOTES
1	Silver Maple	Acer saccarinium	32	Good	Multi-Stem, Included bark, High probability of windsnap.
2	Pin Oak	Quercus palustris	24	Good	
3	Tulip Poplar	Lirodendron tulipifera	25	Good	
4	Red Maple	Acer rubrum	32	Good	Multi Stem
5	Pin Oak	Quercus palustris	24	Good	

CALL "MISS UTILITY" AT
1-800-257-7777
36 HOURS BEFORE THE START OF
ANY CONSTRUCTION ACTIVITIES
THE EXCAVATOR MUST NOTIFY ALL PUBLIC UTILITY COMPANIES WITH UNDERGROUND FACILITIES IN THE AREA OF PROPOSED EXCAVATION AND HAVE THOSE FACILITIES LOCATED BY THE UTILITY COMPANIES.

OWNER / DEVELOPER:
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SITE ONLY EX. CONDITIONS DRAINAGE AREA MAP

MONTGOMERY COUNTY, NRI/FSD PLAN 420231610

LOT 2, PLAT 19212, ETCHISON ACRES
6412 DAMASCUS ROAD
TAX MAP GW52, LOT 2, ZONING: AG
1ST ELECTION DISTRICT, 4.62 ACRES
GAITHERSBURG, MONTGOMERY COUNTY, MARYLAND

DATE: MARCH, 2023 | SCALE: 1"=30' | SHEET 1 OF 1