May 23, 2022

Nashville Environmental Field Office
TDEC
711 R.S. Gass Blvd
Nashville, TN 37216

Re: Hydrologic Determination Submittal
Cave Road, Davidson Co., Tennessee

To Whom it May Concern,

Please find enclosed the "Wetlands and Hydrologic Determination Report" for the above referenced project. EnviroScience, Inc. respectfully request a verification of hydrologic determinations under the jurisdiction of the State of Tennessee. Additionally, EnviroScience requests the opportunity to accompany TDEC staff during the verification visit. Table 1 below summarizes features assessed within the project area.

Table 1. Summary of Requested Hydrologic Determination Verification

Feature	Type	Length (linear feet)
C-1	WWC	246
WWC = Wet Weather Conveyance		

If you have any questions or would like more information, please call EnviroScience at (330) 688-0111, or email me at AZimmerman@EnviroScienceInc.com.

Respectfully,

Andrew Zimmerman
Aquatic Biologist, QHP-IT

Enclosures

Cc: Josh Lyon – President/Principal Engineer, Klober Engineering Services
josh@klobereng.com

Attachment A

Wetlands Delineation and Hydrologic Determination Report

WETLAND DELINEATION & HYDROLOGIC DETERMINATION REPORT

Cave Road, City of Nashville, Davidson County, Tennessee

Prepared for:

KLOBER
ENGINEERING SERVICES

Klober Engineering Services
3556 Tom Austin Highway, Suite 1
Springfield, TN 37127

ES Project No.: 15833
Date: March 7, 2022

Prepared by:

EnviroScience
Excellence In Any Environment

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Stow, OH 44224
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Cave Road Wetland Delineation & Hydrologic Determination Report

Document Date: 3/7/2022

Project No.: 15833

Prepared for:
Josh Lyon
Klober Engineering Services
3556 Tom Austin Highway, Suite 1
Springfield, TN 37127

Authorization for Release

The analyses, opinions, and conclusions in this document are based entirely on EnviroScience's unbiased, professional judgement. EnviroScience's compensation is not in any way contingent on any action or event resulting from this study.

The undersigned attest, to the best of their knowledge, that this document and the information contained herein is accurate and conforms to EnviroScience's internal Quality Assurance standards.

Andrew Zimmerman, QHP-IT
Aquatic Biologist

Patrick Geraghty
Biologist

Reiss Warren
Wetland Biologist/Technical Reviewer

Melissa Vaccarino
Editorial Reviewer

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EXECUTIVE SUMMARY

EnviroScience, Inc. performed a hydrologic determination and delineation of wetlands and other waters in February 2022 for Klober Engineering Services at the Cave Road project area. The project area is located in the City of Nashville, Davidson County, Tennessee. The project area consists of one parcel (Parcel Number: 09400020800) and is approximately 6.4 acres. The approximate center coordinates are 36.161180°, -86.723866°. It is bound by Cave Road, railroad, forest, and Cumberland River to north, industrial to the east and south, and railroad to the west. The project area generally slopes to the northeast toward the Cumberland River, which is approximately 300 feet north of the project area. The project area consists predominantly of forest. The surrounding land use consists predominantly of industrial land and some forested areas.

The delineation results include one wetland and one WWC (wet weather conveyance)/ephemeral stream. The WWC/ephemeral stream identified onsite accounts for 246 linear feet. The wetland accounts for 0.089 acres within the project area. The maps provided in Appendix A depict the project area; representative photographs are included in Appendix B; field data sheets are provided in Appendix C and Appendix D; and calculations of normal weather are provided in Appendix E. The Hydrologic Determination Certification Metro Nashville Stormwater Division Form is available in Appendix F. A Community Water Determination Property Access Form is presented in Appendix G.

All aquatic resources are under the jurisdiction of the U.S. Army Corps of Engineers and/or Tennessee Department of Environment & Conservation. Agency coordination may be required prior to temporary or permanent impacts to these aquatic resources. No filling may occur in regulated areas without their written permission. Please contact the U.S. Army Corps of Engineers – Nashville District Main Office at (615) 369-7500, Tennessee Department of Environment & Conservation – Nashville Environmental Field Office at (615) 687-7000, and Nashville Metro Water Services at 615-862-4600.

1.0 INTRODUCTION AND SITE DESCRIPTION

EnviroScience, Inc. performed a hydrologic determination and delineation of wetlands and other waters in February 2022 for Klober Engineering Services at the Cave Road project area. The project area is located in the City of Nashville, Davidson County, Tennessee. The project area consists of one parcel (Parcel Number: 09400020800) and is approximately 6.4 acres. The approximate center coordinates are 36.161180°, -86.723866°. It is bound by Cave Road, railroad, forest, and Cumberland River to north, industrial to the east and south, and railroad to the west. The project area generally slopes to the northeast toward the Cumberland River, which is approximately 300 feet north of the project area. The project area consists predominantly of forest. The surrounding land use consists predominantly of industrial land and some forested areas.

The delineation results include one wetland and one WWC (wet weather conveyance)/ephemeral stream. The WWC/ephemeral stream identified onsite accounts for 246 linear feet. The wetland accounts for 0.089 acres within the project area. The maps provided in Appendix A depict the project area; representative photographs are included in Appendix B; field data sheets are provided in Appendix C and Appendix D; and calculations of normal weather are provided in Appendix E. The Hydrologic Determination Certification Metro Nashville Stormwater Division Form is available in Appendix F. A Community Water Determination Property Access Form is presented in Appendix G.

The project area is in the Cumberland River – Browns Creek drainage basin (HUC 051302020305), which drains approximately 123.16 mi^2 (USEPA, 2022). The project area is within the Inner Nashville Basin of the Interior Plateau ecoregion (USEPA, 2012). The project area is located within the area covered by the *Eastern Mountains and Piedmont Supplement* (USACE, 2012) and associated plant list (Lichvar, 2016). The project area is regulated by the U.S. Army Corps of Engineers (USACE) Nashville District – West Branch Section and the Tennessee Department of Environmental & Conservation (TDEC), and Nashville Metro Water Services (Nashville MWS).

2.0 METHODS

Government agencies regulate coastal and inland waters for commerce, flood control, and water quality. These water bodies provide numerous functions and values necessary to protect and sustain our quality of life. Wetlands comprise a significant portion of regulated waters. USACE and U.S. Environmental Protection Agency (USEPA) jointly define wetlands as:

> "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

The remaining deepwater aquatic habitats (open waters) are defined by the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) as:

> ". . . areas that are permanently inundated at mean annual water depths >6.6 ft or permanently inundated areas <6.6 ft in depth that do not support rooted emergent or woody plant species."

Wetlands were delineated using:

- *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987)
- *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region, Version 2.0* (2012)

Ordinary high water marks (OHWM) defined the outermost regulatory boundaries of ephemeral and open waters.

Each sample plot and the perimeter of each wetland and other water were surveyed and marked in the field with plain pink flags and pink "wetland boundary" flags, respectively. A GPS unit with submeter accuracy was used in conjunction with aerial photography and topographic maps for the survey. Computer-Aided Design (CAD) software was used to determine wetland dimensions, and Geographic Information Systems (GIS) software was used to produce a map of the project area showing wetlands and other waters. Biologists photo-documented all resources that were encountered within the project area.

Streams were evaluated using:

- TDEC *Guidance for Making Hydrologic Determinations (HD), Version 1.5*, to identify and locate the boundaries of stream and WWC features (TDEC, 2020).

2.1 WETLANDS

The following is a description of the wetland assessment and delineation methods.

2.1.1 Determination and Delineation

Secondary literature sources were reviewed to find known wetlands, other significant ecological resources, and areas with high potential for wetlands in or near the project area. Resources included the following:

1. U.S. Geological Survey (USGS) topographic maps
2. National Wetlands Inventory (NWI) maps
3. Web Soil Survey
4. Aerial Photographs
5. Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map

A field inspection of the project area was then completed to identify major plant communities and visually locate potential wetlands. A routine, onsite (Level 2) wetland determination was used to perform the delineation. Wetland communities were classified according to the classification scheme of Cowardin et al. (1979; Table 2.1). Non-wetland communities were classified as one of the categories described in Table 2.2.

Table 2.1 Wetland Communities (Cowardin et al. 1979)

Community	Description
PEM	Palustrine Emergent
PSS	Palustrine Scrub-Shrub
PFO	Palustrine Forested
POW	Palustrine Open Water

Table 2.2 Non-wetland Communities

Community	Description
Urban/ Maintained	Regularly maintained land; residential; industrial
Agricultural	Land used for producing crops or raising livestock; cropland; pastureland
Cleared	Disturbed areas devoid of most vegetation from recent clearing, grading, or filling
Open Field	Herbaceous community without woody vegetation
Old Field	Herbaceous community having woody vegetation coverage of <50%
Scrub-Shrub	Community dominated by woody vegetation <6 m (20 ft) tall
Forest	Community dominated by woody vegetation >6 m (20 ft) tall

Sample plots are typically established within each natural community and potential wetland. Data are recorded on Routine Wetland Determination Data forms. The following information is provided as a reference.

2.1.2 Vegetation

Four plant strata are evaluated within specific radii of the plot center to detect the presence or absence of hydrophytic vegetation. Each stratum is ranked by aerial cover in descending order of abundance. Table 2.3 provides information on each vegetative stratum.

Table 2.3 Vegetative Strata

Stratum	Definition	Survey Area
Tree	Woody plants > or equal to 3 in. (7.6 cm) diameter at breast height (dbh), regardless of height	30 ft (9.1 m) radius
Sapling/shrub	Woody plants <3 in. (7.6 cm) dbh and ≥3.28 ft (1 m) tall	15 ft (4.6 m) radius
Herbaceous	Herbs and woody plants less than 3.28 ft (1 m) in height	5 ft (1.5 m) radius
Woody vines	Woody vines >3.28 ft (1 m) in height	30 ft (9.1 m) radius

Percent dominance is obtained for each species and within each stratum. Dominant species are those that, cumulatively totaled in order of abundance, immediately exceed 50% and include any individual species with an abundance of 20% or more (USACE, 2012). Dominant taxa are identified using recognized local guides. Nomenclature follows the *National List of Scientific Plant Names* (USDA, 1982). Following the identification of each plant species present within the plot, all dominant species within each stratum are assigned a wetland indicator status, according to Lichvar (2016). Indicators are summarized in Table 2.4.

Table 2.4 Plant Indicators

Indicator	Category	Definition
OBL	Obligate Wetland	Almost exclusively (>99% of occurrences) found in wetlands
FACW	Facultative Wetland	Most likely found in wetlands (67–99% of occurrences)
FAC	Facultative	Equally likely found in wetlands or nonwetlands (34–66%)
FACU	Facultative Upland	Most likely found in nonwetlands (1–33% occurrence in wetlands)
UPL	Obligate Upland	Almost exclusively found in nonwetlands (<1% occurrence in wetlands)

An "NI" (no indicator) designation represents species where insufficient information is available to assign an indicator. An "NL" (no listing) designation is given to species whose identification is not determined sufficiently enough to assign an indicator. Once the indicator status is assigned to each dominant species, the evaluator can perform the percent dominance test according to the protocol outlined within the applicable Regional Supplement (USACE, 2012) to determine if the plot meets the criterion for hydrophytic vegetation.

2.1.3 Hydrology

Surface and subsurface hydrologic indicators are evaluated at the sample plot and throughout the adjacent community to detect the presence or absence of wetland hydrology. Primary sources of wetland hydrology include direct precipitation, headwater flooding, backwater flooding, groundwater, or any combination of these. When obtaining data at each sample plot, the evaluator observes evidence of hydrology. Primary hydrology indicators (only one of these is necessary to indicate sufficient wetland hydrology) include surface water, water marks, sediment deposits, drift deposits, etc. Secondary hydrology indicators (which require two or more at each sample plot) include surface soil cracks, drainage patterns, crayfish burrows, etc. (USACE, 2012).

2.1.4 Soils

The upper horizons of the soil at each sample plot are examined to detect the presence or absence of hydric soils indicators. Current USACE guidance requires the evaluator to assess the upper 20 inches of soil for hydric soil characteristics. Most indicators of hydric soils require an assessment of soil matrix color and mottle characteristics for each horizon (Environmental Laboratory, 1987; USACE, 2012). These characteristics are determined by comparing a moist sample with the *Munsell Soil Color Chart* (Munsell Color, 2009) or *The Globe Soil Color Book* (Visual Color Systems, 2004).

2.1.5 Cowardin Wetland Classification

The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory uses the *Classification of Wetlands and Deepwater Habitats of the United States* to classify wetland habitat types (Cowardin et al., 1979). This classification system is hierarchical and defines five major systems: Marine, Estuarine, Riverine, Lacustrine, and Palustrine.

2.2 OTHER WATERS

Other waters include ephemeral and open waters. These waters are further subdivided into two categories: 1) ponds and lakes; and 2) streams and rivers.

2.2.1 Ponds and Lakes

Palustrine systems other than wetlands and lacustrine waters are addressed as ponds and lakes, respectively. These non-linear open waters may harbor important aquatic communities such as vegetated shallows (aquatic beds) and mudflats. They are classified according to Cowardin et al. (1979).

2.2.2 Streams and Rivers

Riverine systems are linear flowing waters bounded by a channel. Cowardin et al. (1979) divide these systems into four groups; however, streams are placed into one of the three regulatory types listed below for this report.

Ephemeral: An ephemeral stream only conveys runoff precipitation and meltwater. It is permanently located above the water table and is most often dry.

Intermittent: An intermittent stream is located below the water table for parts of the year but does have dry periods.

Perennial: A perennial stream typically has flowing water throughout the entire year.

2.2.3 Hydrologic Determinations

The State of Tennessee defines Waters of the State as streams, which must be identified by a certified Hydrologic Professional. All other linear features are defined WWCs.

Notwithstanding any other law or rule to the contrary, a "wet weather conveyance" means manufactured or natural watercourses, including natural watercourses modified by channelization:

1. That flow only in direct response to precipitation runoff in their immediate locality.
2. Whose channels are at all times above the groundwater table.
3. That are not suitable for drinking water supplies.
4. In which hydrological and biological analyses indicate that, under normal weather conditions, due to naturally occurring ephemeral or low flow, there is insufficient water to support fish or multiple populations of obligate lotic aquatic organisms whose life cycles include an aquatic phase of at least two months.

Stream and hydrologic determinations were performed using the TDEC *Guidance for Making Hydrologic Determinations, Version 1.5*, to identify and locate the boundaries of stream and WWC features (TDEC, 2020). EnviroScience biologist Andrew Zimmerman, Qualified Hydrologic Professional – In-Training (QHP-IT), performed hydrologic determinations.

EnviroScience established the survey area of the watercourse along the property extent and fixed its location using a GPS unit with submeter accuracy. The water feature was then assessed using the previously mentioned methodologies. Biologists photo-documented all resources that were encountered within the assessed survey area.

3.0 LITERATURE REVIEW

The following sections detail background information on the project area and further explain the various maps located in Appendix A.

3.1 USGS TOPOGRAPHIC MAP

The USGS 7.5-minute topographic series map of the site (Nashville East Quadrangle) is shown in Figure 2 (Appendix A). The project area is shown as sloping to the north, with a drainage valley that empties to the north into the Cumberland River. The elevation is shown to approximately range from 420 to 490 feet above mean sea level (AMSL).

3.2 NATIONAL WETLANDS INVENTORY MAP

The NWI map (Nashville East Quadrangle) of the project area is shown in Figure 3 (Appendix A). A forested, broad-leaved deciduous, semi permanently flooded, impounded palustrine (PFO1Fh) system is depicted along the eastern boundary of the project area and corresponds to W-1. One intermittent, streambed, seasonally flooded riverine (R4SBC) system is depicted and originates at the northern edge of the property area. This feature may correspond to C-1 however disturbances in the surrounding area have altered its path of flow.

3.3 COUNTY SOIL SURVEY

The project area is found on the *Soil Survey of Davidson County, Tennessee*, accessed on the Soil Survey Geographic (SSURGO) Database (USDA Web Soil Survey, 2021; Figure 4, Appendix A). Two soil types were identified within the project area. The onsite soils are summarized in Table 3.1 below.

Table 3.1 Soil Types Mapped in the Project Area

Symbol	Soil Name	Status	Common Landform	Percent Hydric	Acres in Project Area	Percent Within Project Area
Ln	Lindell-Urban land complex	Not hydric	Hillslopes on plateaus	0	2.045	31.9
SvD	Stiversville-Urban land complex, 3 to 25 percent slopes	Not hydric	Plateaus on hills	0	4.359	68.1

3.4 AERIAL PHOTOGRAPHY

A recent aerial photograph of the project area is shown in Figure 5 (Appendix A). The project area is located south of the Cumberland River. Industry and forested land make up the adjacent area; a railroad track is abutting the project area to the north with forest beyond; industry and forest are located to the east and south, and another railroad and railroad bridge make up the western boundary of the project area with a Water Treatment plant beyond. The majority of the project area is forested land. Cave Road runs east-west through the northern portion of the project area. The surrounding area consists predominantly of industrial land use.

3.5 FEMA FLOOD INSURANCE RATE MAP

The FEMA produces Flood Insurance Rate Maps (FIRM) which show the locations of the predictable floodplain during precipitation flood events. The FIRM of the project area is included in Appendix A (Figure 6). The northeastern portion of the project area is within a 100-year flood zone associated with the Cumberland River.

4.0 RESULTS AND DISCUSSION

Two sample plots were established within two vegetative communities. Table 4.1 summarizes the sample plot data.

Table 4.1 Sample Plot Results

Sample Plot	Photo*	Community**	Hydrophytic Vegetation	Wetlands Hydrology	Hydric Soil	Status	Location
1	1	PFO	X	X	X	Wetland	W-1
2	2	Forest	-	-	-	Non-Wetland	SP-2

*photos are located in Appendix B
** PFO = Palustrine Forested

Each sample plot, delineated wetland, and other water resource is illustrated in Figure 5 (Appendix A). Representative photographs are included in Appendix B. The following section describes general conditions found within each plant community and summarizes information from the data forms located in Appendix C.

4.1 NON-WETLANDS

The project area contains one upland forest vegetative community. Dominant species within each community are discussed below; complete vegetative data is included in the Sample Plot Forms provided in Appendix C.

Sample Plot 2 represents the forest community within the project area. The dominant species identified in the tree stratum were hackberry (*Celtis occidentalis*, FACU). Dominant species located within the shrub stratum includes; European privet (*Ligustrum vulgare*, FACU) and Japanese honeysuckle (*Lonicera japonica*, FACU). The dominant species identified within the herbaceous stratum included Asiatic jasmine (*Trachelospermum asiaticum,* FACU). No evidence of hydric soils or hydrology was identified within this vegetative community.

4.2 WETLANDS

One wetland was identified and delineated within the project area. The onsite wetland consists of a palustrine forest (PFO) community. Wetland results are given in Table 4.2 and are briefly described in the following section. Wetland size has been determined for the portion of the wetlands within the project area. These wetlands are illustrated in Figure 5 (Appendix A).

Table 4.2 Wetland Results within the Project Area

Wetland	Photo*	Cowardin Class	Size Within Project Area (acres)
W-1	3-6	PFO	0.791
Total Wetlands			**0.791**

*Photos are located in Appendix B.

Sample Plot 1 represents the PFO community within W-1. The dominant species observed within the tree stratum community included green ash (*Fraxinus pennsylvanica*, FACW), and swamp chestnut oak (*Quercus michauxii,* FACW). The sample plot is located within a seasonally flooded depression and no herbaceous vegetation was present. No other vegetation was observed within the other stratums.

4.3 STREAM AND WET WEATHER CONVEYANCE

Due to overlapping state and federal regulatory authorities, a watercourse can be considered a stream, a WWC, or both stream and WWC. Section 4.3.1 discusses the WWC/ephemeral stream identified within the project area.

One linear watercourse was identified within the project area. Stream and WWC assessment results are summarized in Table 4.3 and Table 4.4. Locations of the stream and WWC features are depicted in Figure 5 (Appendix A). Representative photographs are included in Appendix B, and TDEC Hydrologic Determination Field Data Sheets are provided in Appendix D. Data sheet scoring forms document the primary and secondary field indicator evaluations. Secondary field indicator evaluation observations include information on stream geomorphology, hydrology, and biology. Normal weather condition calculations are provided in Appendix E, the Hydrologic Determination Certification Metro Nashville Stormwater Division Form is available in Appendix F, and the Community Water Determination Property Access Form is presented in Appendix G.

Table 4.3 Streams and Wet Weather Conveyances within the Project Area

Watercourse	Photo*	Preliminary Status**	Length Within Project Area (linear feet)
C-1	8-9	WWC/EPH	246
Total WWC (linear feet)			**246**
Total Stream (linear feet)			**246**
Total Watercourse (linear feet)			**246**

*photos are located in Appendix B
** EPH = ephemeral stream

Table 4.4 Hydrologic Determination and Stream Assessment Results

Watercourse	Assessed Reach		TDEC Field Indicators	TDEC Preliminary Hydrologic Determination*	USACE Preliminary Evaluation**
	Upstream Extent (lat/long)	Downstream Extent (lat/long)			
C-1	36.162293, -86.723861	36.162579, -86.723137	13.5	WWC	EPH

*Hydrologic Determinations and Jurisdictional Determinations must be verified by Nashville MWS Services, TDEC, and USACE
** EPH = ephemeral stream

4.3.1 Streams and Wet Weather Conveyances

C-1 originates in the northern portion of the project area and flows to the east between Cave Road and the elevated railroad bed. Cave Road, the railroad, and surrounding disturbances appear to influence the path of flow and confine this channel. A significant amount of the contributing hydrology to the channel appears to originate as sheet flow from W-1 and the drainage valley south of Cave Road. At the time of the assessment, high water levels south of Cave Road resulted in flooding of W-1 and water was observed flowing over the road and into the channel of C-1. This observation indicates that at a minimum, C-1 receives surface hydrology from W-1 when it is inundated with water caused by the impoundment of Cave Road. C-1 is considered a stream with ephemeral flow but was also assessed as a WWC following TDEC guidance. The channel was assessed using secondary HD indicators and received a score of 13.5. Channels receiving scores less than 19 are considered WWC by TDEC.

4.4 PONDS AND LAKES

No open water aquatic resources were identified within the project area.

5.0 REGULATORY JURISDICTION

The streams and wet weather conveyances described in this document are under the jurisdiction of Nashville MWS, TDEC, and/or USACE. No filling may occur in these areas without their written permission. Please contact the U.S. Army Corps of Engineers – Nashville District Main Office at (615) 369-7500, Tennessee Department of Environment & Conservation – Nashville Environmental Field Office at (615) 687-7000, and Nashville Metro Water Services at 615-862-4600.

6.0 ASSUMPTIONS AND DISCLAIMERS

The constant influence of human activity on the project area can rapidly change ecological boundaries. Over time, natural succession and changes in hydrology can also affect their boundaries. The precision of GPS collected data is subject to variation caused by canopy cover, atmospheric interference, and satellite configuration. Because slight inaccuracies are possible, all acreages and derived boundaries presented in this report are approximate.

The results and conclusions in this report apply to the year and date in which the data were collected. This report is not considered officially valid until USACE approves it. The report is then valid for a period of five years. Refer to the USACE Regulatory Guidance Letter #94-1 (23 May 1994).

7.0 REFERENCES

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Appendix A

Project Maps

Figure 1. Location of Site on Highway Map of Davidson County, Tennessee. Cave Road Wetland Delineation and Hydrologic Determination.

Project Area

0 500 1,000 2,000 Feet

0 150 300 600 Meters

EnviroScience
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Basemap courtesy of Esri.

Path: C:\Users\Anna Giordano\Desktop\GIS_Projects\K\Klober Engineering Services\15833_Cave Rd Aquatic Resource Delineation and HD\GIS\Map1_Location.mxd

Date: 2/18/2022

Figure 2. USGS 7.5-minute Topographic Map of Nashville East Quadrangle. Cave Road Wetland Delineation and Hydrologic Determination.

Project Area

0 500 1,000 2,000 Feet

0 150 300 600 Meters

EnviroScience
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Basemap courtesy of National Geographic Society (2013).

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Date: 2/18/2022

R4SBC
R5UBH
PFO1A
PFO1A
PFO1/UBFh
PUBHh
PUBHx
R4SBC
PFO1F
PFO1A
PUBHh
PFO1C
PUBHx
R4SBC
R4SBC
R4SBA
PFO1Ah
PFO1Ah
PEM1A
PEM1A
PUBHh
PFO1A
PFO1Ah
PFO1Ah
PEM1C
PEM1Ch
PUBHx
L1UBHh
PUBFx
PFO1Ah
R4SBC
R4SBC
PFO1Fh
R4SBC
PUBHx
PFO1A
R4SBC
PUBFh
PUBFh
R5UBH
PUBFh
PSS1C
PUBH
R4SBC
PABFx
R5UBH
R4SBC

Figure 3.
NWI Map of Site
(Nashville East Quadrangle).
Cave Road Wetland Delineation
and Hydrologic Determination.

Project Area

0 500 1,000 2,000 Feet
0 150 300 600 Meters

EnviroScience
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Path: C:\Users\Anna Giordano\Desktop\GIS_Projects\K\Klober Engineering Services\15833_Cave Rd Aquatic Resource Delineation and HD\GIS\Map3_NWI.mxd

Date: 2/18/2022

Basemap courtesy of National Geographic Society (2013). NWI data courtesy of USFWS (current as of October 1, 2020).

Figure 4.
Soil Map of Site in
Davidson County, Tennessee.
Cave Road Wetland Delineation
and Hydrologic Determination.

Project Area

0 500 1,000 2,000 Feet

0 150 300 600 Meters

EnviroScience
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Basemap courtesy of Esri. Soil data courtesy of SSURGO.

Date: 2/18/2022 Path: C:\Users\Anna Giordano\Desktop\GIS_Projects\K\Klober Engineering Services\15833_Cave Rd Aquatic Resource Delineation and HD\GIS\Map4_Soil.mxd

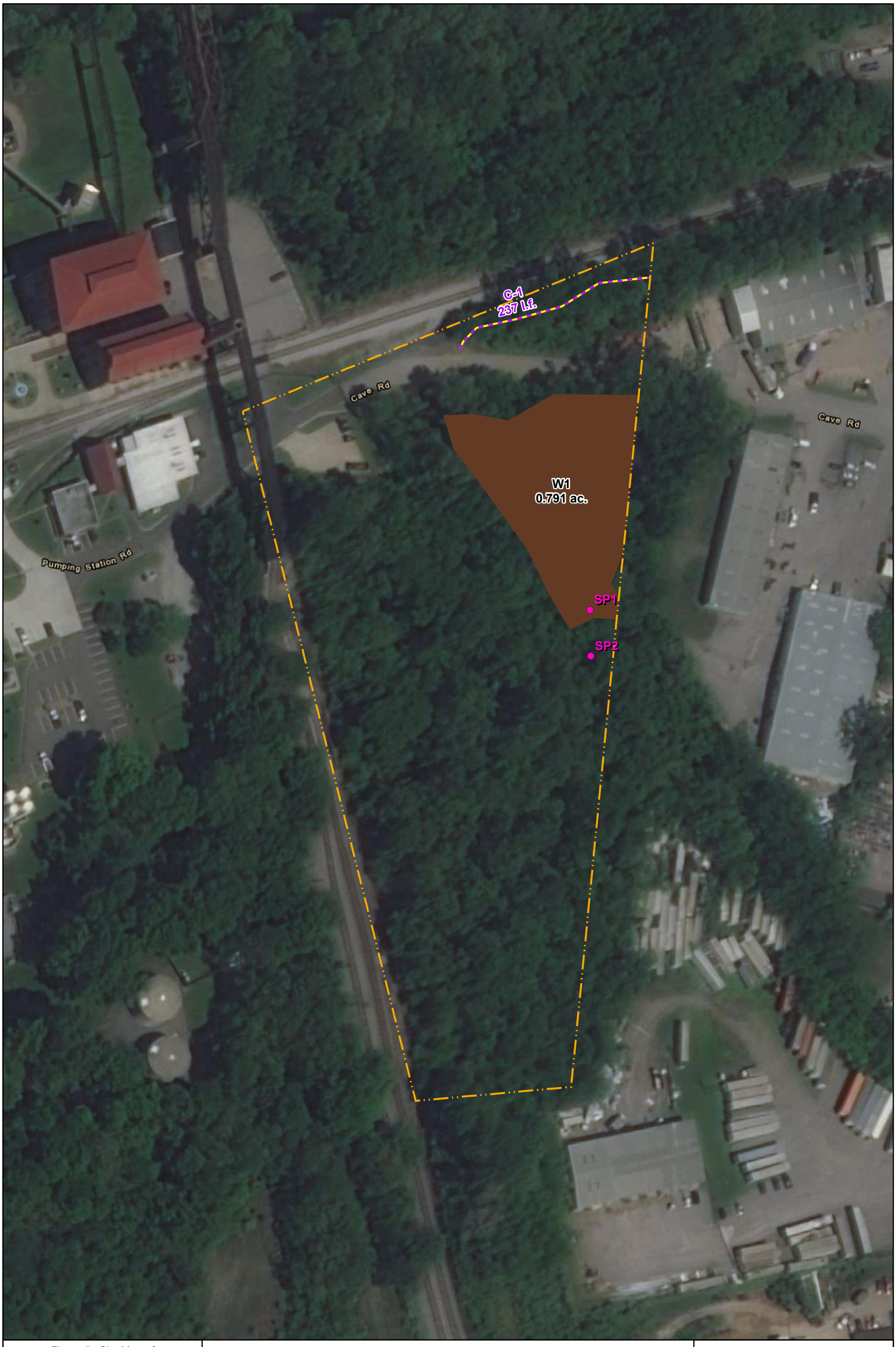


Figure 5. Site Map of Wetlands and Other Water Resources. Cave Road Wetland Delineation and Hydrologic Determination.

Sample Plot
Ephemeral Stream
Wet Weather Conveyance
Wetland (PFO)
Project Area

EnviroScience
Excellence In Any Environment

Basemap courtesy of Esri.

Date: 2/18/2022 Path: C:\Users\Anna Giordano\Desktop\GIS_Projects\K\Klober Engineering Services\15833_Cave Rd Aquatic Resource Delineation and HD\GIS\Map5_Site.mxd

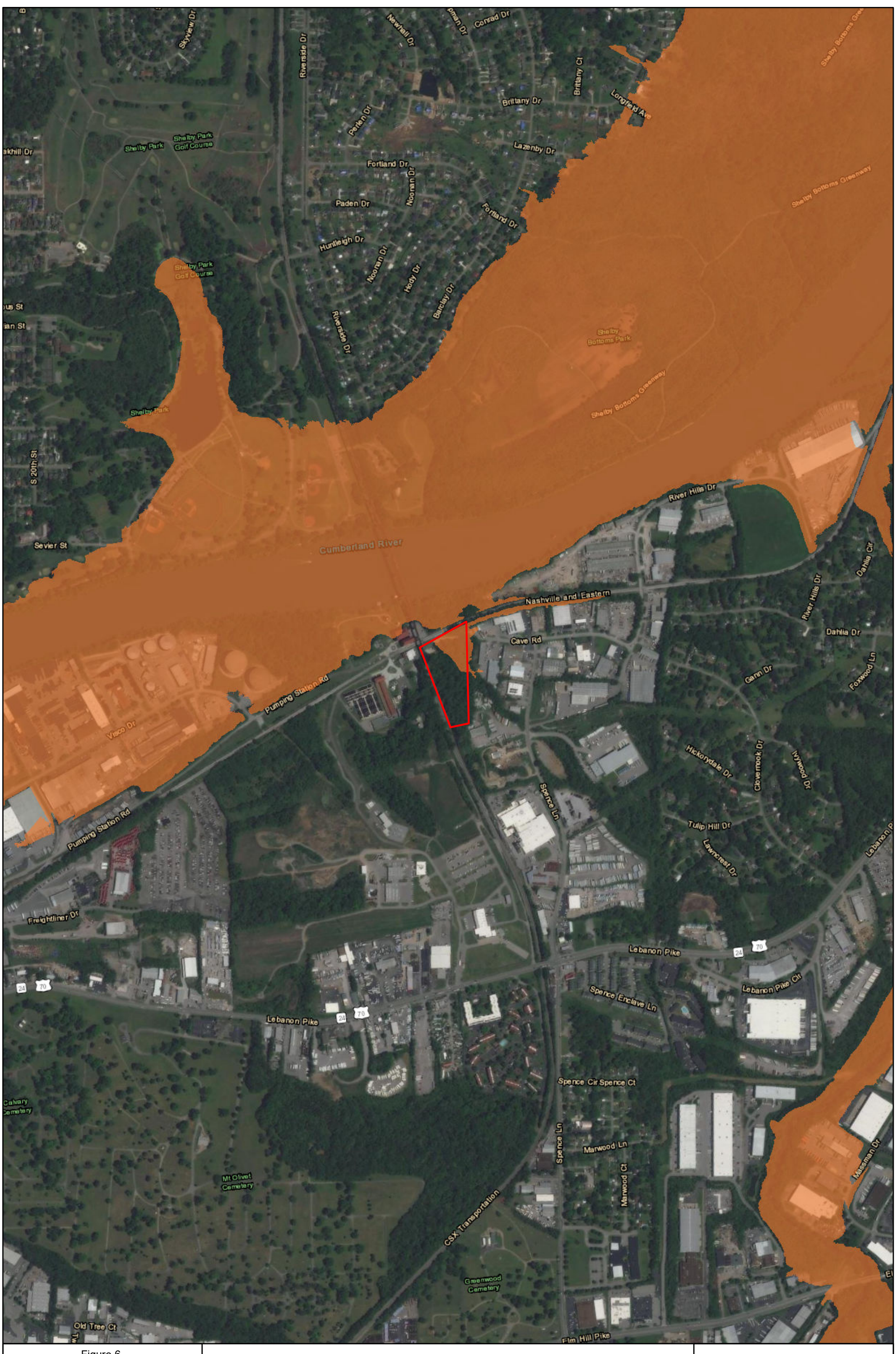


Figure 6.
FEMA Map of Site in
Davidson County, Tennessee.
Cave Road Wetland Delineation
and Hydrologic Determination.

100-Year Flood Zone
Project Area

0 500 1,000 2,000 Feet
0 150 300 600 Meters

EnviroScience
Excellence In Any Environment

Date: 2/18/2022 Path: C:\Users\Anna Giordano\Desktop\GIS_Projects\K\Klober Engineering Services\15833_Cave Rd Aquatic Resource Delineation and HD\GIS\Map6_FEMA.mxd

Basemap courtesy of Esri. Flood data courtesy of FEMA.

Appendix B

Site Photographs

Photo 1. Sample Plot 1 representing palustrine forested (PFO) vegetative community within the project area; facing north.

Photo 2. Sample Plot 2 representing the forest vegetative community within the project area; facing north.

Photo 3. Wetland W-1 facing north.

Photo 4. Wetland W-1 facing east.

Photo 5. Wetland W-1 facing south.

Photo 6. Wetland W-1 facing west.

Photo 7. Represents water flowing out of W-1, across Cave Road; facing west.

Photo 8. C-1, representing sheet flow across Cave Road and the origin point of the channel facing northeast.

Photo 9. C-1, representing the channel features north of Cave Road; facing north.

Photo 10. Depicting an offsite watercourse which flows into W-1 along the eastern boundary of the project area from the southeast; facing south.

Appendix C

Sample Plot Data Forms

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: 15833/Cave Road City/County: Nashville/Davidson Sampling Date: February 8, 2022

Applicant/Owner: Klober Engineering Services State: TN Sampling Point: SP-1

Investigator(s): Patrick Geraghty- EnviroScience, Inc. Section, Township, Range:

Landform (hillslope, terrace, etc.): Depression Local Relief (concave, convex, none): concave Slope (%): 0-5

Subregion (LRR or MLRA): N123 Lat: 36.161503 Long: -86.723359 Datum: WGS84

Soil Map Unit Name: Linden-Urban Land complex (Ln) NWI classification: PFO1Fh

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation NO, Soil YES, or Hydrology YES significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation NO, Soil NO, or Hydrology NO naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X	No ____	Is the Sampled Area within a Wetland?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____		W-1	
Wetland Hydrology Present?	Yes X	No ____			

Remarks:

PFO wetland. The area has an impacted drainage from the construction the Cave Road roadway. Railroad embankment north of wetland across Cave Road.

HYDROLOGY

Wetland Hydrology Indicators:

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

X Surface Water (A1)	____ True Aquatic Plants (B14)	____ Surface Soil Cracks (B6)
____ High Water Table (A2)	____ Hydrogen Sulfide Odor (C1)	X Sparsely Vegetated Concave Surface (B8)
X Saturation (A3)	____ Oxidized Rhizospheres on Living Roots (C3)	X Drainage Patterns (B10)
____ Water Marks (B1)	____ Presence of Reduced Iron (C4)	____ Moss Trim Lines (B16)
____ Sediment Deposits (B2)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Dry-Season Water Table (C2)
X Drift Deposits (B3)	____ Thin Muck Surface (C7)	____ Crayfish Burrows (C8)
X Algal Mat or Crust (B4)	____ Other (Explain in Remarks)	____ Saturation Visible on Aerial Imagery (C9)
____ Iron Deposits (B5)		X Stunted or Stressed Plants (D1)
____ Inundation Visible on Aerial Imagery (B7)		X Geomorphic Position (D2)
____ Water-Stained Leaves (B9)		____ Shallow Aquitard (D3)
____ Aquatic Fauna (B13)		____ Mircotopographic Relief (D4)
		____ FAC-Neutral Test (D5)

Secondary Indicators (minimum of two required)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches):	8-48 inches
Water Table Present?	Yes ____	No ____	Depth (inches):	____
Saturation Present? (includes capillary fringe)	Yes ____	No ____	Depth (inches):	____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
SP-1 is a depressional wetland with the greatest water depth exceeding 48 inches. The area had just received a significant rain event and was inundated with water. Mallards ducks were located within the wetland and stayed onsight during the delineation. A small amount of duck weed was located on top of the water. Few trees within the deeper water were stressed and stunted.

VEGETATION (Five Strata) - Use scientific names of plants. Sampling Point: SP-1

Tree Stratum: (Plot Size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fraxinus pennsylvanica*	15	YES	FACW
2. *Quercus michauxii*	15	YES	FACW
3.			
4.			
5.			
6.			
7.			
	30	= Total Cover	
50% of total cover: 15	20% of total cover:		6

Shrub Stratum: (Plot Size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	0	= Total Cover	
50% of total cover: 0	20% of total cover:		0

Herb Stratum: (Plot size: 5')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	0	= Total Cover	
50% of total cover: 0	20% of total cover:		0

Woody Vine Stratum: (Plot size: 30')			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
50% of total cover: 0	20% of total cover:		0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	x 1 =	0
FACW species 30	x 2 =	60
FAC species	x 3 =	0
FACU species	x 4 =	0
UPL species	x 5 =	0
Column Totals: 30 (A)		60 (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

X 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling - Woody plants, excluding woody vines, aproximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody plants, excluding woody vines, aproximately 3 to 20 ft (1 to 6 m) in height.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vines - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
The entire wetland was inundated and some trees were stressed and stunted. No herbaceous layer present but some duck weed (Lemna sp.) was present on the water surface. Large alga mats present within the inundated area.

SOIL

Sampling Point: SP-1

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 2/1	100					Sandy	muck soils no redox

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

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- X Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147,148)**
- ___ Thin Dark Surface (S9) **(MLRA147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

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

Remarks:

It was difficult to dig below 10" due to the depth of the water within the wetland and sample plot.

WETLAND DETERMINATION DATA FORM - Eastern Mountains and Piedmont

Project/Site: 15833/Cave Road City/County: Nashville/Davidson Sampling Date: February 8, 2022

Applicant/Owner: Klober Engineering Services State: TN Sampling Point: SP-2

Investigator(s): Patrick Geraghty- EnviroScience, Inc. Section, Township, Range:

Landform (hillslope, terrace, etc.): Hillslope Local Relief (concave, convex, none): Convex Slope (%): 5%

Subregion (LRR or MLRA): N123 Lat: 36.16136 Long: -86.723355 Datum: WGS84

Soil Map Unit Name: Stiversville Urban land complex, 3 to 25 percent slopes NWI classification: N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks.)

Are Vegetation NO, Soil NO, or Hydrology NO significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation NO, Soil NO, or Hydrology NO naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland?	Yes ____	No X
Hydric Soil Present?	Yes ____	No X			
Wetland Hydrology Present?	Yes ____	No X			

Remarks:

Upland forest plot

HYDROLOGY

Wetland Hydrology Indicators:

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

____ Surface Water (A1)	____ True Aquatic Plants (B14)	____ Surface Soil Cracks (B6)
____ High Water Table (A2)	____ Hydrogen Sulfide Odor (C1)	____ Sparsely Vegetated Concave Surface (B8)
____ Saturation (A3)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Drainage Patterns (B10)
____ Water Marks (B1)	____ Presence of Reduced Iron (C4)	____ Moss Trim Lines (B16)
____ Sediment Deposits (B2)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Dry-Season Water Table (C2)
____ Drift Deposits (B3)	____ Thin Muck Surface (C7)	____ Crayfish Burrows (C8)
____ Algal Mat or Crust (B4)	____ Other (Explain in Remarks)	____ Saturation Visible on Aerial Imagery (C9)
____ Iron Deposits (B5)		____ Stunted or Stressed Plants (D1)
____ Inundation Visible on Aerial Imagery (B7)		____ Geomorphic Position (D2)
____ Water-Stained Leaves (B9)		____ Shallow Aquitard (D3)
____ Aquatic Fauna (B13)		____ Mircotopographic Relief (D4)
		____ FAC-Neutral Test (D5)

Secondary Indicators (minimum of two required)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____		
Water Table Present?	Yes ____	No X	Depth (inches): ____	**Wetland Hydrology Present?**	
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____	Yes ____	No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Heavy rains and flooding in the region

VEGETATION (Five Strata) - Use scientific names of plants. Sampling Point: SP-2

Tree Stratum: (Plot Size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Celtus occidentalis*	30	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	30 = Total Cover		
50% of total cover: 15	20% of total cover:		6

Shrub Stratum: (Plot Size: 15')			
1. *Ligustrum vulgare*	20	Y	FACU
2. *Lonicera japonica*	20	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	40 = Total Cover		
50% of total cover: 20	20% of total cover:		8

Herb Stratum: (Plot size: 5')			
1. *Trachelosperum asiaticum*	80	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	80 = Total Cover		
50% of total cover: 40	20% of total cover:		16

Woody Vine Stratum: (Plot size: 30')			
1. *Euonymous fortunei*	10	N	FAC
2. *Vitis vulpina*	10	N	FAC
3.			
4.			
5.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover:		4

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	x 1 =	0
FACW species	x 2 =	0
FAC species 10	x 3 =	30
FACU species 75	x 4 =	300
UPL species	x 5 =	0
Column Totals: 170 (A)		330 (B)

Prevalence Index = B/A = 1.941176471

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

Definitions of Four Vegetation Strata:

Tree - Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling - Woody plants, excluding woody vines, aproximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub - Woody plants, excluding woody vines, aproximately 3 to 20 ft (1 to 6 m) in height.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vines - All woody vines greater than 3.28 ft in height.

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

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

SOIL

Sampling Point: SP-2

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	7.5YR 5/4	100					Sandy/loam	

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

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

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1) **(LRR N, MLRA 147, 148)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147,148)**
- ___ Thin Dark Surface (S9) **(MLRA147, 148)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 136, 122)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

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

Remarks:

Appendix D

Hydrologic Determination Field Data Sheets

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.5

Named Waterbody	Cumberland River	**Date/Time:**	2/9/2022 11:00
Assessors/Affiliation:	Andrew Zimmerman/ EnviroScience Inc.	**Project ID:**	
Site Name/Description:	Cave Road / C-1		
Site Location:	Nashville, TN		
HUC (12 digit):	51302020305	**Lat/Long:**	
Previous Rainfall (7-days):	2.36in		36.162291, -86.723857
Precipitation this Season vs Normal:	abnormally wet (elevated) average low abnormally dry unknown		
Source of recent & seasonal precip data:	Weather Underground, NWS		
Watershed Size:	0.22mi^2	**County:**	Davidson
Soil Type(s)/Geology:	Ln	**Source:**	SoilWeb
Surrounding Land Use:	Industrial		

Degree of historical alteration to natural cannel morphology & hydrology (circle one):

(Severe) Moderate Slight Absent

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic features exists solely due to a process discharge	x	WWC
2. Defined bed and bank absent, vegetation composed of upland and FACU species	x	WWC
3. Watercourse dry anytime during February through April 15h, under normal precipitation/groundwater conditions	x	WWC
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	x	WWC
5. Presence of multiple populations of obligate lotic organisms with > 2 month aquatic phase	x	Stream
6. Presence of fish (except *Gambusia*)	x	Stream
7. Presence of naturally occurring ground water table connection	x	Stream
8. Flowing water in channel and 7 days since last precip >0.1" in local watershed	x	Stream
9. Evidence watercourse has been used as a supply of drinking water	x	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) = 13.5

Justification / Notes:

The channel has gone under severe alterations from the railroad and Cave Road. The channel starts at the northern edge of Cave Rd due to sheet flow across Cave Road from W-1 during high percipitation events. This was observed during the site visit.

Secondary Field Indicator Evaluation

A. Geomorphology (Subtotal = 5.75)	**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 = 4.25)	**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 stream bed or sides of channel	No = 0		Yes = 1.5	

C. Biology (Subtotal = 3.5)	**Absent**	**Weak**	**Moderate**	**Strong**
18. Fibrous roots in channel[1]	3	2	1	0
19. Rooted upland plants in 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[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 = 13.5

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

Notes:

1. Poorly defined with obvious interuptions
3. Predominatntly pools
4. A strong depositional bar at the top of the reach
10. A weak to moderate headcut at the top of the reach
12. Natural valley which drains into a wetland, overflow during high rain events from wetland flows across Cave Rd and into channel
15. Water in channel flow from wetland

Appendix E

Normal Weather Condition Calculations

Calculation of Normal Weather Conditions

		Long-term rainfall records							
	Month	Minus One Std. Dev. (DRY)	Normal(Mean inches)	Plus One Std. Dev. (WET)	Actual Rainfall	Condition (dry, wet, normal)	Condition value	Month weight value	Product of previous two columns
1st prior month*	Jan-22	1.71	4.05	6.39	6.53	Wet	3	x 3	9
2nd prior month*	Dec-21	1.56	4.25	6.94	3.63	Normal	2	x2	4
3rd prior month*	Nov-21	1.99	3.76	5.53	1.47	Dry	1	x1	1
								Sum =	14

Note:

If sum is:	
6-9	Then prior period has been drier than normal
10-14	Then prior period has been normal
15-18	Then prior period has been wetter than normal

Condition Value	
Dry =	1
Normal =	2
Wet =	3

Conclusions:
Normal weather conditions are present at the site for the period. Sources from NWS Nashville.

Appendix F

Hydrologic Determination Certification Metro Nashville Stormwater Division Form

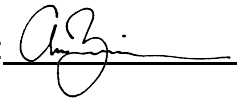
Hydrologic Determination Certification
Metro Nashville Stormwater Division

Map & Parcel: 09400020800
Address: 0 Cave Road, Nashville, TN 37210
Project Name: Cave Road Wetland Delineation and HD
Owner/ Developer: CWM, LLC

A hydrologic determination was performed on 2/9/22 by qualified staff for a conveyance located on the above parcel in accordance with the hydrologic determination guidance developed by TDEC and approved by MWS. Based on the observed geomorphology, hydrology, and biology, the conveyance is a wet weather conveyance (WWC) and not a community water as defined by Section 6.9 of Nashville's Stormwater Management Manual, Volume 1.

HD performed by:

Name & Firm: Andrew Zimmerman /EnviroScience, Inc.

Signature: 

Signature and stamp of Professional Engineer designing the project.

Attach:
Hydrologic Determination Field Sheet
Map
Photos of beginning, middle, and end of WWC
GPS coordinates of beginning and end of WWC on property

****MWS reserves the right to verify any hydrologic determination, especially those performed during drier months.****
This document should be submitted with the Grading Permit application for all conveyances that will not be protected.

Appendix G

Community Water Determination Property Access Form

Community Water Determination Property Access

This form grants permission for a qualified professional to perform a community water determination on my property. The results of this determination will be submitted to Metro Water Services (MWS) staff for review and used to assess whether Metro's water quality buffer criteria (per Section 6.9 of Vol. 1 of the Metro Stormwater Management Manual) would be applicable to the water feature/conveyance in question. Water quality buffers protect community waters by establishing a no disturb area adjacent to them. The results of the determination will be entered into Metro's permit tracking database and be attached to the parcel. This determination will not assess if an Aquatic Resources Alteration Permit is required from the Tennessee Department of Environment and Conservation (TDEC) or if a channel is a Waters of the United States per the Army Corps of Engineers (Corps). Please submit the completed form to Rebecca Dohn (Rebecca.dohn@nashville.gov or fax 615-880-2425).

I Jeff Maddox (owner name) herby authorize TDEC/Metro Representative (qualified professional) to enter my property and perform a hydrologic determination.

Property Owner Information:

Sign Name: Jeff Maddox

Print Name: Jeff Maddox

Date: 3/7/22

Email address: jcalmad71@me.com

Phone Number: 615-438-2894

Property Address: 511 Cave Rd (adjacent to 511 Cave Rd)
Nashville, TN 37210

Standard Parcel Number: 09400020800

Qualified Professional:

Name / Company: TDEC/Metro Representative

Email Address / Phone Number:

Because natural variation and human activities can alter hydrologic conditions, MWS reserves the right to reassess the classification of this watercourse in the future. Please contact Rebecca Dohn at (615) 880-2420 with questions or for additional information.