Hydrologic Determination

Heron Homes / Lyndon Bussell / 2.21.24

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1.0 INTRODUCTION

The City of McMinnville conducted a hydrologic determination for the proposed Heron Homes subdivision located on Pace St. Parcel#: 058 002.00 in McMinnville, Warren County, Tennessee. The subject property encompasses 34.14 acres with the conveyance existing at the Northeastern portion of the property and eventually meets the confluence at Bybee Branch which is Northwest of the origin point.

The hydrologic determination conducted with the Subject Property resulted in the identification of (1) Wet Weather Conveyance and (1) Stream.

The purpose of the site inspection was to determine if any streams and/or wet weather conveyances were present within the subject property. Any stream and/or wet weather conveyance encountered were assessed using the Tennessee Department of Environment and Conservation Standard Operating Procedure for conducting Hydrologic Determinations. In addition, available aerial photographs, National Wetland Inventory Map, U.S. Geological Survey (USGS) Topographic maps, and NRCS Soil Survey maps for the property were reviewed to evaluate overall site characteristic of the subject property.

2.0 SITE DESCRIPTION

The subject property is made up of one parcel that encompasses 34.14 acres which consists of undeveloped land with a portion of the land appearing to have been a nursery at some point in its history. The subject property is located at Pace St. (Parcel #: 058 002.00) with the property owner being listed as Heron Homes. The flow of the conveyance/stream is from South to Northwest. The natural resource and/or Wet Weather Conveyance features located on-site are listed in the table below.

Site Number	Upstream Starting	Downstream Ending	Estimated amount of aquatic resources in review area.
WWC-1	35.7805, -85.7580	35.7102, -85.7581	~732 Linear Feet
Stream-1	35.7102, -85.7581	35.7109, -85.7589	~400 Linear Feet

The site is bordered to the West by farmland and to the East by mostly forest with some housing. The Northern portion of the property is bordered by some forests with a few houses and the Southern portion of the property is bordered by Pace St. and residential properties. According to the Tennessee Valley Authority rain gauge data in McMinnville, TN, the site received approximately 0.48" of rainfall in the seven days prior to the site visit and 0.00" in the previous 48hrs (Table 1). According to the website, the site did receive approximately 2.88" of rainfall in the first 3 weeks of February and 1.67" in the 10 days leading up to the determination.

Date:	2/14 Wed	2/15 Thurs	2/16 Fri	2/17 Sat	2/18 Sun	2/19 Mon	2/20 Tues	2/21 Wed
Gauge – MMVT-1	0.00”	0.00”	0.48”	0.00”	0.00”	0.00”	0.00”	0.00”

Table 1 – TVA Rainfall Gauge

3.0 BACKGROUND DOCUMENT REVIEW

A review of background documentation was performed utilizing National Wetland Inventory (NWI) maps and NRCS County Soil Survey Maps. As such, each subsection addresses each resource reviewed.

3.1 National Wetland Inventory Map Review

A review of the NWI map was conducted to determine the likelihood of the presence, location, size, and type of wetland which may be located within the subject property. The USFWS generates NWI maps through aerial photograph interpretation. The City of McMinnville have noted that the NWI map might not show the extent or existence of wetland systems accurately in a specific area, nor do the maps always correctly identify wetlands present or absent; therefore, the map was utilized for preliminary analysis only. Field reconnaissance was necessary to determine the actual presence and type of wetland within the subject property.

The NWI map identified a Riverine (R5UBH) system that outlines the conveyance in question. The system was identified using imagery from 1981. Additionally, the NWI identifies the Water Regime to be Permanently Flooded which, from the pictures, one will see that water does not cover the substrate throughout the year in all years and in fact is the opposite.

3.2 Soil Survey Map Review

The Warren County Soil Survey indicates several different soil types are present within the subject property as listed below.

Symbol	Soil Name	Description	Hydric
BaE	Baxter Cherty Silt Loam	Clayley residuum weathered from cherty limestone	No
MoB	Mountview Silt Loam	Loess over clayley residuum weathered from chrerty limestone	No
La	Lawrence Silt Loam	Loess over loamy alluvium and/or residuum weathered from limestone	No
WaB	Waynesboro Loam	Clayley alluvium derived from interbedded sedimentary rock	No
WaC	Waynesboro Loam	Old clayley alluvium derived from limestone, sandstone, and shale	No
WaC2	Waynesboro Loam	Old clayley alluvium derived from limestone, sandstone, and shale	No

WcC3	Waynesboro Clay Loam	Clayley alluvium derived from interbedded sedimentary rock	No

4.0 Site Characteristics

The City of McMinnville conducted the Hydrologic Determination on February 21st, 2024. The purpose of the site reconnaissance was to determine if a wetland, stream, and/or wet weather conveyance conditions exist on the subject property. Once the general characteristic was observed, data points were taken with a soil probe and the site was walked to identify hydric soils and wetland vegetation with (2) drainage feature being observed. The drainage feature was scored using the Tennessee Department of Environment and Conservation Hydrologic Determination Field Data Form. The feature located onsite was not identified on the McMinnville US Geological Survey 7.5 Minute Topographic Quadrangle for the subject property. For this report, the two (2) features located on-site have been found to be a Wet Weather Conveyance (upland) that turns into a stream.

To summarize, one (1) Wet Weather Conveyance and (1) Stream was observed:

Stream-1 and WWC-1 did not display any primary indicators at the time of the field assessment. WWC-1 measured 732 linear feet and began from 35.7805, -85.7580 and ended at 35.7102, -85.7581 where Stream-1 began. WWC-1 exhibited little indication of any recent flow even though 1.67" of rain had fallen in the past 10 days. There were no indicators of biota throughout this section of the reach and the abundance of leaves in the channel bed was indicated of a lack flow. WWC-1 did receive high marks in geomorphology, and we believe this is due to the "flashy" nature of the conveyance. Hydrology and Biology indicators were also virtually absent. There were little to no indications that any flow has occurred and there was non-wetland vegetation in the thalweg of the conveyance. We believe this to be a WWC due to this. Stream-1 was 400 linear feet in length and begins at 35.7102, -85.7581 and continues to the confluence of Bybee Branch but for this determination it ends at the property line at 35.7109, -85.7589. This section of the reach had evidence of water being present for longer periods such as an ordinary high-water mark and water currently present with a low flow. Various head cuts in the stream exhibited small pools at the base (sometimes under the leaves). Once you begin removing the leaves in portions of the stream, you being to see substrate texture sorting, some non-obligate lotic organisms and water

just beneath the soil surface. Stream-1 also scored well on geomorphology but had a more defined bed and bank, riffle pool sequences were more readily visible from a profile view, and there were a better sorting of soil textures under the leaves. Additionally, Stream-1 scored better on the hydrology section considering there was a very low flow at the time of the determination. Furthermore, the biology indicators were the same as upstream but scored higher with no fibrous roots and very little rooted plants in the thalweg. For these reasons, we see this portion of the and the rest to the confluence of Bybee Branch to be considered a stream.

5.0 Conclusions

The following natural resource features (with respective approximate sizes) were identified on the project site:

1. Wet Weather Conveyance-1 – 732 Linear Feet
2. Stream-1 – 400 Linear Feet

The stream identified in this study will need to be verified by the Tennessee Department of Environment and Conservation (TDEC) prior to any land disturbing activities. For questions or concerns, please reach me at 931-414-2077.

6.0 Appendix

6.1 Hydrologic Determination Field Data Sheets

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Resources, Version 1.5

Named Waterbody: Pace St WWC-1		Date/Time: 2-21-24 / 9:40am
Assessors/Affiliation: Lyndon Bussell / City of McMinnville		Project ID: WWC-1
Site Name/Description: Heron Homes / Residential Development		
Site Location: Pace St. Parcel # 050 002.00		
HUC (12 digit): 051301070401 - Charles Creek	Latitude: (Start) 35.7805 (End) 35.7102	
Previous Rainfall (7-days): 0.48"	Longitude: (Start) -85.7580 (End) -85.7581	
Precipitation this Season vs. Normal: abnormally wet elevated (average) low abnormally dry unknown Source of recent & seasonal precip. data: TVA & NOAA		
Watershed Size: 58 Acres; 0.1 Sq miles	County: Warren	
Soil Type(s) / Geology: Waynesboro, Mountview, Parker, Sequatchie, Lawrence	Source: NRCS	
Surrounding Land Use: Farm, Forest & Residential		
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	✓	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) = 12.75

Justification / Notes: There is little indication of any recent flow even though nearly 2" have fallen in the past 10 days. There are no indications of any biota throughout reach. There is an abundance of leaves which is another indicator of flow or presence during direct response to rainfall. The high score in all geomorphology is believed to be due to the "flashy" nature of the conveyance upstream. Because of this, we believe this section to be a wet weather conveyance.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 8.25)	Absent	Weak	Moderate	Strong	
1. Continuous bed and bank	0	1	(2)	3	2
2. Sinuous channel	0	(1)	2	3	1
3. In-channel structure: riffle-pool sequences	(0)	1	2	3	0
4. Sorting of soil textures or other substrate	0	(1)	2	3	0.5
5. Active/relic floodplain	(0)	0.5	1	1.5	0
6. Depositional bars or benches	(0)	1	2	3	0
7. Braided channel	(0)	1	2	3	0
8. Recent alluvial deposits	(0)	0.5	1	1.5	0
9. Natural levees	(0)	1	2	3	0
10. Headcuts	0	1	(2)	3	2
11. Grade controls	0	0.5	1	(1) 1.5	1.25
12. Natural valley or drainageway	0	0.5	1	(1.5)	1.5
13. At least second order channel on existing USGS or NRCS map	(0)	1	2	3	0

B. Hydrology (Subtotal = 1.5)	Absent	Weak	Moderate	Strong	
14. Subsurface flow/discharge into channel	(0)	1	2	3	0
15. Water in channel and >48 hours since sig. rain	(0)	1	2	3	0
16. Leaf litter in channel	1.5	1	0.5	(0)	0
17. Sediment on plants or on debris	0	0.5	(1)	1.5	0.75
18. Organic debris lines or piles (wrack lines)	0	0.5	(1)	1.5	0.75
19. Hydric soils in channel bed or sides of channel	(No = 0)		Yes = 1.5		0

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

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

Total Points = 12.75

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

Notes : (1) Continuous bed & bank: a few stretches where bed & bank is difficult to define (2) Sinuous channel: 878/732 = 1.19 weak. (3) In-channel structure is hard to define upstream due to a less consistently defined bed & bank & amount of leaves. (4) Soil textures: a few locations close to where the stream begins shows a different soil texture in the bed & bank than in the surrounding soil textures. (10) & (11) Numerous headcuts & grade controls throughout reach. (14) & (15) No water on subsurface flow exhibited in channel. (16) Leaf litter covered nearly 100% of reach (17) & (18) Debris in channel has sediment on them & organic debris piles are prevalent on obstructions in channel. (20) & (21) Rooted, non-wetland plants are consistent throughout the thalweg and fibrous roots are present upstream and become less observable the closer to the stream you get. (22-26) Absolutely no biota present.

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Resources, Version 1.5

Named Waterbody: Dale St. stream - 1		Date/Time: 2-21-24 / 9:00 am
Assessors/Affiliation: Lyndon Russell / City of McMinnville		Project ID: Stream - 1
Site Name/Description: Heron Homes / Residential Development		
Site Location: Dale St. Parcel # 058 002.00		
HUC (12 digit): 051301070401 - Charles Creek	Latitude: (Start) 35.7102 (End) 35.7109	
Previous Rainfall (7-days): 0.48"	Longitude: (Start) -85.7581 (End) -85.7589	
Precipitation this Season vs. Normal: abnormally wet elevated (average) low abnormally dry unknown Source of recent & seasonal precip. data: TVA + NOAA		
Watershed Size: 58 Acres & ~ 0.1 Sq miles	County: Warren	
Soil Type(s) / Geology: Waynesboro, Mountview, Baxter, Sengtown & Lawrence	Source: NRCS	
Surrounding Land Use: Farm, Forest & Residential		
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	✓	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: This section of the road has evidence of water being present for longer periods of time such as an ordinary high water mark & water currently present with a low flow. Additionally, sections of this portion of the reach has small pools at various headcuts. Once you remove the leaves, you begin to see substrate texture sorting, some non-obligate lotic organisms & water just beneath the soil. For these reasons, we believe this section and the rest of stream to the confluence of Bybee Branch is just that... a stream.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 1.5)	Absent	Weak	Moderate	Strong	
1. Continuous bed and bank	0	1	2	(3)	3
2. Sinuous channel	0	1	2	3	1.5
3. In-channel structure: riffle-pool sequences	0	1	2	3	1
4. Sorting of soil textures or other substrate	0	1	2	3	1.5
5. Active/relic floodplain	(0)	0.5	1	1.5	0
6. Depositional bars or benches	(0)	1	2	3	0
7. Braided channel	(0)	1	2	3	0
8. Recent alluvial deposits	(0)	0.5	1	1.5	0
9. Natural levees	(0)	1	2	3	0
10. Headcuts	0	1	(2)	3	2
11. Grade controls	0	0.5	(1)	1.5	1
12. Natural valley or drainageway	0	0.5	1	(1.5)	1.5
13. At least second order channel on existing USGS or NRCS map	(0)	1	2	3	0

B. Hydrology (Subtotal = 3)	Absent	Weak	Moderate	Strong	
14. Subsurface flow/discharge into channel	(0)	1	2	3	0
15. Water in channel and >48 hours since sig. rain	0	1	2	3	1.5
16. Leaf litter in channel	1.5	1	0.5	(0)	0
17. Sediment on plants or on debris	0	0.5	1	1.5	0.75
18. Organic debris lines or piles (wrack lines)	0	0.5	1	1.5	0.75
19. Hydric soils in channel bed or sides of channel	No = 0		Yes = 1.5		0

C. Biology (Subtotal = 5.5)	Absent	Weak	Moderate	Strong	
20. Fibrous roots in channel bed [1]	(3)	2	1	0	3
21. Rooted plants in the thalweg [1]	3	2	1	0	2.5
22. Crayfish in stream (exclude in floodplain)	(0)	1	2	3	0
23. Bivalves/mussels	(0)	1	2	3	0
24. Amphibians	(0)	0.5	1	1.5	0
25. Macrobenthos (record type & abundance)	(0)	1	2	3	0
26. Filamentous algae; periphyton	(0)	1	2	3	0
27. Iron oxidizing bacteria/fungus	(0)	0.5	1	1.5	0
28. Wetland plants in channel bed [2]	(0)	0.5	1	1.5	0

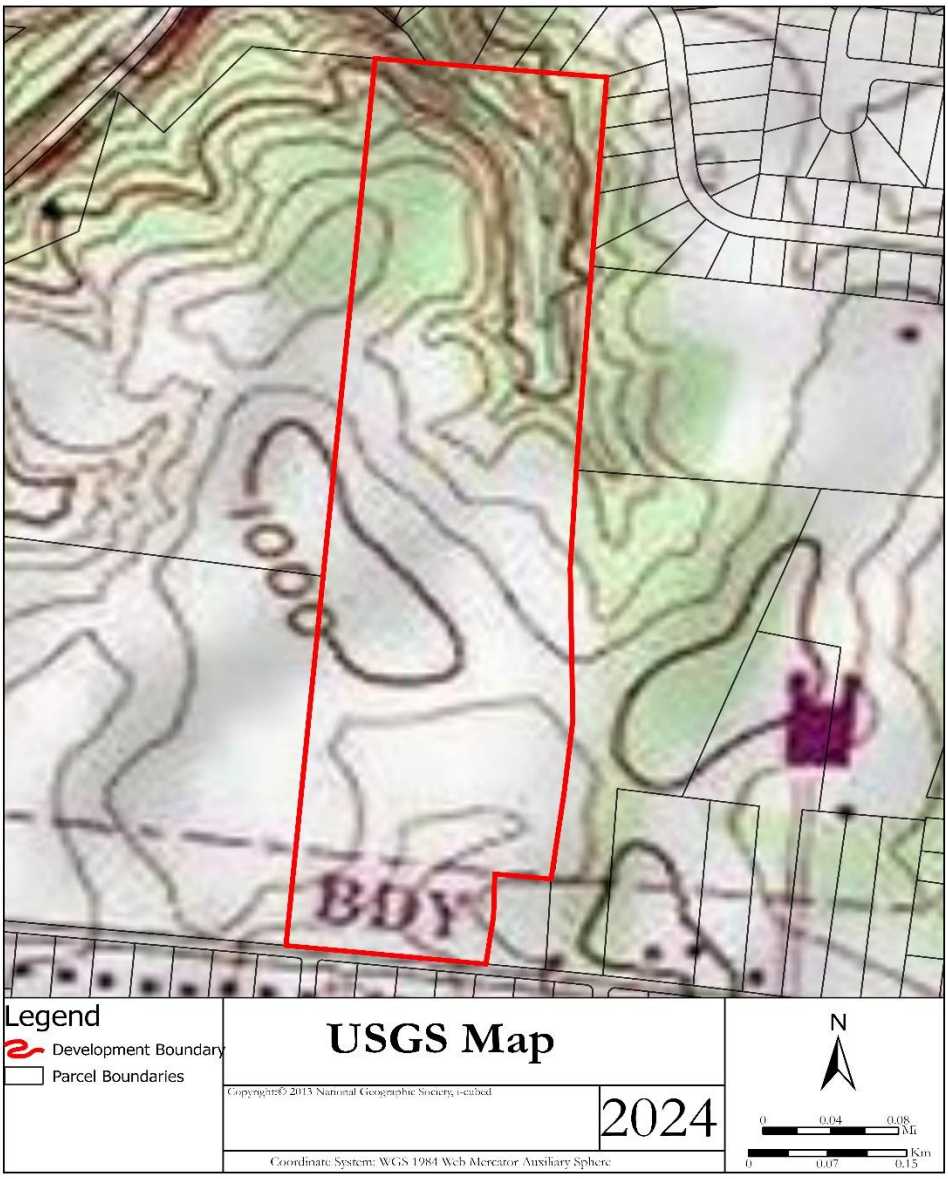
[1] Focus is on the presence of terrestrial plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 20

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

Notes : (1) Continuous bed + bank: very evident throughout this portion of the reach. (2) Sinuous channel: 306/400: 1.26 weak/Moderate. (3) In-channel structures: the riffle-pool sequences are more readily visible. (4) Soil textures are different in more parts of the reach and the sorting of the substrate is present once you remove the leaves. (9) + (10) Headcuts + grade controls are prevalent throughout reach. (15) Water in channel: there is water in the channel at a few different locations on this part of the reach. Flow is minimal. (16), (17), (18): Leaf litter is still close to 100%, Sediment is present & some debris and there are organic piles present. Fibrous roots are absent from this section of the reach & very few rooted non-wetland plants were noted. The only biota noted were some non-obligate lotic organism such as worms, beetles & mosquitos.

6.2 USGS Map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Parcel Boundaries
USGS Map
Copyright© 2013 National Geographic Society, i-cubed
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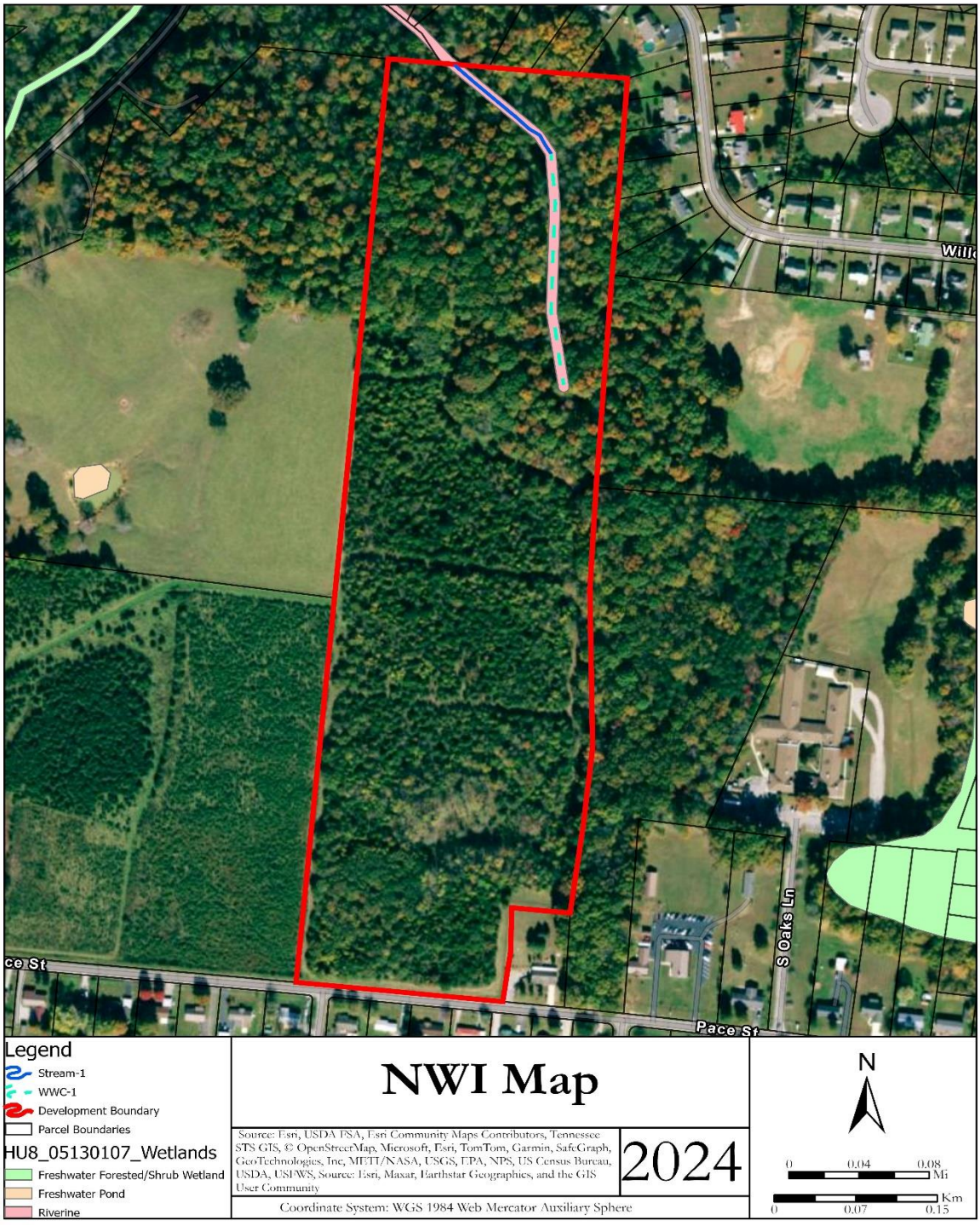
6.3 NWI Map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S Oaks Ln
Pace St

6.4 Warren County Soil Survey

6.5 Normal Weather Conditions Calculation

Normal Weather Conditions Calculations Table

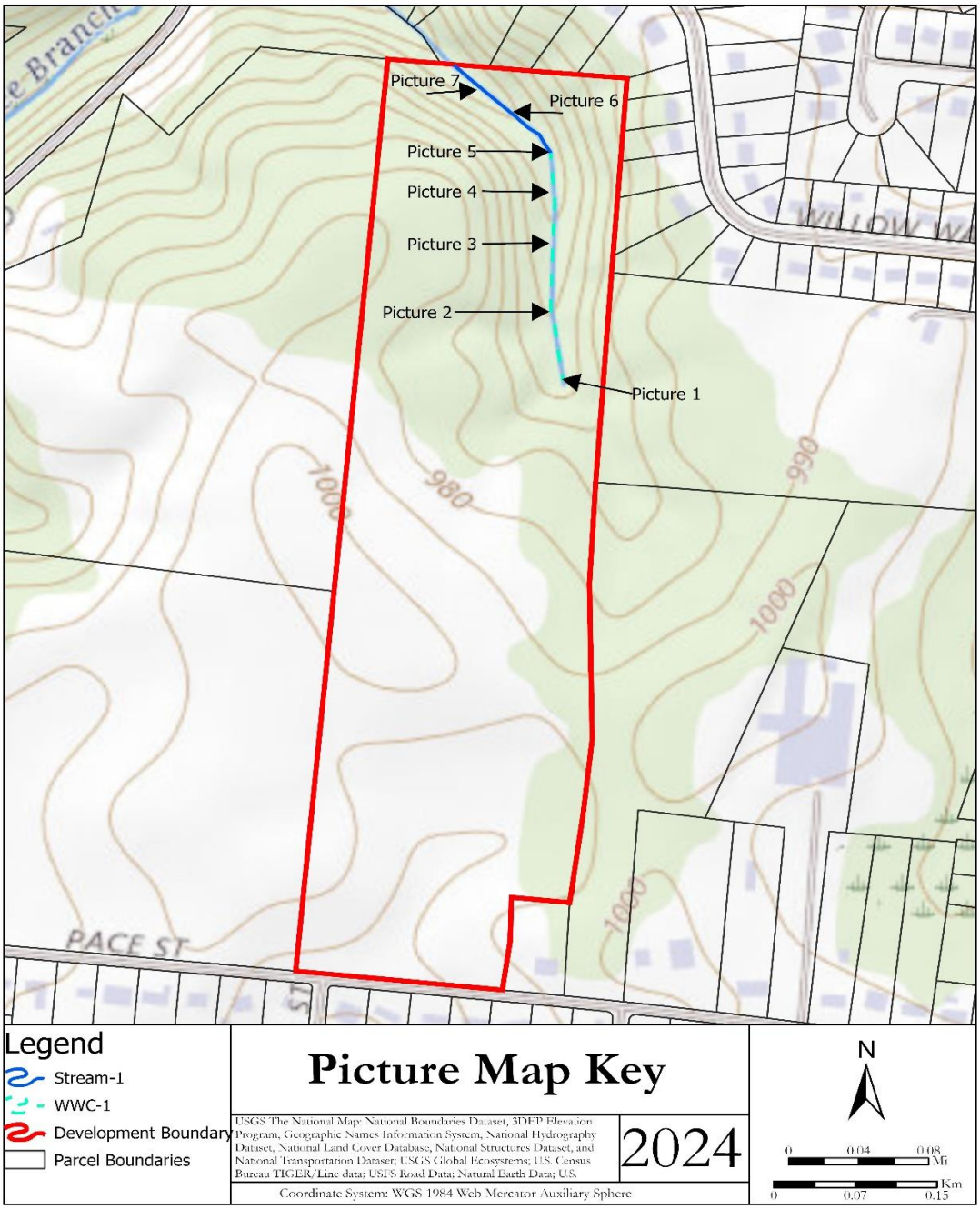
	Month	Standard Deviation	Long-term rainfall records: Minus One Std. Dev. (DRY)	Long-term rainfall records: Normal (Mean inches)	Long-term rainfall records: Plus One Std. Dev. (WET)	Actual Rainfall	Condition (elevated, low, average)	Condition value	Month weight value	Product of previous two columns
1st prior month*	January	2.66	2.09	4.75	7.41	5.32	Average	2	3	6
2nd prior month*	December	2.93	2.14	5.07	8.00	2.36	Average	2	2	4
3rd prior month*	November	1.85	2.32	4.17	6.02	1.78	Low	1	1	1
									Sum =	11

Note:

If sum is:	
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

6.6 Stream and Picture Report Key



6.7 Field Photography

6.7.1 Beginning of WWC-1.

6.7.2 WWC-1 Leaf Litter Looking Upstream.

6.7.3 WWC-1 Grade Controls Looking Upstream

6.7.4 WWC-1 Headcut Looking Upstream.

6.7.5 Beginning of Intermittent Stream-1 Looking Upstream.

6.7.6 Intermittent Stream-1 Meander Looking Upstream.

6.7.7 Intermittent Stream-1 Flow Looking Upstream.