September 10, 2021

Robert G. Campbell & Associates
7523 Taggart Lane
Knoxville, Tennessee 37938

Attention: Mr. Robert Campbell, PE

Subject: **Hydrologic Determination Report**
Sevierville Pike Project
Knox County, Tennessee
GEOServices Project No. 24-21945

Dear Mr. Campbell:

GEOServices, LLC has completed a Hydrologic Determination Report for a multiple drainage features at the above-referenced project, located at 8802 Sevierville Pike in Knox County, Tennessee. Please see our findings in the attached report.

GEOServices appreciates the opportunity to continue providing services to you and looks forward to working with you in the future. If you have any questions, please do not hesitate to contact us at your convenience.

Sincerely,
GEOServices, LLC

Jason Mann, PE, TN-QHP # 1042-TN10
Senior Project Manager

Byron L. Barton, P.G.
Senior Geologist

HYDROLOGIC DETERMINATION REPORT

FOR

SEVIERVILLE PIKE PROJECT

KNOX COUNTY, TENNESSEE

Prepared For:

Robert G. Campbell & Associates
7523 Taggart Lane
Knoxville, Tennessee 37938

Prepared by:

GEOServices, LLC
2561 Willow Point Way
Knoxville, Tennessee 37931

September 10, 2021

GEOServices Project # 24-21945

1.0 INTRODUCTION

GEOServices, LLC (GEOServices) performed a hydrologic determination on a five (5) drainage features located in the headwaters of Hines Creek, located at 8802 Sevierville Pike in Knox County, Tennessee. The site investigation and hydrologic determination were conducted on August 9, 2021 by Jason Mann of GEOServices.

2.0 SITE DESCRIPTION

The subject project location consists of two parcels; the parcels are described on Map 138, Parcels 270 and 274 102.00 according to the Knox County Property Assessor. The overall project footprint is roughly 173 acres in size; **Map 1** in Appendix A provides an overview of the subject location. The site is bordered on all sides by residential and commercial properties

Map 2 in Appendix A illustrates the location of the hydrologic resources evaluated on site. Two (2) of the channels are wet weather conveyances, and three (3) channels are jurisdictional streams. All of the channels evaluated drain toward the Hines Creek. The channels on-site were evaluated for geomorphological, hydrological, and biological stream indicators.

Based on the Shooks Gap USGS 7.5 - Minute Topographic Quadrangle (**Map 3** in Appendix A), three (3) of the subject channels are designated as "blue line" features, and two (2) are not. Additionally, the topography of the parcel has an approximate elevation range between approximately 1062 and 920 feet above mean sea level.

The soils map associated with this site is shown as **Map 4** in Appendix A. While there are multiple soil types found in the general area, only one of the soils mapped on site is correlated with hydric conditions. Steadman Silt Loam is listed as a hydric soil.

The entire project lies in the Hines Creek Watershed (HUC 060101070405), which is nested within the Lower French Broad Watershed (HUC 06010107). Hines Creek is not listed on the most-

recent 303(d) list of impaired waterways in Tennessee. The receiving stream is considered to be fully supporting of the seven designated surface water uses in Tennessee.

3.0 RESOURCE DESCRIPTION

Three (3) of the channels found on site have sustained flows, and are considered jurisdictional streams. One of the streams has been recently altered, and the determination process has been influenced by current conditions. Two (2) of the channels are wet weather conveyances. No other water resources were found or evaluated during this investigation.

4.0 METHODS

The channels have been evaluated using the Tennessee Department of Environment and Conservation Hydrologic Determination Field Data form v1.5. Weather calculations, field data sheets, photos, and a copy of QHP Certification 1042-TN10 is provided in the attached appendices.

5.0 RESULTS

UT Hines Creek, Channel 1 – Stream due to secondary stream indicators; a secondary score of 31.0 was calculated using a rigorous and reasonable amount of effort.

UT Hines Creek, Channel 2 – Stream due to secondary stream indicators; a secondary score of 20.0 was calculated using a rigorous and reasonable amount of effort.

UT Hines Creek, Channel 3 – Stream due to primary and secondary stream indicators; a secondary score of 21.5 was calculated using a rigorous and reasonable amount of effort. The channel has been recently disturbed and the alterations impact the score.

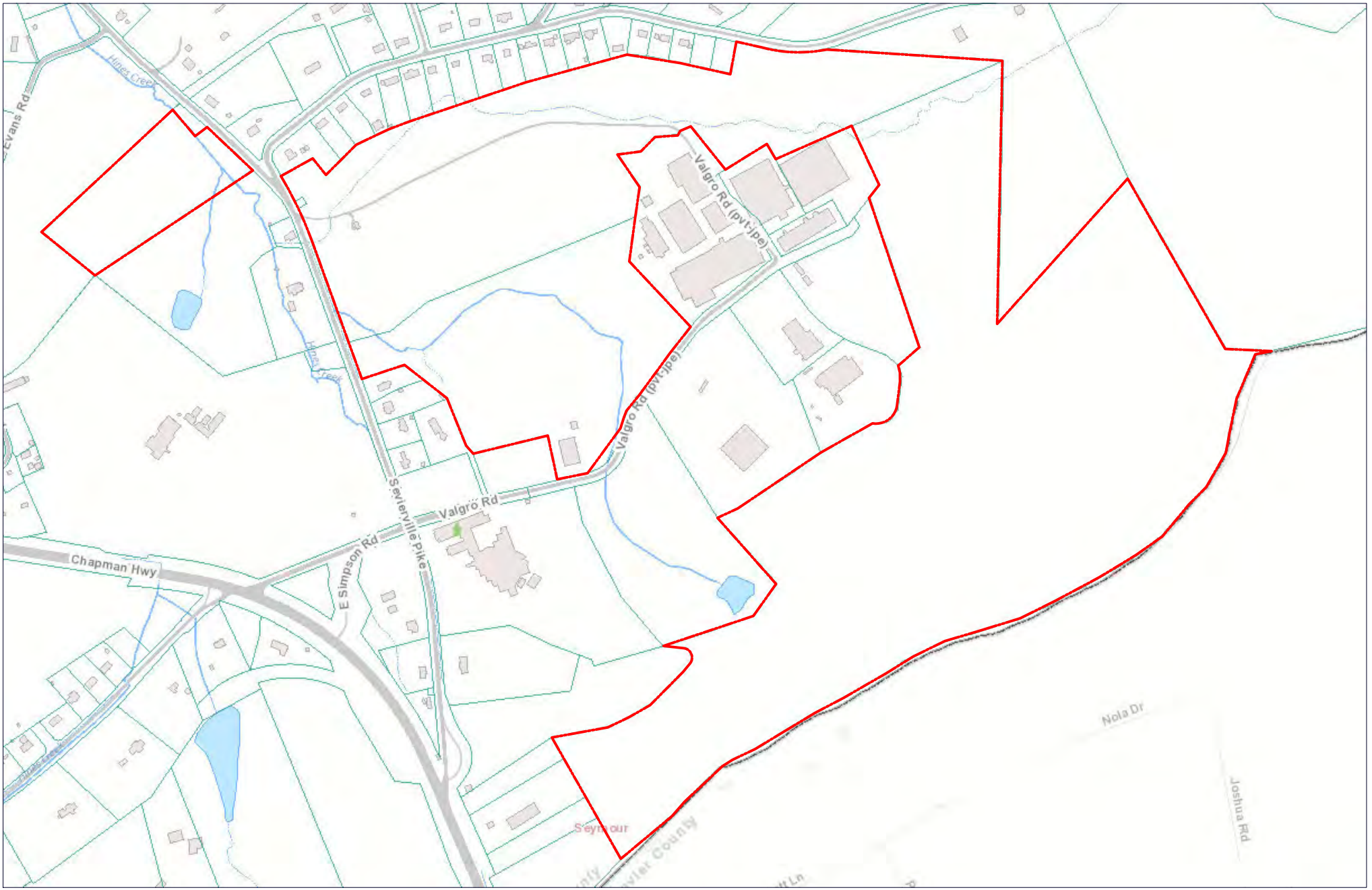
UT Hines Creek, Channel 4 – Wet Weather Conveyance due to secondary stream indicators; a secondary score of 11.0 was calculated using a rigorous and reasonable amount of effort.

UT Hines Creek, Channel 5 – Wet Weather Conveyance due to secondary stream indicators; a secondary score of 18.0 was calculated using a rigorous and reasonable amount of effort.

Map 2 illustrates the georeferenced location of the water resource in question, and is included in Appendix A.

Appendix A

Maps



Note:
Site boundary and features shown are approximate only.
Drawing composed from field notes and observations only.

Subject Property.

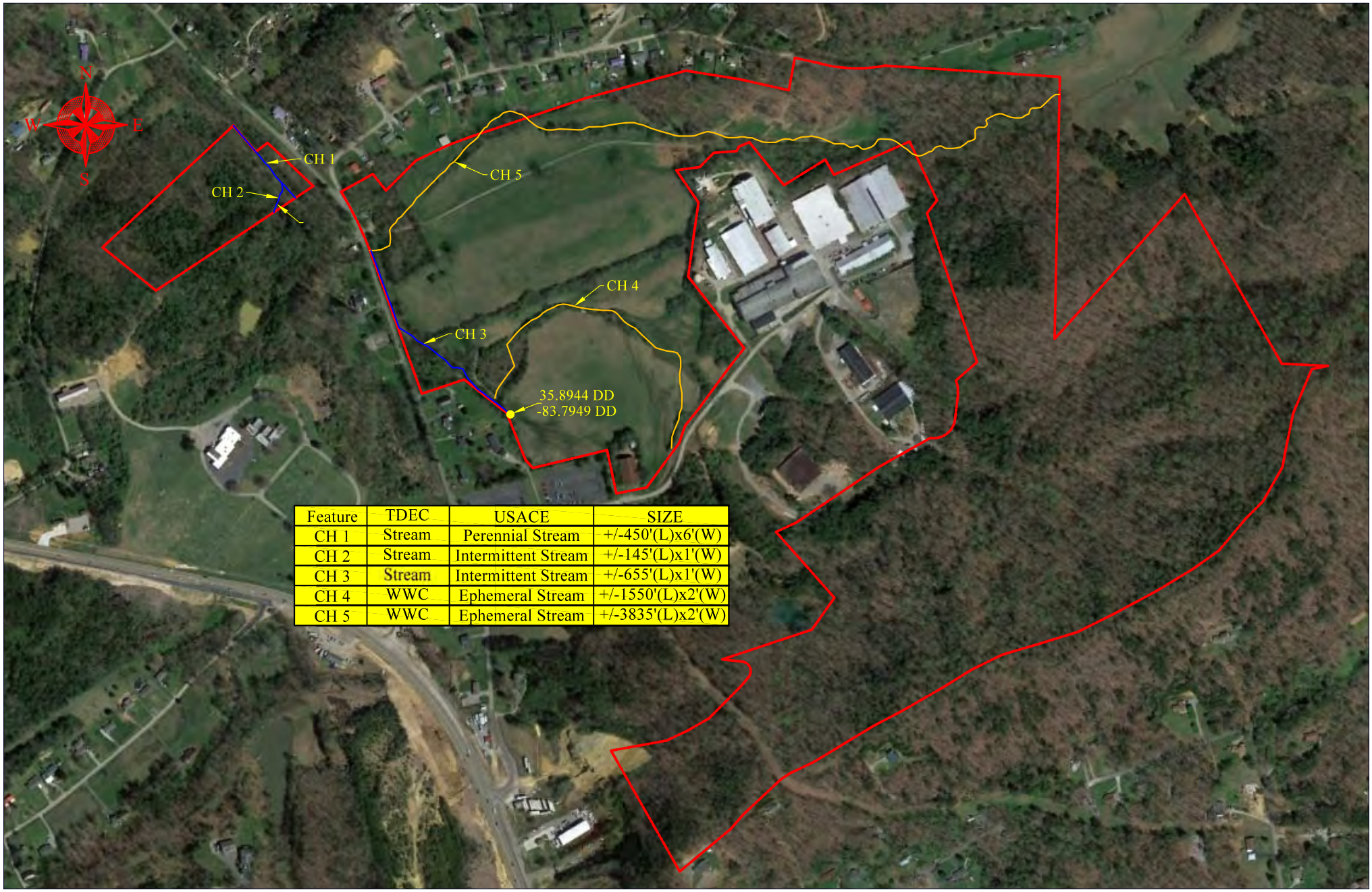
SCALE:	NTS
CHECKED BY:	JM
DRAWN BY:	CSG
DATE:	9–4–2021

GEOServices, LLC-Geotechnical and Materials Engineers
2651 Willow Point Way
Knoxville, Tennessee 37931
Phone: (865) 539-8242
Fax: (865) 539-8252

SUBJECT LOCATION
SEVIERVILLE PIKE
STREAM DETERMINATION
8802 SEVIERVILLE PIKE
KNOX COUNTY, TENNESSEE

JOB NO: 24–21945

1



Feature	TDEC	USACE	SIZE
CH 1	Stream	Perennial Stream	+/-450'(L)x6'(W)
CH 2	Stream	Intermittent Stream	+/-145'(L)x1'(W)
CH 3	Stream	Intermittent Stream	+/-655'(L)x1'(W)
CH 4	WWC	Ephemeral Stream	+/-1550'(L)x2'(W)
CH 5	WWC	Ephemeral Stream	+/-3835'(L)x2'(W)

Note:
Site boundary and features shown are approximate only.
Drawing composed from field notes and observations only.

Subject Property.

SCALE:	NTS
CHECKED BY:	JM
DRAWN BY:	CSG
DATE:	9–4–2021

GEOS
GEOServices, LLC Geotechnical and Materials Engineers
2651 Willow Point Way
Knoxville, Tennessee 37931
Phone: (865) 539-8242
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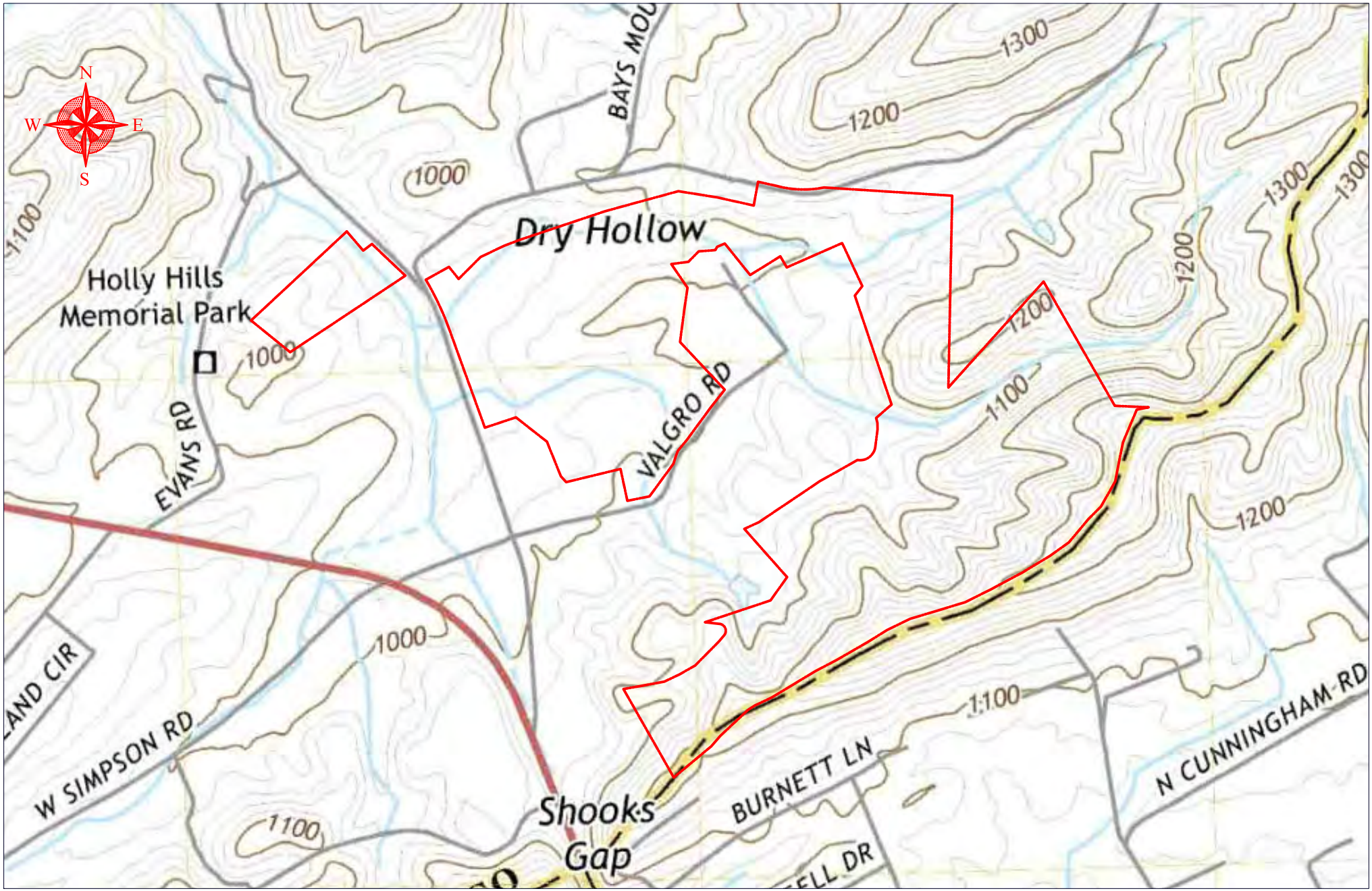
WATER RESOURCE MAP
SEVIERVILLE PIKE
STREAM DETERMINATION
8802 SEVIERVILLE PIKE
KNOX COUNTY, TENNESSEE

JOB NO: 24–21945

2



Note:
Site boundary and features shown are approximate only.
Drawing composed from field notes and observations only.
Subject Property.

SCALE:	NTS
CHECKED BY:	JM
DRAWN BY:	CSG
DATE:	9–4–2021

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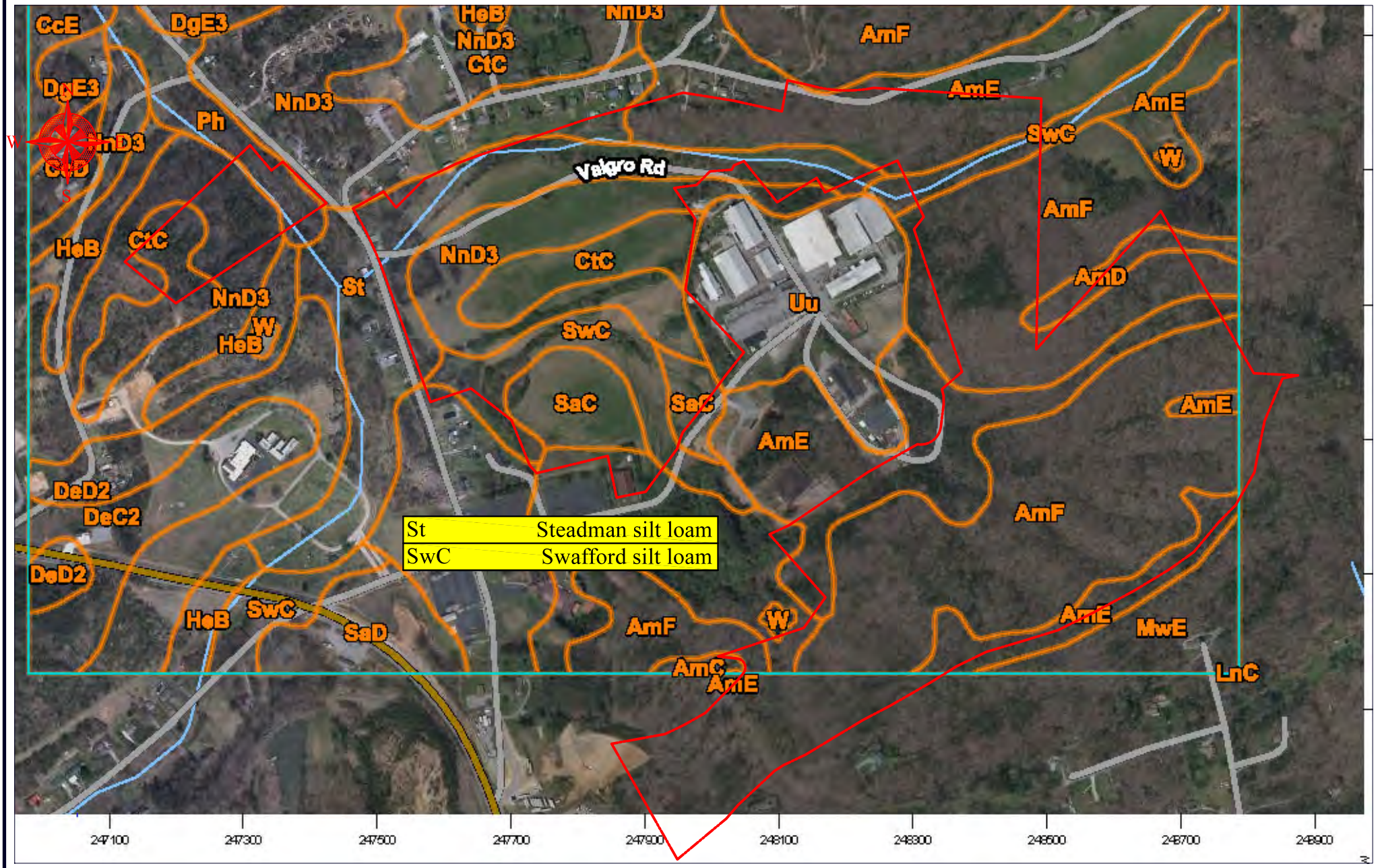
TOPOGRAPHIC MAP
SEVIERVILLE PIKE
STREAM DETERMINATION
8802 SEVIERVILLE PIKE
KNOX COUNTY, TENNESSEE

JOB NO: 24–21945

3



St Steadman silt loam
SwC Swafford silt loam

Note:
Site boundary and features shown are approximate only.
Drawing composed from field notes and observations only.

Subject Property.

SCALE:	NTS
CHECKED BY:	JM
DRAWN BY:	CSG
DATE:	9–4–2021

GEOServices, LLC Geotechnical and Materials Engineers
2651 Willow Point Way
Knoxville, Tennessee 37931
Phone: (865) 539-8242
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WEB SOIL SURVEY
SEVIERVILLE PIKE
STREAM DETERMINATION
8802 SEVIERVILLE PIKE
KNOX COUNTY, TENNESSEE

JOB NO: 24–21945

Appendix B

Photographs

SITE PHOTOGRAPHS

Photo 1: Photo of Channel 1 as it enters the subject property

Photo 2: Photo of Channel 2 as it enters the subject parcel

Photo 3: Photo of Channel 2 at the confluence with Channel 1

Photo 4: Channel 3 originates with a culvert, acting as a springhead;
no water source could be found upgradient of this location

Photo 5: The lower section of Channel 3 has been altered

Photo 6: Typical representation of the Channel 3

Photo 7: Photo of Channel 4 as it exits the subject parcel

Photo 8: Typical representation of the Channel 4 near the confluence with Channel 3

Photo 9: Photo of the Channel 5 as it enters the subject parcel

Photo 10: Typical representation of the Channel 5 midway through the property

Appendix C

Field Data Sheets

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.5

Named Waterbody:	UT Hines Creek - Channel # 1	Date/Time:	8/9/21
Assessors/Affiliation:	Jason Mann, GEOServices	Project ID :	24-21945
Site Name/Description:	Sevierville Pike Project		
Site Location:	Sevierville Pike, Knox County, TN		
HUC (12 digit):	060101070405	Lat/Long:	35.8963
Previous Rainfall (7-days) :	0.19"		-83.7955
Precipitation this Season vs. Normal : abnormally wet elevated average low abnormally dry unknown Source of recent & seasonal precip data : NOAA - See Attached			
Watershed Size :	895 acres	County:	Knox
Soil Type(s) / Geology :	Steadman Silt Loam	Source:	WSS
Surrounding Land Use :	Residential & Commercial		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe Moderate (Slight) Absent			

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC
2. Defined bed and bank absent, vegetation composed of upland and FACU species	✓	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	NA	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✓	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase		Stream
6. Presence of fish (except *Gambusia*)	✓	Stream
7. Presence of naturally occurring ground water table connection	✓	Stream
8. Flowing water in channel and 7 days since last precip >0.1" in local watershed	✓	Stream
9. Evidence watercourse has been used as a supply of drinking water	✓	Stream

NOTE: If any Primary Indicators 1-9 = "Yes", then no further investigation is necessary. However, assessors may choose to score secondary indicators as supporting evidence.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.5*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 31

Justification / Notes :

U/S : 35.8972°, -83.7984°
D/S : 35.8982°, -83.7993°

Secondary Field Indicator Evaluation 24-21945 CH1

A. Geomorphology (Subtotal = 15.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	2	(3)
2. Sinuous channel	0	1	(2)	3
3. In-channel structure: riffle-pool sequences	0	1	(2)	3
4. Sorting of soil textures or other substrate	0	1	(2)	3
5. Active/relic floodplain	0	0.5	(1)	1.5
6. Depositional bars or benches	0	(1)	2	3
7. Braided channel	(0)	1	2	3
8. Recent alluvial deposits	(0)	0.5	1	1.5
9. Natural levees	(0)	1	2	3
10. Headcuts	(0)	1	2	3
11. Grade controls	(0)	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	(1.5)
13. At least second order channel on existing USGS or NRCS map	No = 0		(Yes = 3)	

B. Hydrology (Subtotal = 5.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	(0)	1	2	3
15. Water in channel and >48 hours since sig. rain	0	1	(2)	3
16. Leaf litter in channel (January – September)	(1.5)	1	0.5	0
17. Sediment on plants or on debris	(0)	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	0	(0.5)	1	1.5
19. Hydric soils in channel bed or sides of channel	No = 0		(Yes = 1.5)	

C. Biology (Subtotal = 10)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel bed [1]	(3)	2	1	0
21. Rooted plants in the thalweg [1]	(3)	2	1	0
22. Crayfish in stream (exclude in floodplain)	(0)	1	2	3
23. Bivalves/mussels	0	1	(2)	3
24. Amphibians	(0)	0.5	1	1.5
25. Macrobenthos (record type & abundance)	0	(1)	2	3
26. Filamentous algae; periphyton	0	(1)	2	3
27. Iron oxidizing bacteria/fungus	(0)	0.5	1	1.5
28.Wetland plants in channel bed [2]	(0)	0.5	1	1.5

[1] Focus is on the presence of terrestrial plants.

[2] Focus is on the presence of aquatic or wetland plants.

Total Points = 31

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.5

Named Waterbody:	UT Hines Creek - Channel # 2	Date/Time:	8/9/21
Assessors/Affiliation:	Jason Mann, GEOServices	Project ID :	24-21945
Site Name/Description:	Sevierville Pike Project		
Site Location:	Sevierville Pike, Knox County, TN		
HUC (12 digit):	060101070405	Lat/Long:	35.8963
Previous Rainfall (7-days) :	0.19"		-83.7955
Precipitation this Season vs. Normal : abnormally wet elevated average low abnormally dry unknown Source of recent & seasonal precip data : NOAA - See Attached			
Watershed Size :	~13 acres	County:	Knox
Soil Type(s) / Geology :	Steadman silt loam	Source:	WSS
Surrounding Land Use :	Residential & Commercial		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe Moderate (Slight) Absent			

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC
2. Defined bed and bank absent, vegetation composed of upland and FACU species	✓	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	NA	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✓	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✓	Stream
6. Presence of fish (except *Gambusia*)	✓	Stream
7. Presence of naturally occurring ground water table connection	✓	Stream
8. Flowing water in channel and 7 days since last precip >0.1" in local watershed	✓	Stream
9. Evidence watercourse has been used as a supply of drinking water	✓	Stream

NOTE: If any Primary Indicators 1-9 = "Yes", then no further investigation is necessary. However, assessors may choose to score secondary indicators as supporting evidence.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.5*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 20

Justification / Notes :

U/S: 35.8971°, -83.7987° property boundary
D/S: 35.8974°, -83.7985° confluence w/ CH 1

Secondary Field Indicator Evaluation 24-21945 CH2

A. Geomorphology (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	(2)	3
2. Sinuous channel	0	(1)	2	3
3. In-channel structure: riffle-pool sequences	(0)	1	2	3
4. Sorting of soil textures or other substrate	0	(1)	2	3
5. Active/relic floodplain	(0)	0.5	1	1.5
6. Depositional bars or benches	0	(1)	2	3
7. Braided channel	(0)	1	2	3
8. Recent alluvial deposits	0	(0.5)	1	1.5
9. Natural levees	(0)	1	2	3
10. Headcuts	0	(1)	2	3
11. Grade controls	0	(0.5)	1	1.5
12. Natural valley or drainageway	0	(0.5)	1	1.5
13. At least second order channel on existing USGS or NRCS map	(No = 0)		Yes = 3	

B. Hydrology (Subtotal = 5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	(0)	1	2	3
15. Water in channel and >48 hours since sig. rain	0	(1)	2	3
16. Leaf litter in channel (January – September)	(1.5)	1	0.5	0
17. Sediment on plants or on debris	0	(0.5)	1	1.5
18. Organic debris lines or piles (wrack lines)	0	(0.5)	1	1.5
19. Hydric soils in channel bed or sides of channel	No = 0		(Yes = 1.5)	

C. Biology (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel bed [1]	3	(2)	1	0
21. Rooted plants in the thalweg [1]	3	(2)	1	0
22. Crayfish in stream (exclude in floodplain)	(0)	1	2	3
23. Bivalves/mussels	0	(1)	2	3
24. Amphibians □	0	(0.5)	1	1.5
25. Macrobenthos (record type & abundance) ★	0	(1)	2	3
26. Filamentous algae; periphyton	0	1	2	3
27. Iron oxidizing bacteria/fungus	0	(0.5)	1	1.5
28. Wetland plants in channel bed [2]	0	(0.5)	1	1.5

[1] Focus is on the presence of terrestrial plants.

[2] Focus is on the presence of aquatic or wetland plants.

Total Points = 20

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes : □ egg masses

★ amphipods & isopods found

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.5

Named Waterbody:	UT Hines Creek - Channel # 3	Date/Time:	8/9/21
Assessors/Affiliation:	Jason Mann, GEOServices	Project ID :	24-21945
Site Name/Description:	Sevierville Pike Project		
Site Location:	Sevierville Pike, Knox County, TN		
HUC (12 digit):	060101070405	Lat/Long:	35.8963
Previous Rainfall (7-days) :	0.19"		-83.7955
Precipitation this Season vs. Normal : abnormally wet elevated average low abnormally dry unknown Source of recent & seasonal precip data : NOAA - See Attached			
Watershed Size :	~ 4/2 acres	County:	Knox
Soil Type(s) / Geology :	Steadman Silt Loam	Source:	WSS
Surrounding Land Use :	Residential & Commercial		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : (Severe) Moderate Slight Absent			

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC
2. Defined bed and bank absent, vegetation composed of upland and FACU species	✓	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	NA	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✓	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✓	Stream
6. Presence of fish (except *Gambusia*)	✓	Stream
7. Presence of naturally occurring ground water table connection		(Stream)
8. Flowing water in channel and 7 days since last precip >0.1" in local watershed	✓	Stream
9. Evidence watercourse has been used as a supply of drinking water	✓	Stream

NOTE: If any Primary Indicators 1-9 = "Yes", then no further investigation is necessary. However, assessors may choose to score secondary indicators as supporting evidence.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.5*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 21.5

Justification / Notes :

u/s: 35.8944°, -83.7949° culvert end / spring (?)
d/s: 35.8964°, -83.7972° confluence w/ CH 5

Stream banks have been graded recently, which impacts this determination.

Secondary Field Indicator Evaluation 24-21945 CH3

A. Geomorphology (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	1	(2)	3
2. Sinuous channel	0	(1)	2	3
3. In-channel structure: riffle-pool sequences	(0)	1	2	3
4. Sorting of soil textures or other substrate	0	(1)	2	3
5. Active/relic floodplain	(0)	0.5	1	1.5
6. Depositional bars or benches	0	(1)	2	3
7. Braided channel	0	(1)	2	3
8. Recent alluvial deposits	0	(0.5)	1	1.5
9. Natural levees	(0)	1	2	3
10. Headcuts	(0)	1	2	3
11. Grade controls	0	(0.5)	1	1.5
12. Natural valley or drainageway	0	(0.5)	1	1.5
13. At least second order channel on existing USGS or NRCS map	(No = 0)		Yes = 3	

B. Hydrology (Subtotal = 6.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	0	1	(2)	3
15. Water in channel and >48 hours since sig. rain	0	1	(2)	3
16. Leaf litter in channel (January – September)	(1.5)	1	0.5	0
17. Sediment on plants or on debris	0	(0.5)	1	1.5
18. Organic debris lines or piles (wrack lines)	0	(0.5)	1	1.5
19. Hydric soils in channel bed or sides of channel	(No = 0)		Yes = 1.5	

C. Biology (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel bed [1]	(3)	2	1	0
21. Rooted plants in the thalweg [1]	(3)	2	1	0
22. Crayfish in stream (exclude in floodplain)	(0)	1	2	3
23. Bivalves/mussels	(0)	1	2	3
24. Amphibians	(0)	0.5	1	1.5
25. Macrobenthos (record type & abundance)	(0)	1	2	3
26. Filamentous algae; periphyton	0	(1)	2	3
27. Iron oxidizing bacteria/fungus	0	(0.5)	1	1.5
28. Wetland plants in channel bed [2]	(0)	0.5	1	1.5

[1] Focus is on the presence of terrestrial plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 21.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Highly impacted

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.5

Named Waterbody:	UT Hines Creek - Channel # 4	Date/Time:	8/9/21
Assessors/Affiliation:	Jason Mann, GEOServices	Project ID :	24-21945
Site Name/Description:	Sevierville Pike Project		
Site Location:	Sevierville Pike, Knox County, TN		
HUC (12 digit):	060101070405	Lat/Long:	35.8963
Previous Rainfall (7-days) :	0.19"		-83.7955
Precipitation this Season vs. Normal : abnormally wet elevated average low abnormally dry unknown Source of recent & seasonal precip data : NOAA - See Attached			
Watershed Size :	~26 acres	County:	Knox
Soil Type(s) / Geology :	Swafford Silt Loam	Source:	WSS
Surrounding Land Use :	Residential & Commercial		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe (Moderate) Slight Absent			

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC
2. Defined bed and bank absent, vegetation composed of upland and FACU species		(WWC)
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	NA	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✓	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✓	Stream
6. Presence of fish (except *Gambusia*)	✓	Stream
7. Presence of naturally occurring ground water table connection	✓	Stream
8. Flowing water in channel and 7 days since last precip >0.1" in local watershed	✓	Stream
9. Evidence watercourse has been used as a supply of drinking water	✓	Stream

NOTE: If any Primary Indicators 1-9 = "Yes", then no further investigation is necessary. However, assessors may choose to score secondary indicators as supporting evidence.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.5*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 11

Justification / Notes :

U/S: 35.8936°, -83.7926° property boundary
d/S: 35.8947°, -83.7952° confluence w/ CH3

Secondary Field Indicator Evaluation 24-21945 CH4

A. Geomorphology (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	(1)	2	3
2. Sinuous channel	0	(1)	2	3
3. In-channel structure: riffle-pool sequences	(0)	1	2	3
4. Sorting of soil textures or other substrate	0	(1)	2	3
5. Active/relic floodplain	(0)	0.5	1	1.5
6. Depositional bars or benches	(0)	1	2	3
7. Braided channel	0	(1)	2	3
8. Recent alluvial deposits	(0)	0.5	1	1.5
9. Natural levees	0	(1)	2	3
10. Headcuts	0	(1)	2	3
11. Grade controls	0	(0.5)	1	1.5
12. Natural valley or drainageway	0	0.5	(1)	1.5
13. At least second order channel on existing USGS or NRCS map	(No = 0)		Yes = 3	

B. Hydrology (Subtotal = 1)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	(0)	1	2	3
15. Water in channel and >48 hours since sig. rain	(0)	1	2	3
16. Leaf litter in channel (January – September)	1.5	1	(0.5)	0
17. Sediment on plants or on debris	(0)	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	0	(0.5)	1	1.5
19. Hydric soils in channel bed or sides of channel	(No = 0)		Yes = 1.5	

C. Biology (Subtotal = 2.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel bed [1]	3	2	(1)	0
21. Rooted plants in the thalweg [1]	3	2	(1)	0
22. Crayfish in stream (exclude in floodplain)	(0)	1	2	3
23. Bivalves/mussels	(0)	1	2	3
24. Amphibians	(0)	0.5	1	1.5
25. Macrobenthos (record type & abundance)	(0)	1	2	3
26. Filamentous algae; periphyton	(0)	1	2	3
27. Iron oxidizing bacteria/fungus	(0)	0.5	1	1.5
28. Wetland plants in channel bed [2]	0	(0.5)	1	1.5

[1] Focus is on the presence of terrestrial plants.

[2] Focus is on the presence of aquatic or wetland plants.

Total Points = 11

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.5

Named Waterbody:	UT Hines Creek - Channel # 5	Date/Time:	8/9/21
Assessors/Affiliation:	Jason Mann, GEOServices	Project ID :	24-21945
Site Name/Description:	Sevierville Pike Project		
Site Location:	Sevierville Pike, Knox County, TN		
HUC (12 digit):	060101070405	Lat/Long:	35.8963
Previous Rainfall (7-days) :	0.19"		-83.7955
Precipitation this Season vs. Normal : abnormally wet elevated average low abnormally dry unknown Source of recent & seasonal precip data : NOAA - See Attached			
Watershed Size :	~170 acres	County:	Knox
Soil Type(s) / Geology :	Steadman silt Loam	Source:	WSS
Surrounding Land Use :	Residential & Commercial		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe Moderate (Slight) Absent			

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC
2. Defined bed and bank absent, vegetation composed of upland and FACU species	✓	WWC
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	NA	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✓	WWC
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✓	Stream
6. Presence of fish (except *Gambusia*)	✓	Stream
7. Presence of naturally occurring ground water table connection	✓	Stream
8. Flowing water in channel and 7 days since last precip >0.1" in local watershed	✓	Stream
9. Evidence watercourse has been used as a supply of drinking water	✓	Stream

NOTE: If any Primary Indicators 1-9 = "Yes", then no further investigation is necessary. However, assessors may choose to score secondary indicators as supporting evidence.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.5*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 18.0

Justification / Notes :

u/s: 35.8983°, -83.7864° property line
d/s: 35.8967°, -83.7972° property line

Secondary Field Indicator Evaluation 24-21945 CH5

A. Geomorphology (Subtotal = 11)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	0	(1)	2	3
2. Sinuous channel	0	1	(2)	3
3. In-channel structure: riffle-pool sequences	(0)	1	2	3
4. Sorting of soil textures or other substrate	0	1	(2)	3
5. Active/relic floodplain	0	(0.5)	1	1.5
6. Depositional bars or benches	0	(1)	2	3
7. Braided channel	(0)	1	2	3
8. Recent alluvial deposits	(0)	0.5	1	1.5
9. Natural levees	(0)	1	2	3
10. Headcuts	(0)	1	2	3
11. Grade controls	(0)	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	(1.5)
13. At least second order channel on existing USGS or NRCS map	No = 0		Yes = 3	

B. Hydrology (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	(0)	1	2	3
15. Water in channel and >48 hours since sig. rain	(0)	1	2	3
16. Leaf litter in channel (January – September)	1.5	(1)	0.5	0
17. Sediment on plants or on debris	(0)	0.5	1	1.5
18. Organic debris lines or piles (wrack lines)	0	0.5	(1)	1.5
19. Hydric soils in channel bed or sides of channel	(No = 0)		Yes = 1.5	

C. Biology (Subtotal = 5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel bed [1]	3	(2)	1	0
21. Rooted plants in the thalweg [1]	3	(2)	1	0
22. Crayfish in stream (exclude in floodplain)	(0)	1	2	3
23. Bivalves/mussels	(0)	1	2	3
24. Amphibians	(0)	0.5	1	1.5
25. Macrobenthos (record type & abundance)	(0)	1	2	3
26. Filamentous algae; periphyton	(0)	1	2	3
27. Iron oxidizing bacteria/fungus	(0)	0.5	1	1.5
28. Wetland plants in channel bed [2] *	0	0.5	(1)	1.5

[1] Focus is on the presence of terrestrial plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 18.0

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

* a few FACW species, but zero OBL species

Appendix D

Weather Data

Normal Weather Conditions Calculations Table

Knoxville - August 2021

			Long-term rainfall records							
	Month	**Standard Deviation**	**Minus One Std. Dev. (DRY)**	**Normal (Mean inches)**	**Plus One Std. Dev. (WET)**	**Actual Rainfall**	**Condition (elevated, low, average)**	**Condition value**	**Month weight value**	**Product of previous two columns**
1st prior month*	JUL	2.47	1.77	4.24	6.71	1.70	LOW	1	3	3
2nd prior month*	JUN	1.80	2.01	3.81	5.61	2.85	AVE	2	2	4
3rd prior month*	MAY	1.97	1.83	3.80	5.77	3.62	AVE	2	1	2
									Sum =	9

Note:

If sum is:	9 - DRY
6-9	then prior period has been abnormally dry
10-14	then prior period has been normal (average)
15-18	Then prior period has been abnormally wet

Condition value:	
Low =	1
Average =	2
Elevated =	3

CLIMATE REPORT
NATIONAL WEATHER SERVICE MORRISTOWN, TN
414 PM EDT SUN AUG 01 2021

.....

...THE KNOXVILLE MCGHEE TYSON AIRPORT CLIMATE SUMMARY FOR THE MONTH OF JULY 2021...

CLIMATE NORMAL PERIOD: 1991 TO 2020
CLIMATE RECORD PERIOD: 1871 TO 2021

WEATHER	OBSERVED VALUE	DATE(S)	NORMAL VALUE	DEPART FROM NORMAL
TEMPERATURE (F)				
HIGHEST	97	07/28		
LOWEST	59	07/04		
AVG. MAXIMUM	88.5		88.4	0.1
AVG. MINIMUM	68.9		68.7	0.2
MEAN	78.7		78.5	0.2
DAYS MAX >= 90	16			
DAYS MAX <= 32	0			
DAYS MIN <= 32	0			
DAYS MIN <= 0	0			
PRECIPITATION (INCHES)				
RECORD				
MAXIMUM	13.16	1917		
MINIMUM	0.33	1995		
TOTALS	1.70		5.25	-3.55
DAYS >= .01	10			
DAYS >= .10	4			
DAYS >= .50	2			
DAYS >= 1.00	0			
GREATEST				
24 HR. TOTAL	0.70	07/01 TO 07/02		
SNOWFALL (INCHES)				
TOTALS	0.0		0.0	0.0
SINCE 7/1	0.0			
SNOWDEPTH AVG.	0			
DAYS >= TRACE	0			
GREATEST				
SNOW DEPTH	0			

DEGREE DAYS			
HEATING TOTAL	0	0	0
SINCE 7/1	0	0	0
COOLING TOTAL	432	420	12
SINCE 1/1	907	915	-8

WEATHER CONDITIONS. NUMBER OF DAYS WITH			
THUNDERSTORM	7	RAIN	6
SNOW	0	FOG	13
FOG W/VIS <= 1/4 MILE	0		

- INDICATES NEGATIVE NUMBERS.
R INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T INDICATES TRACE AMOUNT.

CLIMATE REPORT
NATIONAL WEATHER SERVICE MORRISTOWN, TN
955 AM EDT THU JUL 01 2021

.....

...THE KNOXVILLE MCGHEE TYSON AIRPORT CLIMATE SUMMARY FOR THE MONTH OF JUNE 2021...

CLIMATE NORMAL PERIOD: 1991 TO 2020
CLIMATE RECORD PERIOD: 1871 TO 2021

WEATHER	OBSERVED VALUE	DATE(S)	NORMAL VALUE	DEPART FROM NORMAL
TEMPERATURE (F)				
HIGHEST	93	06/28		
LOWEST	57	06/23		
AVG. MAXIMUM	85.2		85.7	-0.5
AVG. MINIMUM	65.7		64.9	0.8
MEAN	75.5		75.3	0.2
DAYS MAX >= 90	6			
DAYS MAX <= 32	0			
DAYS MIN <= 32	0			
DAYS MIN <= 0	0			
PRECIPITATION (INCHES)				
RECORD				
MAXIMUM	11.83	1928		
MINIMUM	0.20	1944		
TOTALS	2.85		4.24	-1.39
DAYS >= .01	14			
DAYS >= .10	10			
DAYS >= .50	1			
DAYS >= 1.00	0			
GREATEST				
24 HR. TOTAL	0.92	06/21 TO 06/22		
SNOWFALL (INCHES)				
TOTALS	0.0		0.0	0.0
SINCE 7/1	5.3			
SNOWDEPTH AVG.	0			
DAYS >= TRACE	0			
GREATEST				
SNOW DEPTH	0			

DEGREE DAYS

HEATING TOTAL	0	2	-2
SINCE 7/1	3366	3527	-161
COOLING TOTAL	323	311	12
SINCE 1/1	475	495	-20

.....

WEATHER CONDITIONS. NUMBER OF DAYS WITH

THUNDERSTORM	9	RAIN	8
SNOW	0	FOG	13
FOG W/VIS <= 1/4 MILE	1		

- INDICATES NEGATIVE NUMBERS.
R INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T INDICATES TRACE AMOUNT.

CLIMATE REPORT
NATIONAL WEATHER SERVICE MORRISTOWN, TN
657 AM EDT WED JUN 02 2021

.....

...THE KNOXVILLE MCGHEE TYSON AIRPORT CLIMATE SUMMARY FOR THE MONTH OF MAY 2021...

CLIMATE NORMAL PERIOD: 1991 TO 2020
CLIMATE RECORD PERIOD: 1871 TO 2021

WEATHER	OBSERVED VALUE	DATE(S)	NORMAL VALUE	DEPART FROM NORMAL
TEMPERATURE (F)				
HIGHEST	90	05/25 05/26		
LOWEST	41	05/13		
AVG. MAXIMUM	76.9		78.9	-2.0
AVG. MINIMUM	55.0		56.9	-1.9
MEAN	65.9		67.9	-2.0
DAYS MAX >= 90	2			
DAYS MAX <= 32	0			
DAYS MIN <= 32	0			
DAYS MIN <= 0	0			
PRECIPITATION (INCHES)				
RECORD				
MAXIMUM	10.98	1974		
MINIMUM	0.71	1941		
TOTALS	3.62		4.13	-0.51
DAYS >= .01	8			
DAYS >= .10	4			
DAYS >= .50	3			
DAYS >= 1.00	1			
GREATEST				
24 HR. TOTAL	1.30	05/28 TO 05/29		
SNOWFALL (INCHES)				
TOTALS	0.0		0.0	0.0
SINCE 7/1	5.3			
SNOWDEPTH AVG.	0			
DAYS >= TRACE	0			
GREATEST				
SNOW DEPTH	0			

DEGREE DAYS			
HEATING TOTAL	91	53	38
SINCE 7/1	3366	3525	-159
COOLING TOTAL	125	143	-18
SINCE 1/1	152	184	-32

.....

WEATHER CONDITIONS. NUMBER OF DAYS WITH			
THUNDERSTORM	4	RAIN	4
SNOW	0	FOG	8
FOG W/VIS <= 1/4 MILE	1		

- INDICATES NEGATIVE NUMBERS.
R INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T INDICATES TRACE AMOUNT.

000
CXUS54 KMRX 011030
CF6TYS
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

STATION: KNOXVILLE MCGHEE TYSON AIRPORT
MONTH: AUGUST
YEAR: 2021
LATITUDE: 35 49 N
LONGITUDE: 83 59 W

TEMPERATURE IN F:							:PCPN:	SNOW:	WIND			:SUNSHINE:		SKY		:PK WND	
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	12Z DPTH	AVG SPD	MX SPD	2MIN DIR	MIN	PSBL	S-S	WX	SPD	DR
1	86	69	78	0	0	13	0.58	0.0	0	8.2	16	230	M	M	8	13	21	230
2	86	63	75	-3	0	10	0.00	0.0	0	5.0	14	30	M	M	5	18	18	360
3	85	68	77	-1	0	12	T	0.0	0	3.7	13	70	M	M	8	3	17	60
4	79	68	74	-4	0	9	0.18	0.0	0	4.0	17	80	M	M	8	138	24	80
5	89	63	76	-2	0	11	0.00	0.0	0	2.3	8	250	M	M	5	18	12	340
6	89	68	79	1	0	14	0.00	0.0	0	2.3	12	260	M	M	9		14	260
7	86	68	77	-1	0	12	0.01	0.0	0	5.5	15	100	M	M	7	3	19	110
8	90	63	77	-1	0	12	0.00	0.0	0	2.8	9	190	M	M	3	1	13	280
9	93	68	81	3	0	16	0.02	0.0	0	5.5	20	210	M	M	6		23	180
10	92	69	81	3	0	16	0.01	0.0	0	3.9	16	310	M	M	7	3	22	320
11	94	70	82	4	0	17	0.00	0.0	0	6.2	20	280	M	M	6	3	25	270
12	93	68	81	3	0	16	0.00	0.0	0	4.8	12	290	M	M	5	3	17	280
13	95	71	83	5	0	18	0.00	0.0	0	5.2	16	230	M	M	5		22	230
14	96	72	84	6	0	19	0.05	0.0	0	5.8	17	210	M	M	5	3	25	60
15	90	70	80	2	0	15	0.39	0.0	0	4.0	30	40	M	M	8	138	38	40
16	84	69	77	-1	0	12	1.29	0.0	0	3.3	17	220	M	M	10	13	29	220
17	73	70	72	-6	0	7	2.81	0.0	0	8.8	18	30	M	M	10	1	30	20
18	89	69	79	1	0	14	0.00	0.0	0	4.1	10	230	M	M	6		14	210
19	83	72	78	0	0	13	0.05	0.0	0	7.2	13	200	M	M	9	13	17	220
20	90	72	81	3	0	16	0.71	0.0	0	3.1	10	10	M	M	6	13	15	340
21	85	69	77	0	0	12	0.04	0.0	0	4.9	18	230	M	M	7	12	23	240
22	91	73	82	5	0	17	1.15	0.0	0	4.3	12	50	M	M	7	1	16	350
23	91	69	80	3	0	15	0.00	0.0	0	3.0	10	340	M	M	1		15	90
24	93	70	82	5	0	17	0.00	0.0	0	3.7	12	40	M	M	2	1	16	50
25	93	72	83	6	0	18	T	0.0	0	3.8	16	340	M	M	3	38	24	340
26	91	70	81	4	0	16	0.21	0.0	0	4.1	21	30	M	M	5	138	32	20
27	91	71	81	4	0	16	0.00	0.0	0	2.7	9	210	M	M	3		13	310
28	91	71	81	5	0	16	T	0.0	0	3.9	12	60	M	M	4	3	15	60
29	91	72	82	6	0	17	0.00	0.0	0	3.7	9	260	M	M	5	3	11	210
30	86	69	78	2	0	13	0.91	0.0	0	3.8	33	210	M	M	8	13	43	200
31	77	69	73	-3	0	8	1.71	0.0	0	7.1	14	50	M	M	10	1	18	200
SM	2742	2145			0	437	10.12	0.0		140.7			M		191			
AV	88.5	69.2								4.5	FASTST		M	M	6		MAX(MPH)	
									MISC ---->		33	210					43	200

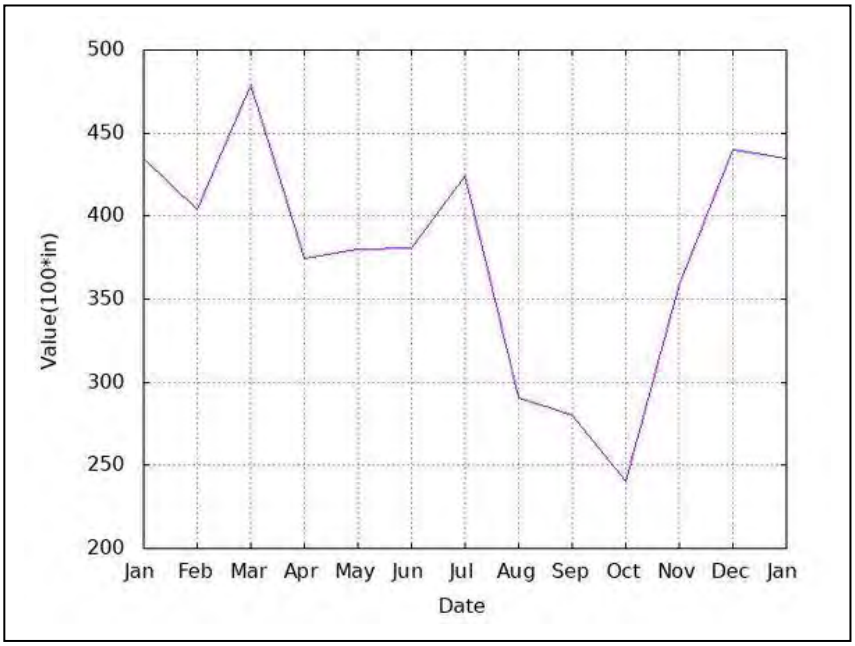
NOTES:
LAST OF SEVERAL OCCURRENCES

Knoxville Normal Weather Data

1991-2020

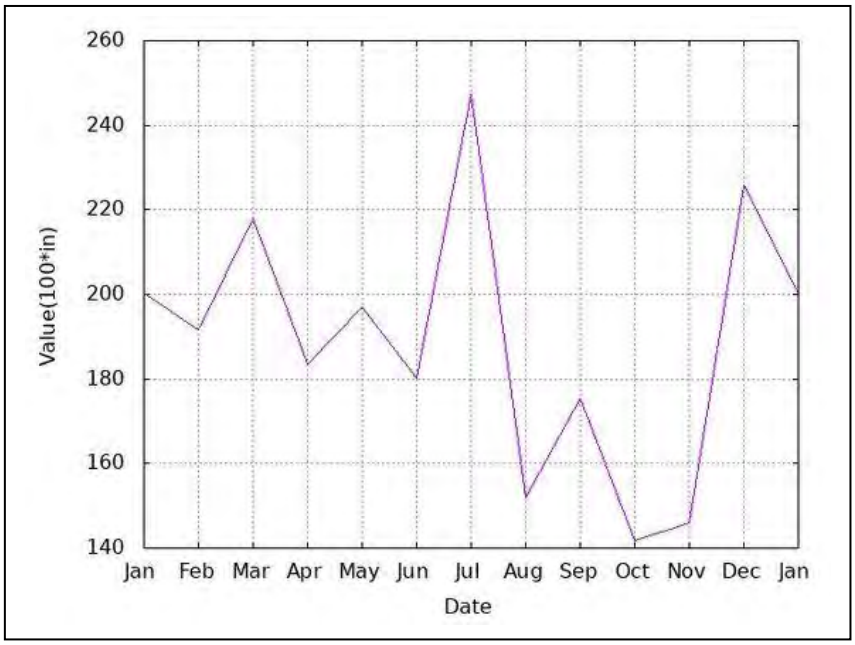
Mean (in.)

1) 4.346
2) 4.037
3) 4.790
4) 3.750
5) 3.802
6) 3.807
7) 4.239
8) 2.906
9) 2.803
10) 2.404
11) 3.586
12) 4.401



Standard Deviation (in.)

1) 2.002
2) 1.915
3) 2.180
4) 1.835
5) 1.969
6) 1.800
7) 2.474
8) 1.519
9) 1.754
10) 1.419
11) 1.459
12) 2.256



Appendix E

Certifications

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

TNQHP TENNESSEE QUALIFIED HYDROLOGIC PROFESSIONAL

11/1/10

Jason Mann
TDEC
3711 Middlebrook Pike
Knoxville, TN 37921

RE: Tennessee Qualified Hydrologic Professional Certification

Dear Mr. Mann

Congratulations, you have successfully completed the Tennessee Hydrologic Determination course. By completing the TN-HDT course, you have also earned 20 Professional Development Hours (PDH). You have now met all the requirements to become a certificated Tennessee Qualified Hydrologic Professional (TN-QHP). Your TN-QHP certification card is attached below.

The TN-QHP certification is valid for three years. You must complete a refresher course within that three year period and submit evidence of course completion along with a renewal application at least 90 days before expiration of your certificate. Should you allow your certification to lapse after 3 years, you will be required to retake the TN-HDT course and submit a new application in order to become a certified TN-QHP.

Please refer to the TDEC website, http://tn.gov/environment/wpc or the TN-HDT training website, www.tnhdt.org for refresher course details and application forms.

Sincerely,

Paul E. Davis, Director
Water Pollution Control

Cc: Timothy Gangaware
TN-HDT Training Program
Coordinator

TDEC TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Tennessee Qualified Hydrologic Professional

TNQHP TENNESSEE QUALIFIED HYDROLOGIC PROFESSIONAL

This card certifies that:

Jason Mann

has successfully completed the 3-day TN HDT course and is a Tennessee Qualified Hydrologic Professional

Certification number **1042-TN10** Expires: **12/31/2014**

Paul E. Davis, P.E.
Director, TDEC-WPC

Timothy Gangaware, AICP
Director, TNWRRC-UT

C-1
8/11

Tennessee Department of Environment & Conservation

This is to certify that

Jason Mann

has successfully completed the three day course to become a
Tennessee Qualified Hydrologic Professional

TN QHP Number **1042-TN10**

Paul E. Davis

Paul E. Davis, P.E.

Timothy Gangaware

Timothy Gangaware, A.I.C.P

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

This certifies that the recipient has earned 20 Professional Development Hours

TNQHP
TENNESSEE QUALIFIED HYDROLOGIC PROFESSIONAL

Tennessee Department of Environment & Conservation

This is to certify that

Jason Mann

successfully completed the one-day
Tennessee Hydrologic Determination Refresher Course

September 22, 2020

Jonathon Burr, DWR

Timothy Gangaware, TNWRRC

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

This certifies that the recipient has earned 6 Professional Development Hours

TENNESSEE QUALIFIED HYDROLOGIC PROFESSIONAL