BASELINE SINKHOLE MONITORING REPORT
ANDREWS QUARRY
WILLIAMSBURG COUNTY, SC

Prepared for

American Materials Company
1410 Commonwealth Drive, Ste. 201
Wilmington, North Carolina 28403

Prepared by

Groundwater Management Associates, Inc.
4300 Sapphire Court, Suite 100
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February 5, 2021

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JKH 2/5/2021
SOUTH CAROLINA
PROFESSIONAL GEOLOGIST

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1.0 Introduction

In March of 2019, RDA, LLC obtained a permit from the SC Department of Health and Environmental Control (SCDHEC) to operate a limestone aggregate mine on approximately 968 acres of property in Williamsburg County South Carolina, near Andrews (Figure 1). American Materials Company (AMC) has purchased the facility with the intention of mining the limestone. AMC obtained a modified Mining Permit and Permit Maps on August 13, 2020 to accommodate the relocation of the plant and discharge pond. AMC refers to the site as the Andrews Quarry.

The mining permit includes multiple environmental compliance requirements, one of which is the identification and monitoring of sinkhole depressions in accordance with the Revised Sinkhole Monitoring Plan (SMP) dated February 22, 2019. AMC contracted Groundwater Management Associates, Inc. (GMA) to assist with evaluation of potential sinkholes at the Andrews Quarry. The subject report presents GMA's results of the Pre-mining Baseline Sinkhole Evaluation of the Andrews Quarry.

2.0 Background

The SMP describes the hydrogeologic setting of the site. Two primary lithologic units occur at the site: 1) the Overburden, and 2) the Limestone. The overburden is composed of siliceous sands, silts, and clays of the Pleistocene Socastee Formation. The Overburden occurs from the land surface to an average depth of approximately 30 feet. Beneath the Overburden is a sandy fossiliferous limestone of the Paleocene Chicora Member of the Williamsburg Formation. The limestone unit is the ore that AMC plans to mine for making aggregate.

The Chicora Member Limestone is primarily composed of calcium carbonate (in the forms of calcite, aragonite, and possibly calcium-magnesium carbonate {i.e., dolomite}), but it also contains appreciable amounts of quartz and phosphatic sands that are cemented together by the calcium carbonate. The interaction of carbonic acid in rain water with the calcium carbonate in limestone will chemically weather the rock. This natural gradual process will dissolve away the limestone, leaving voids in the rock.

If the lithologic composition of the limestone is uniform, weathering of the uppermost portion of the limestone may result in gradual land subsidence over a broad area. This weathering pattern typically does not result in episodic sinkhole development and collapse. The contact between the overburden sediments and the limestone is marked by high-porosity, low-cohesion sediments where residual siliceous mineral grains (sands and clays) derived from weathering of the underlying limestone will accumulate.

In contrast, if the limestone lithology is heterogeneous, there may be lateral variations across an ore body where some materials and zones may weather more rapidly than other materials.

These lateral variations may include differences in mineral composition (facies changes) or structural differences (such as fractures). Local dissolution of limestone to greater depths may occur where heterogeneities are present that foster accelerated weathering. When this occurs, larger voids or caverns may develop. These local cavities may gradually grow over time until they reach a size that cannot support the weight of the overburden materials. Collapse of these cavities results in sinkhole formation. Sinkholes may stabilize as water-filled depressions, or they may expand and coalesce with other similar depressions, ultimately forming headwaters of new drainage systems. Because water is nearly incompressible, a water-filled cavity is partially supported by pore pressure. Depressurization of the cavity may make the cavity unstable and subject to collapse. This may especially be the case when the cavity is partially dewatered. The depth of collapse is limited by the thickness of the limestone. The limestone ore at the RDA site is approximately 20 to 30 feet thick. This relatively thin rock layer, coupled with a shallow burial depth, will not lend itself to forming large, deep sinkhole structures.

Geologists have developed the term "Karst" to describe the landscape of areas underlain by limestone where sinkholes have formed as a result of the natural differential weathering of the rock. For the purposes of this report on the Andrews Quarry, GMA distinguishes two descriptors of Karst features: 1) Active Karst, and 2) Paleo-Karst. Because much of the general topography of the area is related somewhat to chemical dissolution of limestone and gradual land subsidence, GMA only applies the term "Karst" to describe local depressions that appear to have formed by episodic collapse of a void in the recent past. The term Active Karst is used for circular to oval depressions with steep sides and a general lack of older trees in the middle. Paleo-Karst is used to describe circular to oval depressions that lack steep sides, are shallow, and may have established mature trees in the middle.

Recent or active sinkhole features in the Coastal Plain of South Carolina commonly have steep sides and form as circular or oval features, and we consider these features to be Active Karst features.

Older sinkholes that have not been active for decades or centuries tend to be shallow and will infill with sediment and organic matter. Large trees growing within some sinkhole depressions are a good indicator of how much time has elapsed since the depression formed. These types of sinkhole depressions are described herein as Paleo-Karst features.

Assessing the baseline (pre-mining) evidence for Karst features at a mine site is important because groundwater pumping to support open-pit mining may depressurize existing water-filled cavities, and the reduction in water pressure could lead to instability of the cavity and premature collapse, thereby forming an active sinkhole depression. Understanding the locations and patterns of pre-mining Karst features is important for developing an effective SMP for a mine.

The AMC Andrews Quarry mining permit includes limitations on dewatering of the open pit mine. The limestone mining planned by AMC will be “wet” mining, meaning that the limestone within the open pit will not be fully dewatered. The permit limits the groundwater pumping to a maximum depth of +5 feet MSL within the active pit, and groundwater levels must be maintained at a minimum of 2 feet above the top of the limestone in Perimeter Monitoring Well (PMW) stations. These permit limitations help to minimize the potential for sinkhole formation associated with mining activities.

3.0 Scope of Work

Prior to initiation of mine depressurization pumping, the SMP calls for completion of a baseline evaluation to investigate existing sinkhole areas on the property. Initial baseline evaluations were completed in October of 2017, including review and interpretations of LIDAR maps and a site reconnaissance to ground-truth potential karst features within 1000 feet of Segment 6 (GMA, 2017). Figure 2 presents the sinkhole features identified in the 2017 baseline evaluation.

In 2020, AMC acquired a detailed aerial drone survey of the property (Figure 3). This survey was gridded and consistently flown to provide high-resolution photography of the mine site. AMC provided GMA with copies of the aerial photographs for our review and interpretation. GMA compared the detailed aerial photography with LIDAR data to investigate depressions that may represent Karst features. Appendix I includes selected aerial photographs of some depressions identified for ground-truthing. GMA developed a database of identified features, including location coordinates, as a guide for field ground-truthing (Appendix II).

A team of GMA geologists visited the Andrews Quarry site to visit and inspect the identified depression areas. The plan was to inspect, to photograph, and to describe each feature. Using these observations and GMA’s experience, we made a judgment of whether any of the features represented Active Karst.

4.0 Results of Baseline Evaluations

The initial baseline evaluation of October 2017 identified 5 depressions that GMA classified as sinkhole ponds. These features were fairly steep-sided, appeared to be deeper than other depressions at the site, and generally lacked mature trees in the middle. Figure 2 presents the locations of the five sinkhole ponds identified in 2017.

The aerial drone survey was completed after AMC timbered significant areas of the Andrews Quarry site. The reduced vegetation cover provided good visibility over much the property. We compared vegetation changes and evidence of ponded water from the aerial drone survey with the LIDAR topographic data of the site to select 22 depressions for field reconnaissance and ground-truthing. Figure 4 presents the depressions selected for ground-truthing.

On December 8, 2020, two GMA geologist visited each of the depressions identified from the aerial drone survey. While many of the depression areas likely are associated with land subsidence from chemical weathering of limestone (i.e., they may represent Paleo-Karst), only three of the depressions exhibited characteristics of sinkhole depressions (i.e., Active Karst, or more recent Karst features). These three depressions are herein identified as Sinkhole Ponds 6 through 8 (see Figure 5). Appendix III includes detailed aerial photos, LIDAR, and field photographs of the three newly identified Sinkhole Ponds. None of the newly recognized Sinkhole Ponds exhibited evidence of active subsidence.

In addition to the identification of the three additional Sinkhole Ponds, GMA closely reviewed data from the two large wetland areas (Wetlands 4 and 6 on the Mine Map) to discern whether these wetland depressions likely represent Karst features. GMA's review of LIDAR data, coupled with our observations of the sand ridge on the east side of Wetland 4, suggest that a remnant Carolina Bay depression is the likely origin of Wetlands 4 and 6. Carolina Bays are ephemeral surface depressions that have an elongate northwest-southeast orientation and commonly have a sand rim on the southeast side of the depression. The origin of Carolina Bays is widely debated, but field characteristics of these features across the Carolinas clearly indicate common sand deposition on the southeast end of the depressions associated with ponded water and wind and wave activity (Soller and Mills, 1991). Based upon the Carolina Bay-type features of the depressions at Wetlands 4 and 6, GMA considers that these wetland depressions are not of obvious Karst origin. Appendix IV includes LIDAR imagery of Wetlands 4 and 6 along with GMA's inferred possible Carolina Bay outline for this pair of features.

5.0 Conclusions and Recommendations

Baseline evaluations of surface depressions at the Andrews Quarry site have revealed eight depression ponds that exhibit the characteristics of sinkhole depressions. These closed depressions (named Sinkhole Pond 1 through 8) are deeper than other depressions at the site, they have relatively steep sides, and have few to no mature trees in the middle. None of the sinkhole depressions exhibit obvious evidence of active subsidence.

Most of the sinkhole depressions occur in an area oriented roughly north-south extending north of Murray Swamp and east of Jumpin Run Road. GMA anticipates that this area has a lithologic difference, or exhibits a set of fractures, that is more prone to enhanced chemical weathering and sinkhole formation than other portions of the quarry property. Two other isolated depressions on the eastern portion of the quarry property exhibit characteristics of former sinkhole activity.

GMA recommends that the eight Sinkhole Ponds should have survey reference markers established by a SC Registered Land Surveyor. The Surveyor should map the topography and the area of these eight depressions as a baseline survey.
The SMP includes a discussion of monitoring for reactivation of sinkhole depressions outside Segment 6, but on the Andrews Quarry property. GMA recommends that these 8 ponds should be re-surveyed annually after active mine dewatering begins to investigate for evidence of reactivation. This survey activity will be coupled with annual aerial drone surveys to investigate possible new sinkholes on other portions of the quarry property.

6.0 Report Certification

This report was prepared by Groundwater Management Associates, Inc., a professional corporation that employs South Carolina Registered Professional Geologists. I, James K. Holley, a South Carolina Registered Professional Geologist employed by GMA, do certify that the information in this report is correct and accurate to the best of my knowledge.

Groundwater Management Associates, Inc.

James K Holley

James K. Holley, PG (#2377)
Senior Hydrogeologist

JAMES K HOLLEY
REGISTERED
NO. 2377
SOUTH CAROLINA
PROFESSIONAL GEOLOGIST
JKH 2/5/2021

7.0 List of References

Groundwater Management Associates, Inc., 2017, "Hydrogeologic Evaluation of the RDA, LLC Property, Williamsburg County, South Carolina", April 11, 2017, GMA Project 158007, 10 pages of text plus figures, tables, and appendices.

Soller, D.R., and H.H. Mills, 1991, "Surficial Geology and Geomorphology" in The Geology of the Carolinas, Carolina Geological Society Fiftieth Anniversary Volume, Edited by J.W. Horton, and V.A. Zullo, pp 301-302.

Figures

- LEGEND -

MINE PROPERTY BOUNDARY

SITE LOCATION

PROJECT: 163701

SITE LOCATION MAP

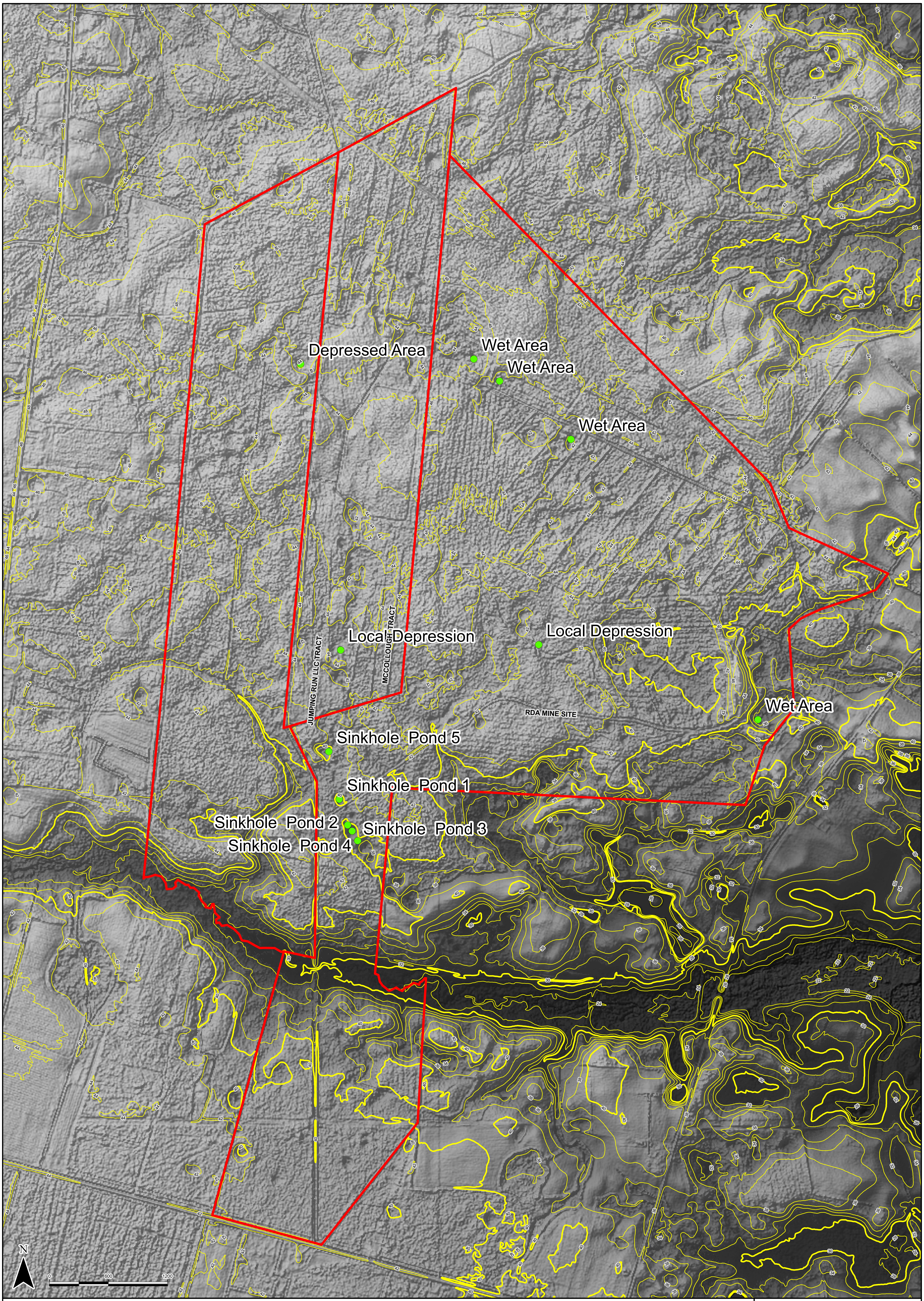
FIGURE 1	DATE: 8/27/2020

SCALE IN FEET

0 2750 5500'

AMERICAN MATERIALS COMPANY,
ANDREWS QUARRY,
WILLIAMSBURG CO., SC

GMA
GROUNDWATER MANAGEMENT ASSOCIATES, INC.



LEGEND

MINE PROPERTY BOUNDARY

TOPOGRAPHIC CONTOUR

ELEVATION (FT)

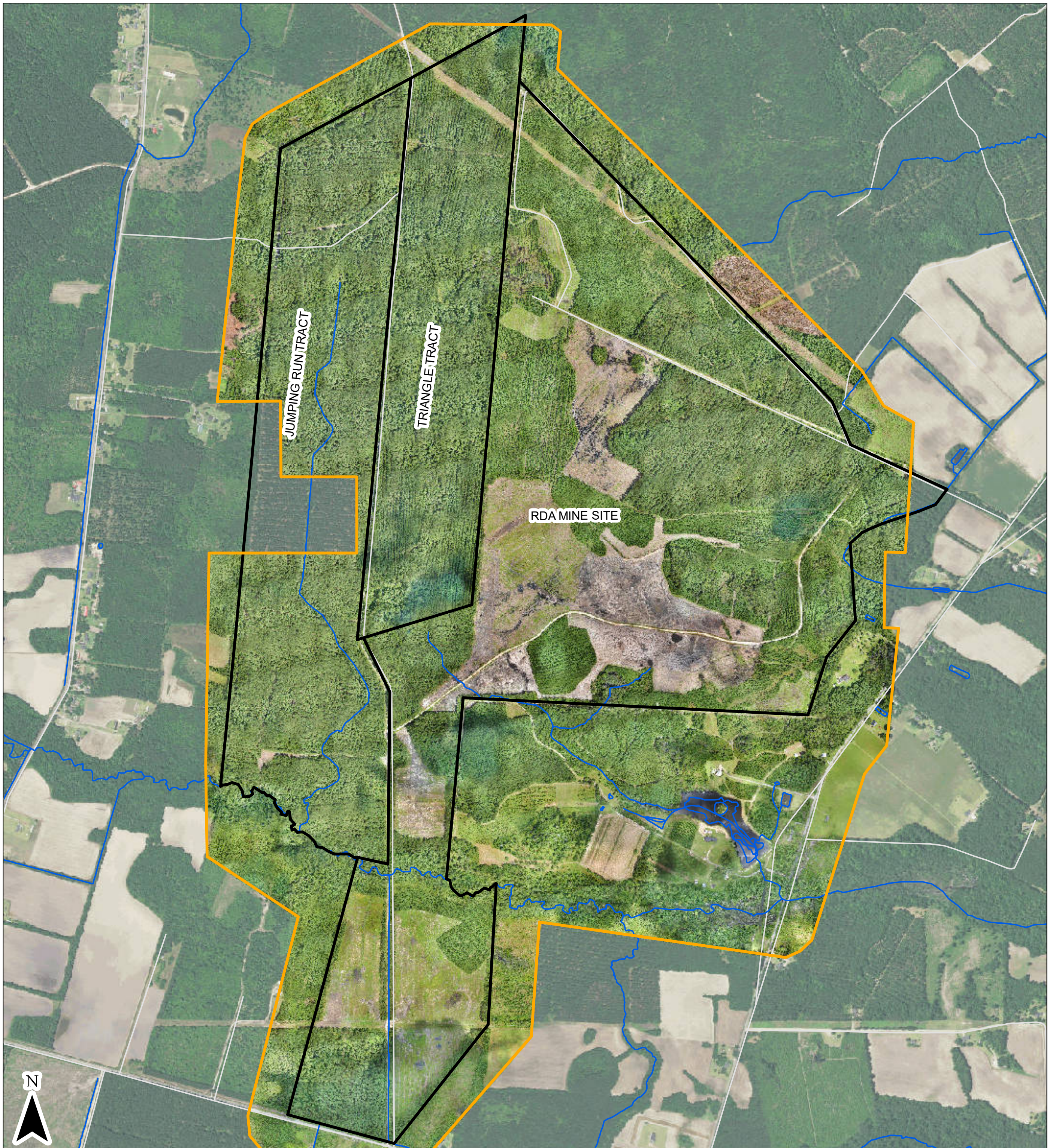
HIGH : 67 FT ABS

LOW : 6 FT ABS

RECONNAISSANCE LOCATION

GMA
GROUNDWATER MANAGEMENT ASSOCIATES, INC.

FILE: DRAWINGS/158007/ KAS_Recon_Location_map_20171109.mxd	Previous Sinkhole Features Identified	DATE: 11/15/2017
PROJECT NO. 158007	ANDREWS QUARRY, WILLIAMSBURG CO., SC	FIGURE 2



LEGEND

DRONE SURVEY AREA

AMC PROPERTY

ROADS

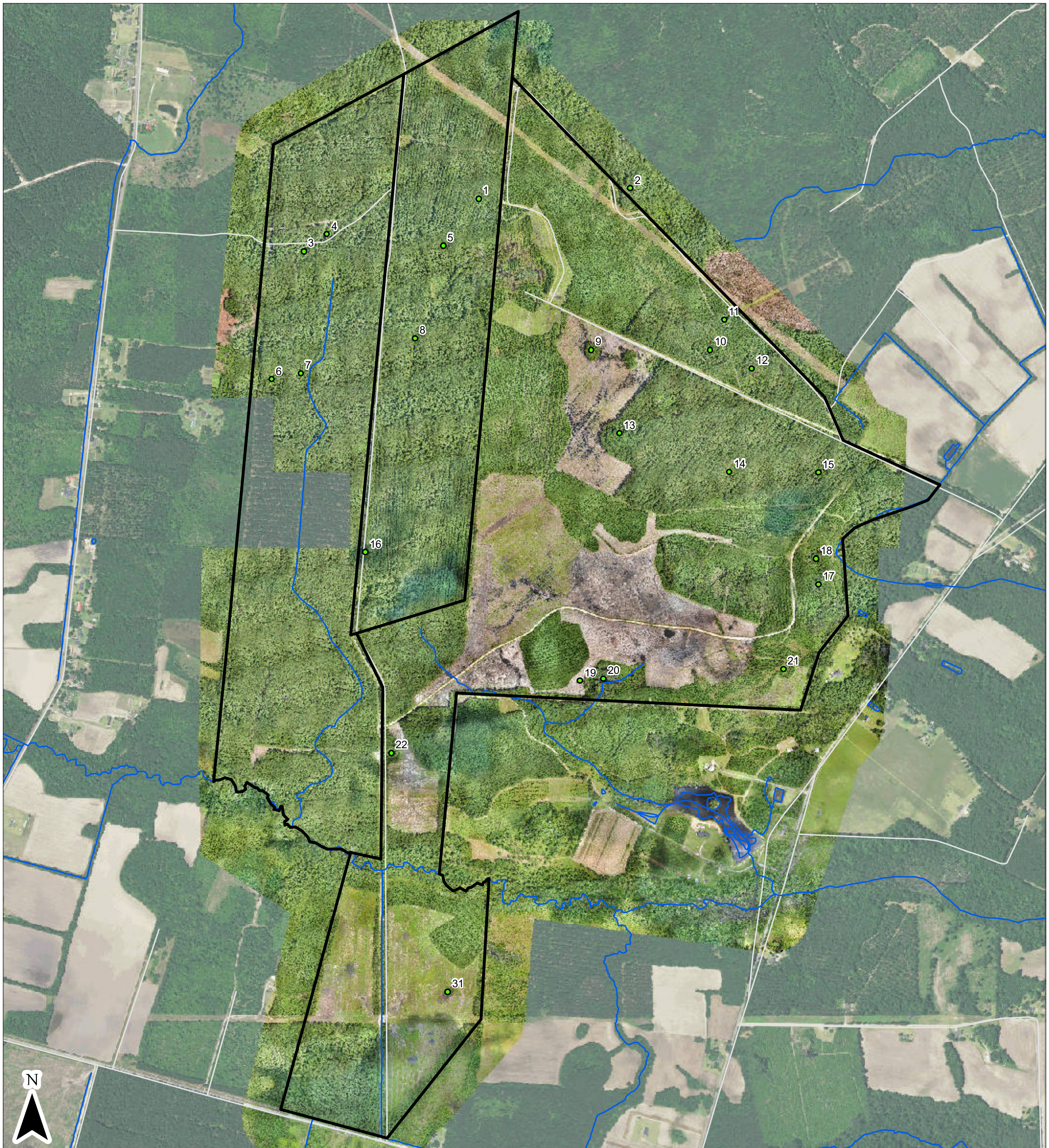
STREAMS

Feet

750 0 750 1,500

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\FIG3_Aerial Photography Survey.mxd	Aerial Photography Survey	DATE: 1/20/2021
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE 3



LEGEND

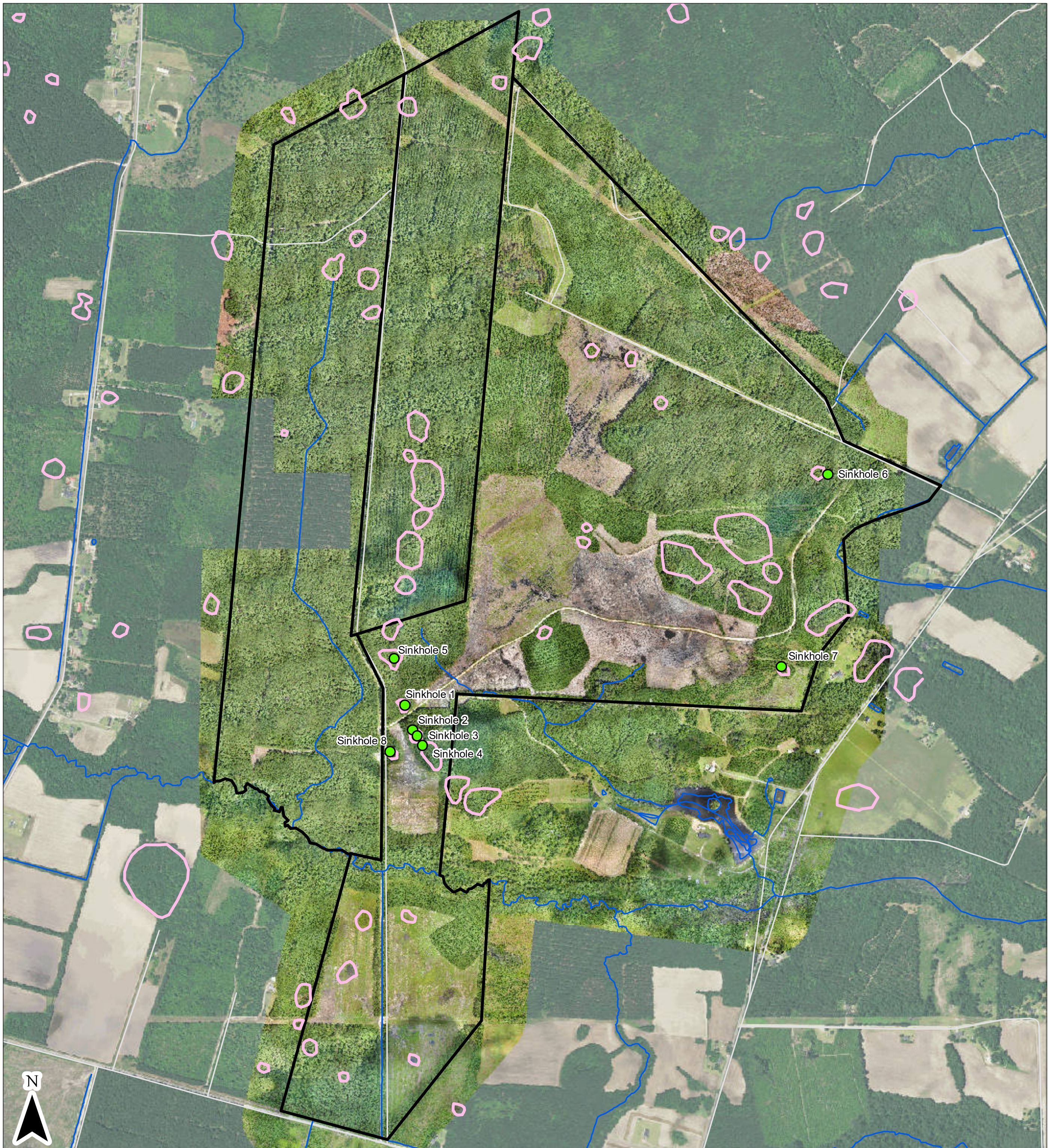
- POTENTIAL SINKHOLE WITH CORRESPONDING DATABASE NUMBER
- AMC PROPERTY
- ROADS
- STREAMS

Feet

750 0 750 1,500

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\FIG4_Additional Depression Features.mxd	Additional Depression Features Visited on December 8-9, 2020	DATE: 1/20/2021
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE 4



LEGEND

- SINKHOLES WITH CORRESPONDING DATABASE NUMBER
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

Feet

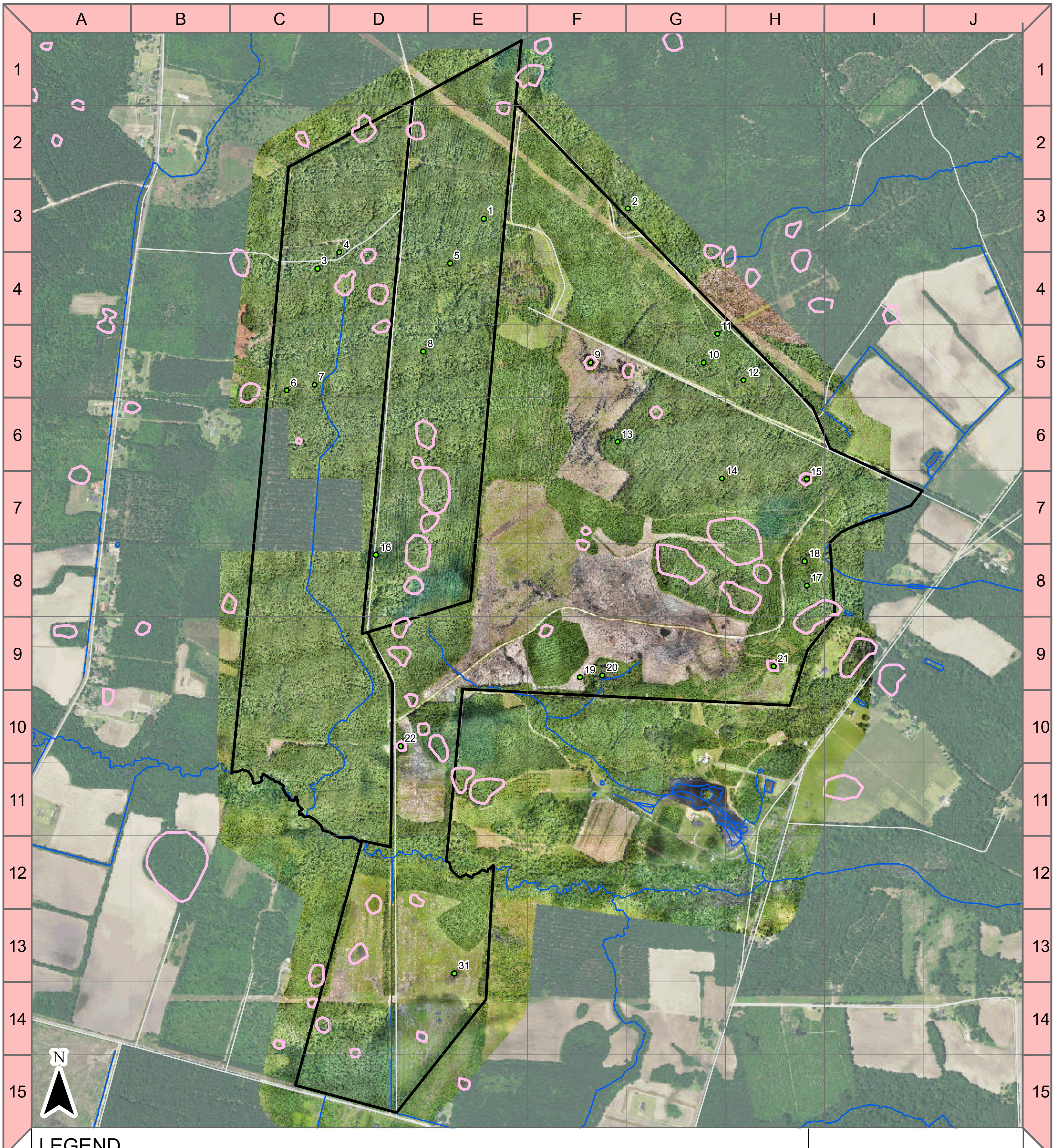
750 0 750 1,500

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\FIG5_Final Assessment of Sinkholes.mxd	Final Assessment of Existing Sinkhole Features at the Quarry	DATE: 1/20/2021
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE 5

Appendix I.

Selected Aerial Photographs with Depressions Selected for Ground Truthing



LEGEND

POTENTIAL SINKHOLE WITH CORRESPONDING DATABASE NUMBER

INTERPRETED KARST FEATURE

AMC PROPERTY

ROADS

STREAMS

Feet

750 0 750 1,500

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitorin\SinkholeMonPrg_GroundTruth_20201207.mxd	POTENTIAL SINKHOLES TO GROUNDTRUTH	DATE: 1/20/2021
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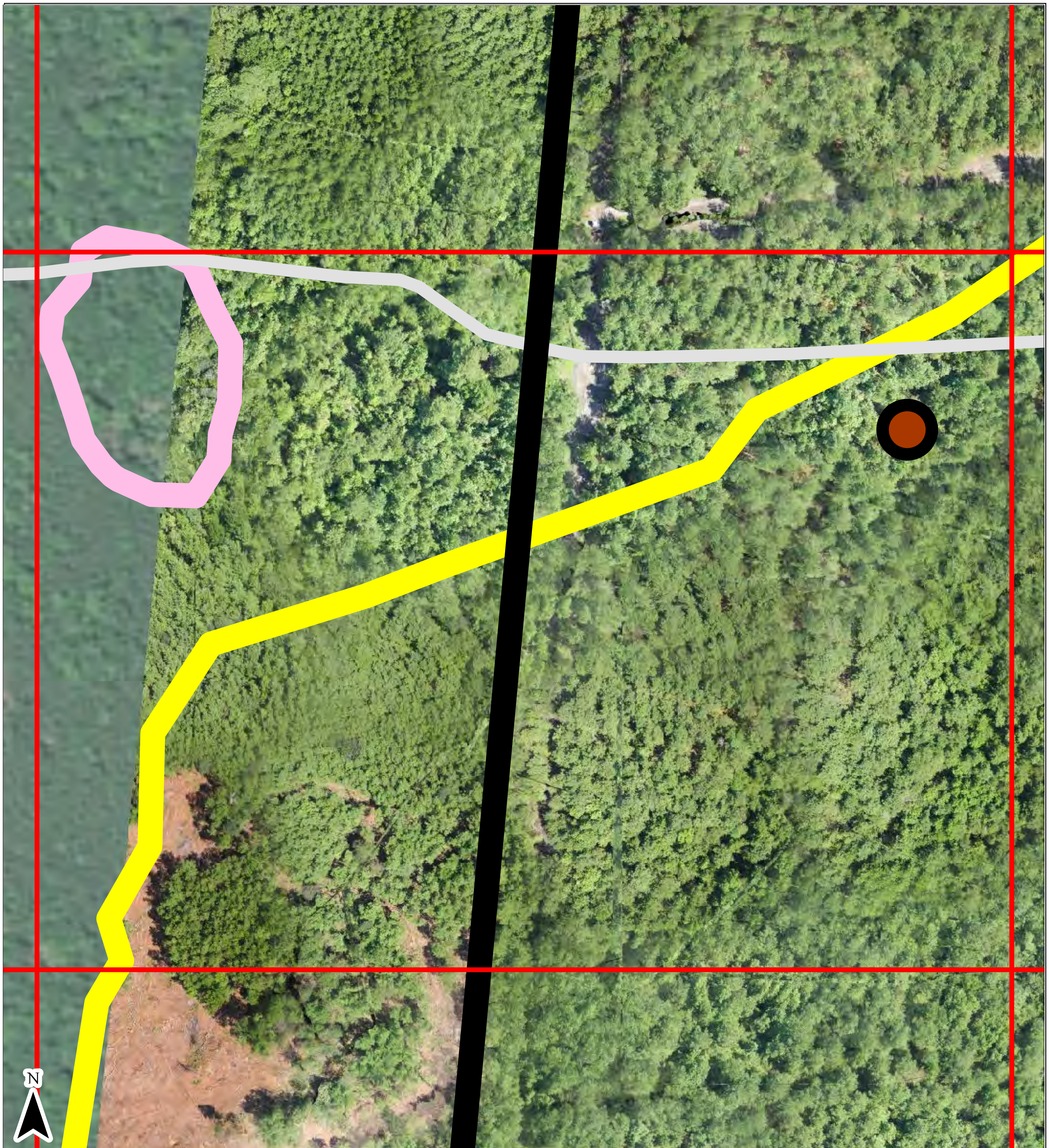


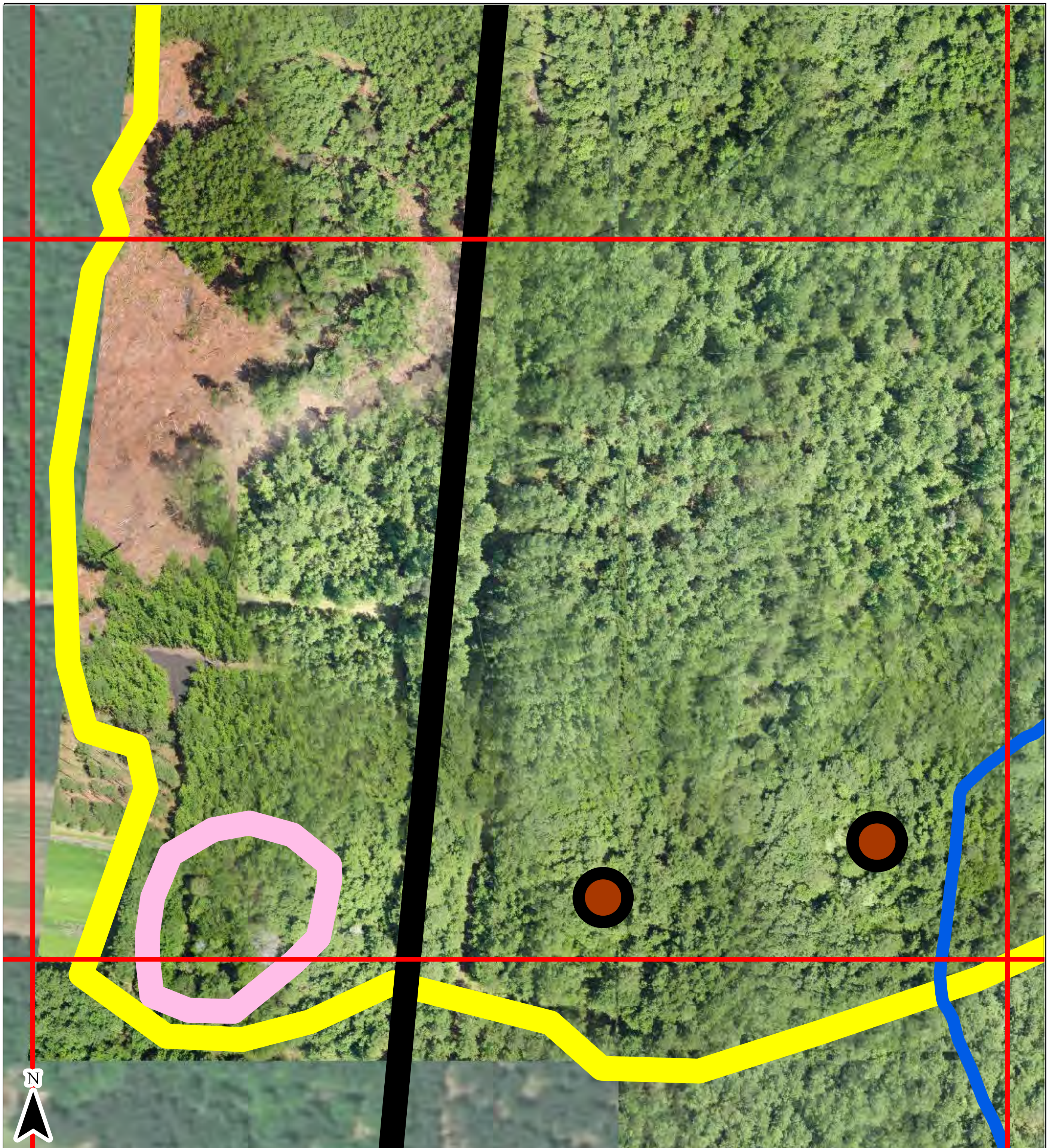
LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\SinkholeMonPrg _20201110.mxd	POTENTIAL SINKHOLES - C4	DATE: 11/18/2020
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X



LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

970 485 0 970 Feet

GMA

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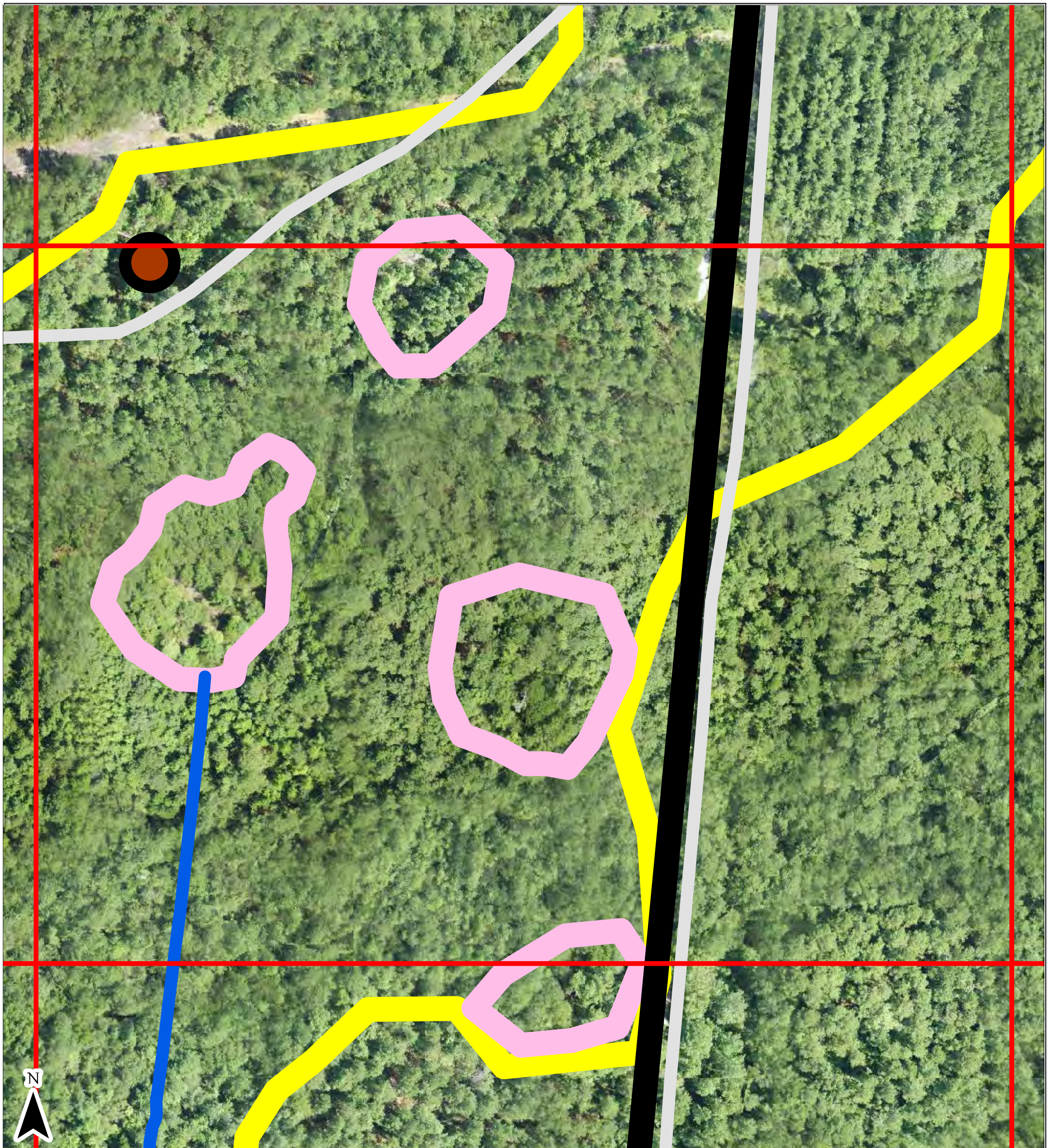
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X



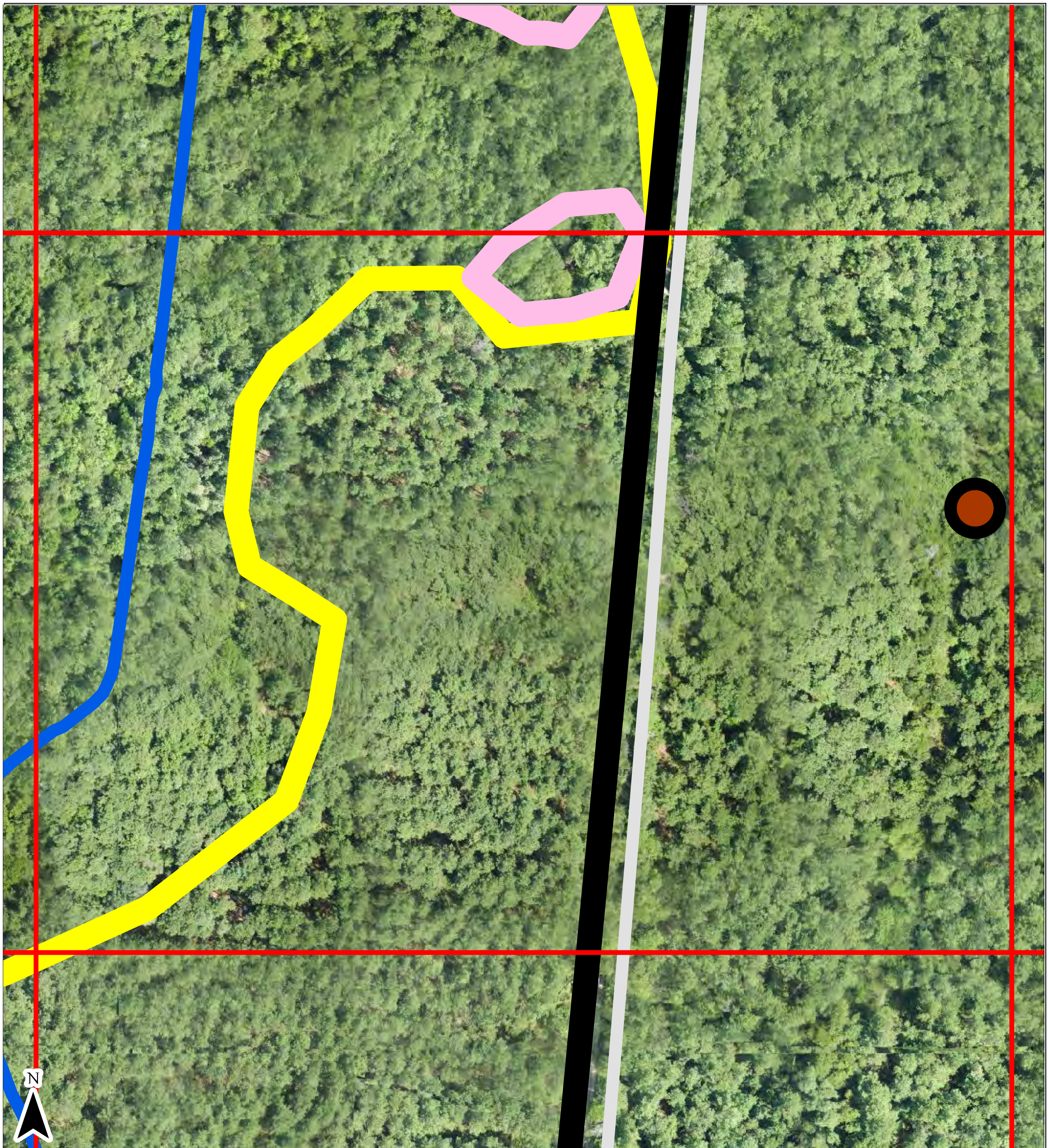
LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\SinkholeMonPrg _20201110.mxd	POTENTIAL SINKHOLES - D4	DATE: 11/18/2020
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X



LEGEND

POTENTIAL SINKHOLE
LOW AREA (PALEO KARST?)
INTERPRETED KARST FEATURE
AMC PROPERTY
ROADS
STREAMS

110 55 0 110 Feet

GMA

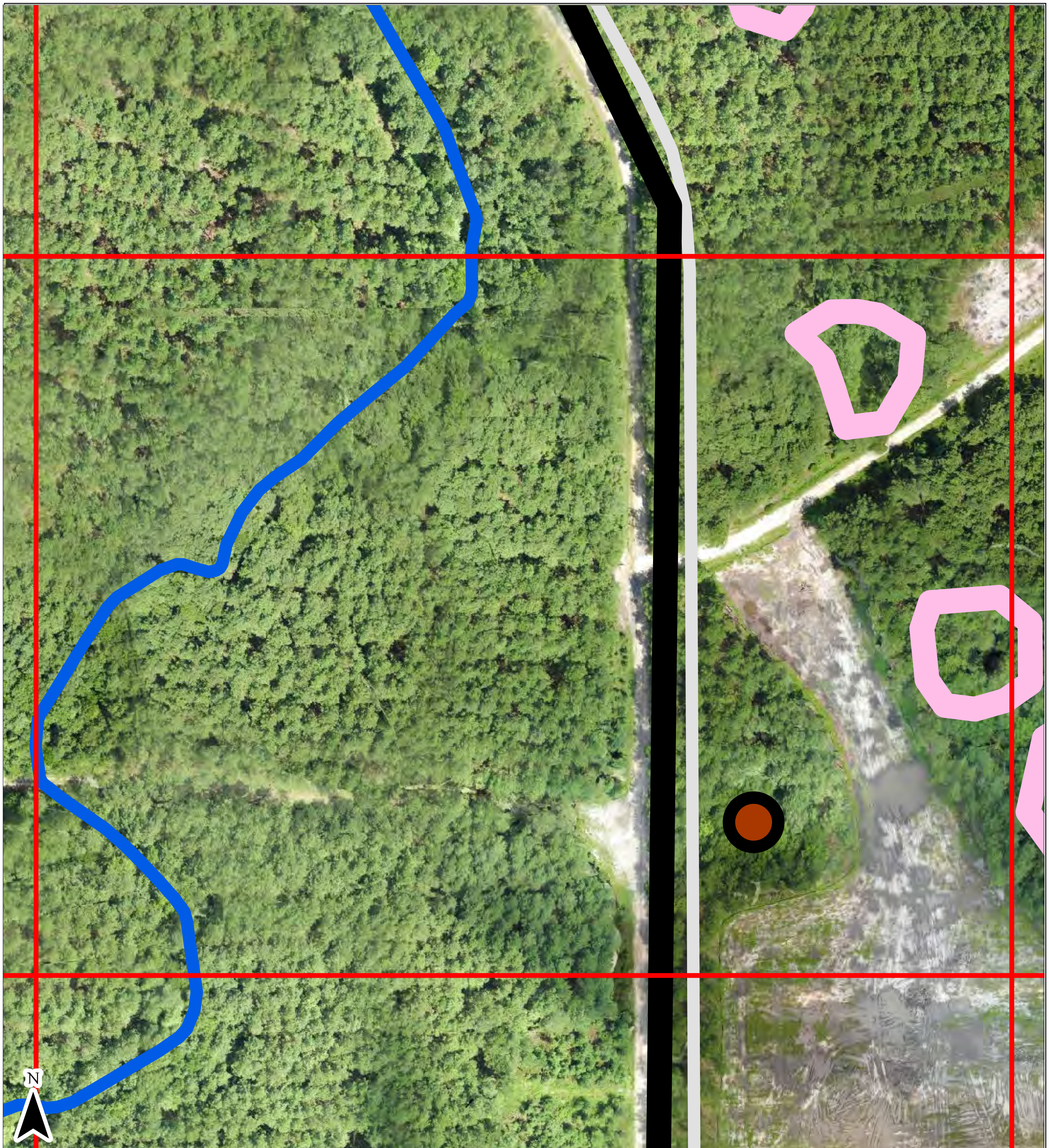
Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\SinkholeMonPrg _20201110.mxd	POTENTIAL SINKHOLES - D5	DATE: 11/18/2020
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X

LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\SinkholeMonPrg_20201110.mxd	POTENTIAL SINKHOLES - D8	DATE: 11/18/2020
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X



LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

GMA

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PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X

LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

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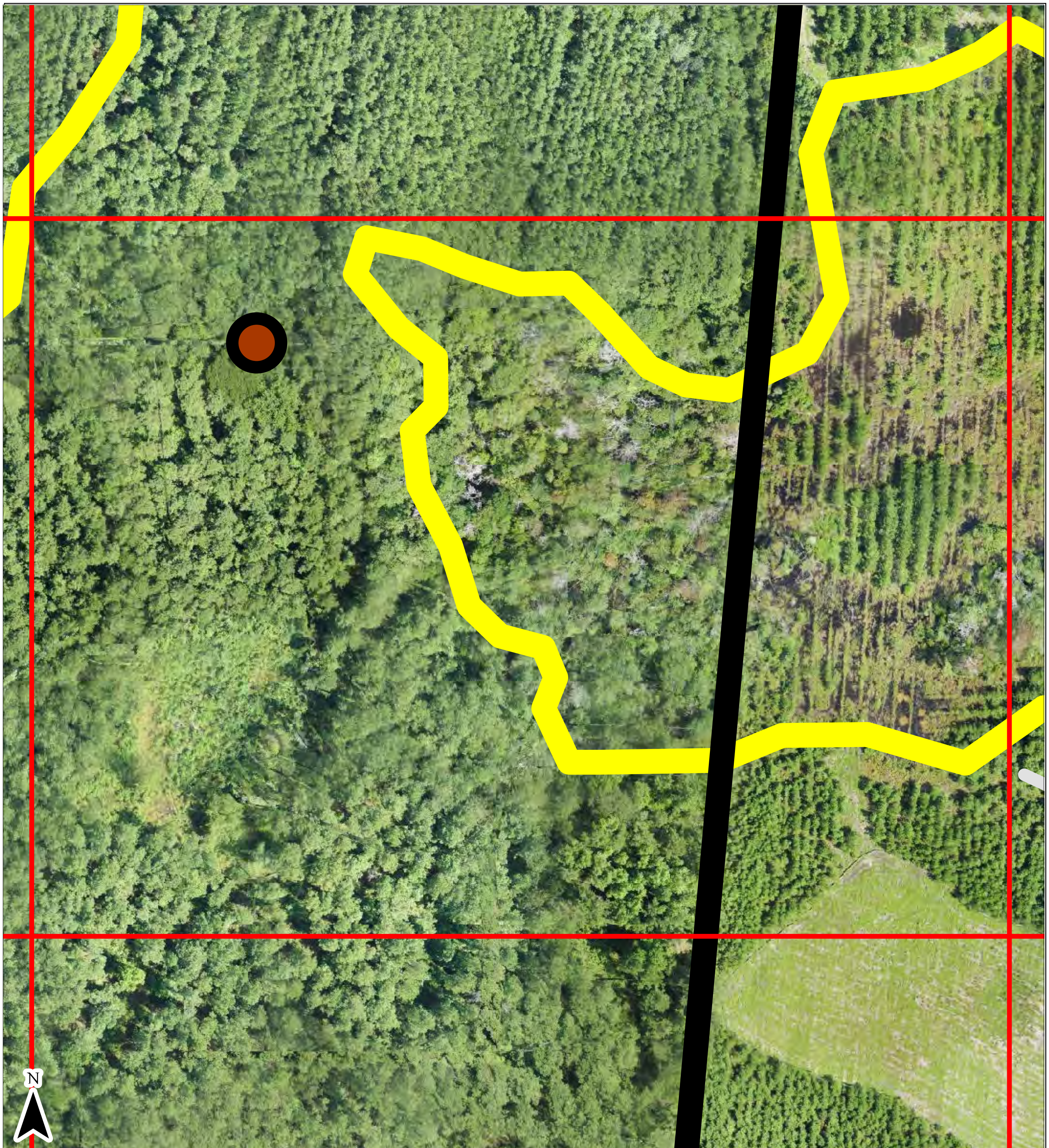
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X



LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

GMA

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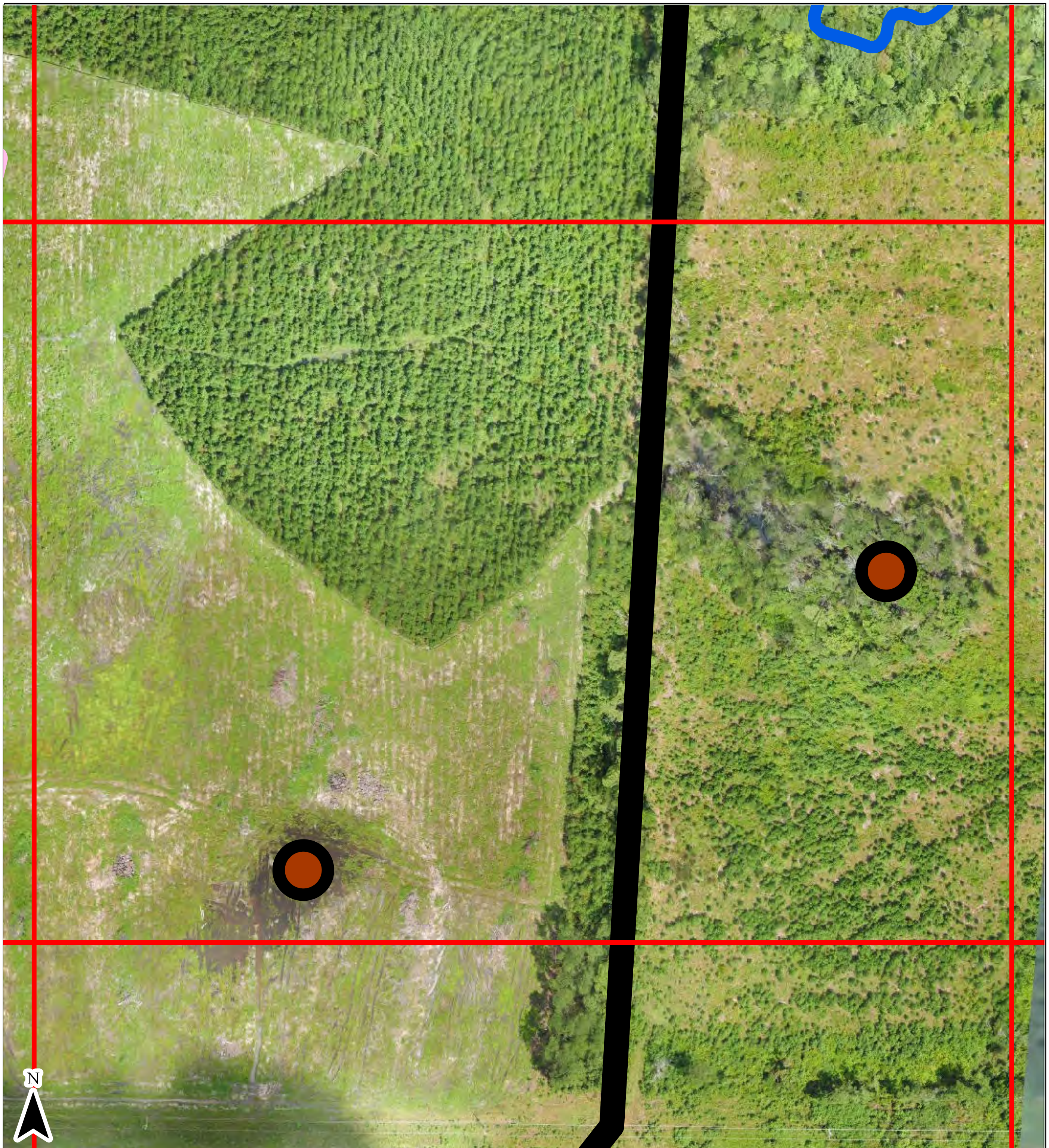
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X



LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\SinkholeMonPrg _20201110.mxd	POTENTIAL SINKHOLES - E13	DATE: 11/18/2020
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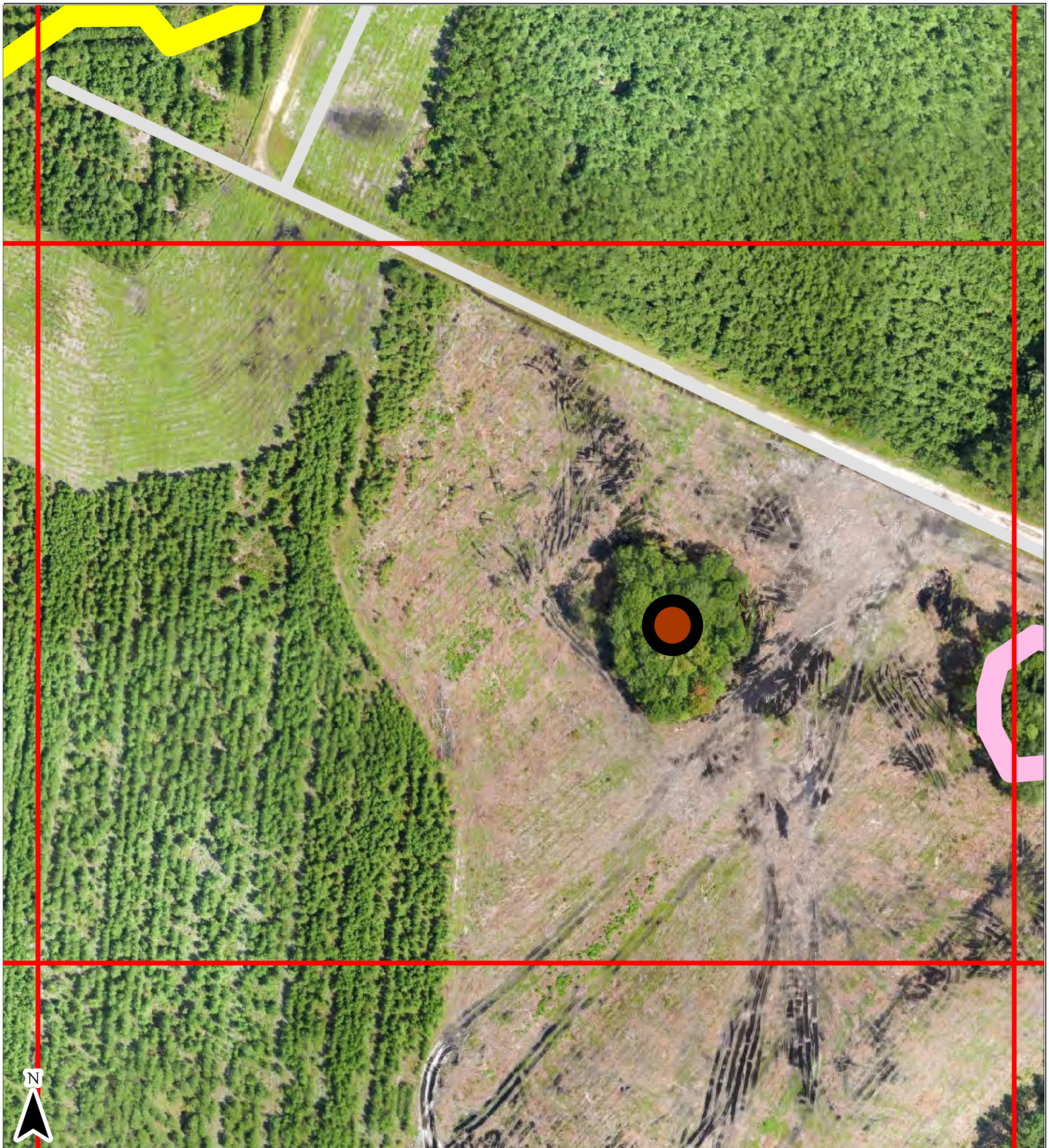


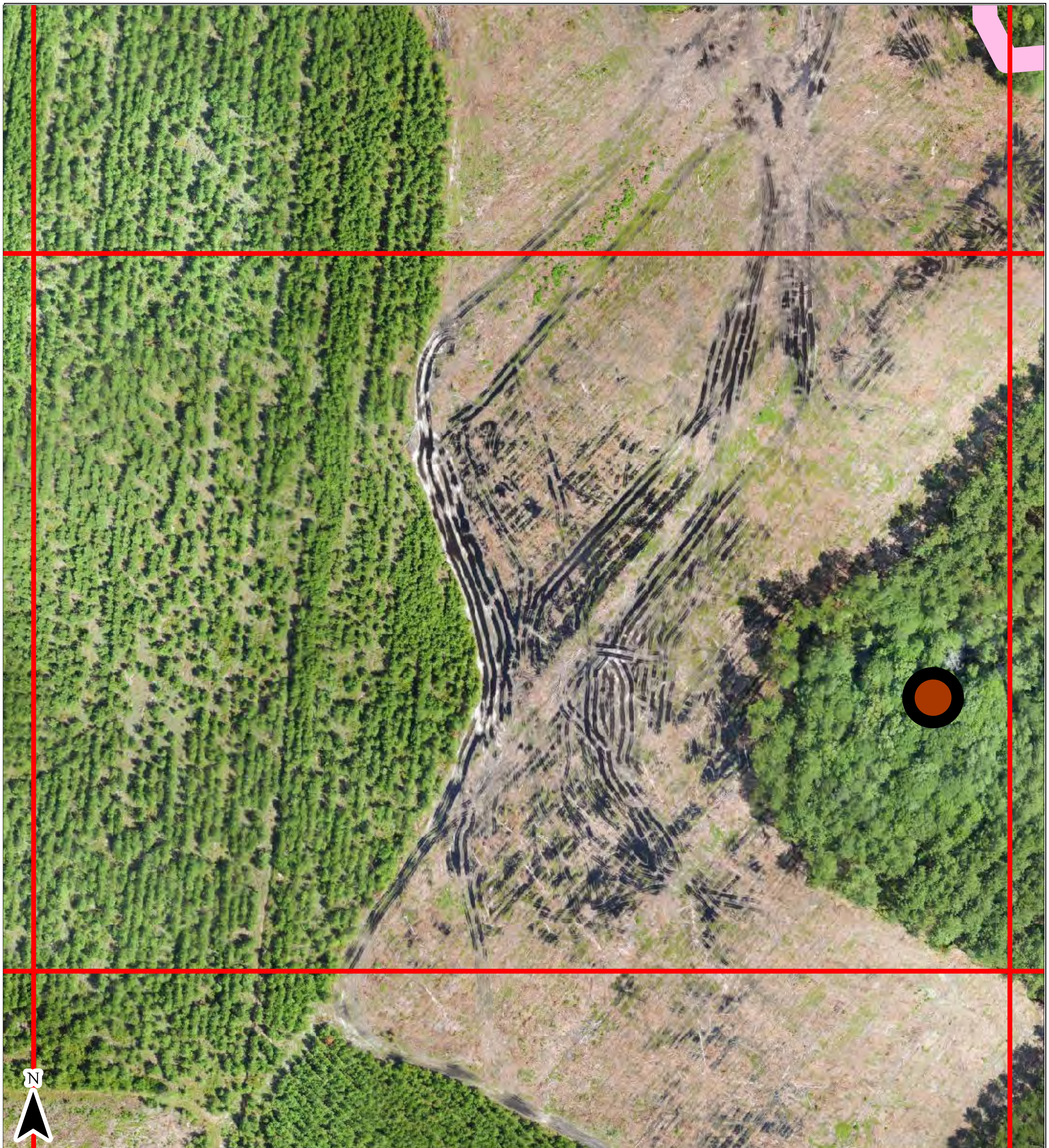
LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\SinkholeMonPrg _20201110.mxd	POTENTIAL SINKHOLES - F5	DATE: 11/18/2020
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X



LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

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PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X

LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

GMA

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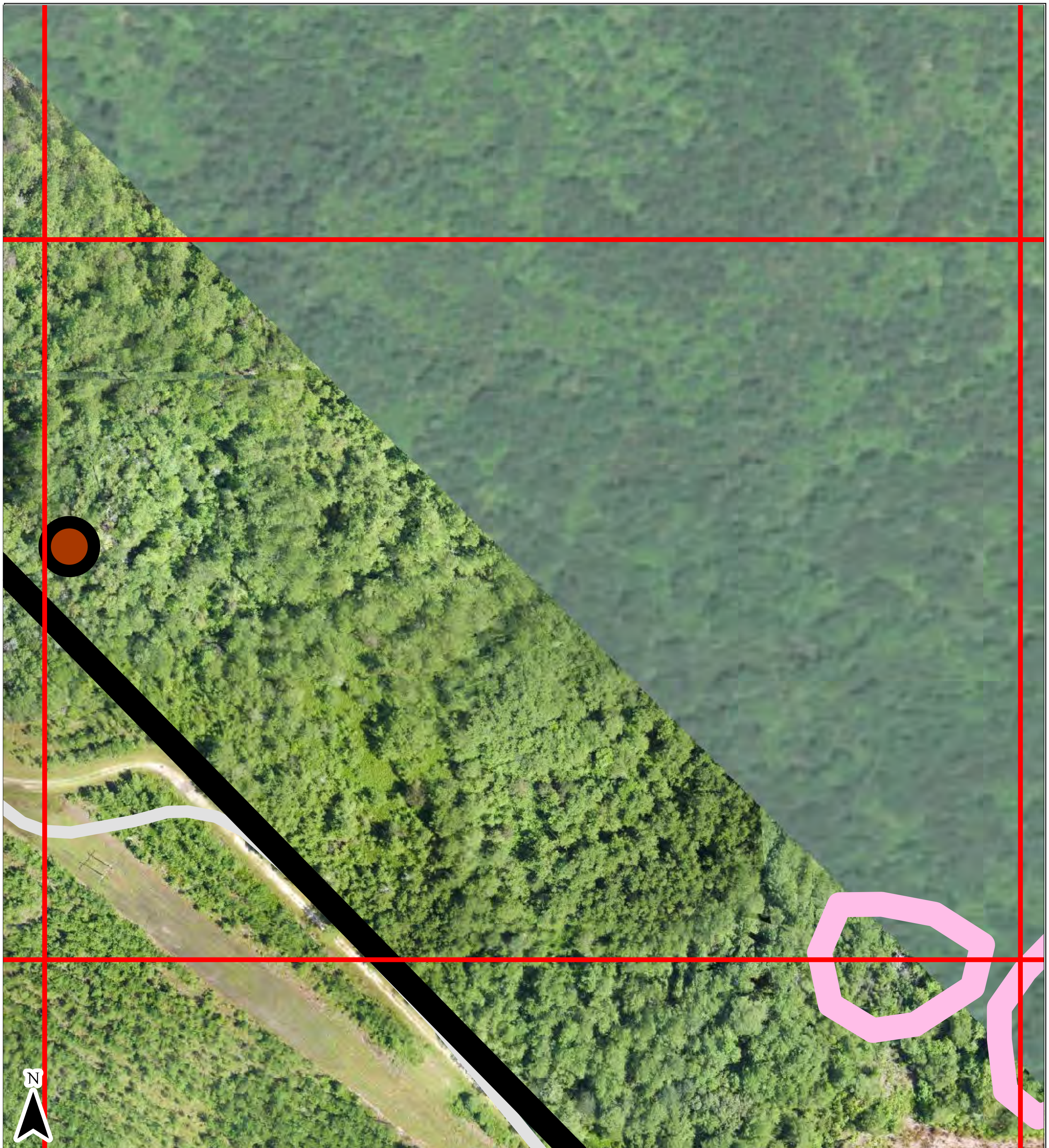
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X



LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\SinkholeMonPrg_20201110.mxd	POTENTIAL SINKHOLES - G3	DATE: 11/18/2020
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X

LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\SinkholeMonPrg _20201110.mxd	POTENTIAL SINKHOLES - G5	DATE: 11/18/2020
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X

LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\SinkholeMonPrg_20201110.mxd	POTENTIAL SINKHOLES - G7	DATE: 11/18/2020
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X

LEGEND

POTENTIAL SINKHOLE
LOW AREA (PALEO KARST?)
INTERPRETED KARST FEATURE
AMC PROPERTY
ROADS
STREAMS

110 55 0 110 Feet

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\SinkholeMonPrg _20201110.mxd	POTENTIAL SINKHOLES - H5	DATE: 11/18/2020
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X

LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
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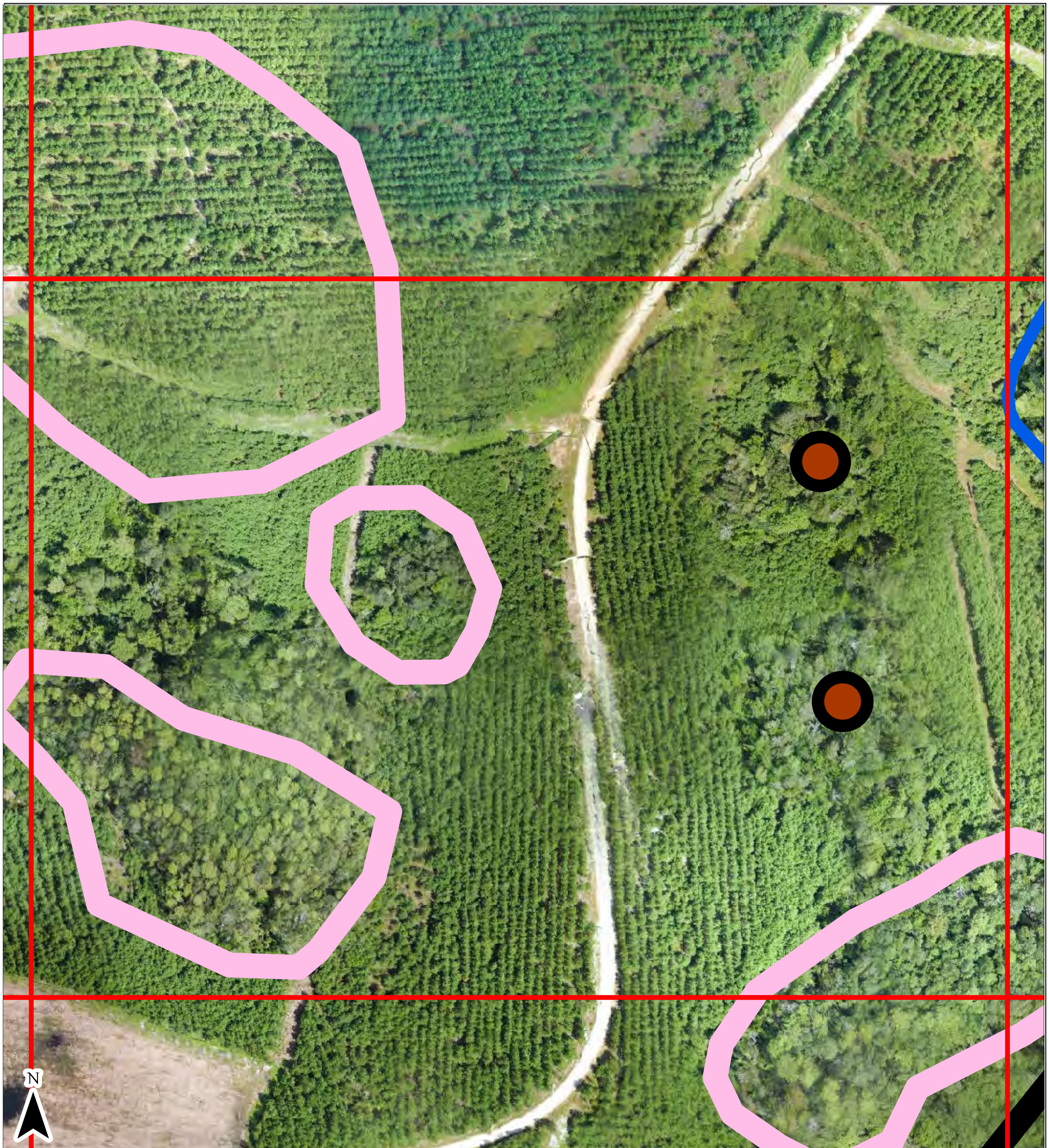
- STREAMS

110 55 0 110 Feet

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\SinkholeMonPrg _20201110.mxd	POTENTIAL SINKHOLES - H7	DATE: 11/18/2020
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X



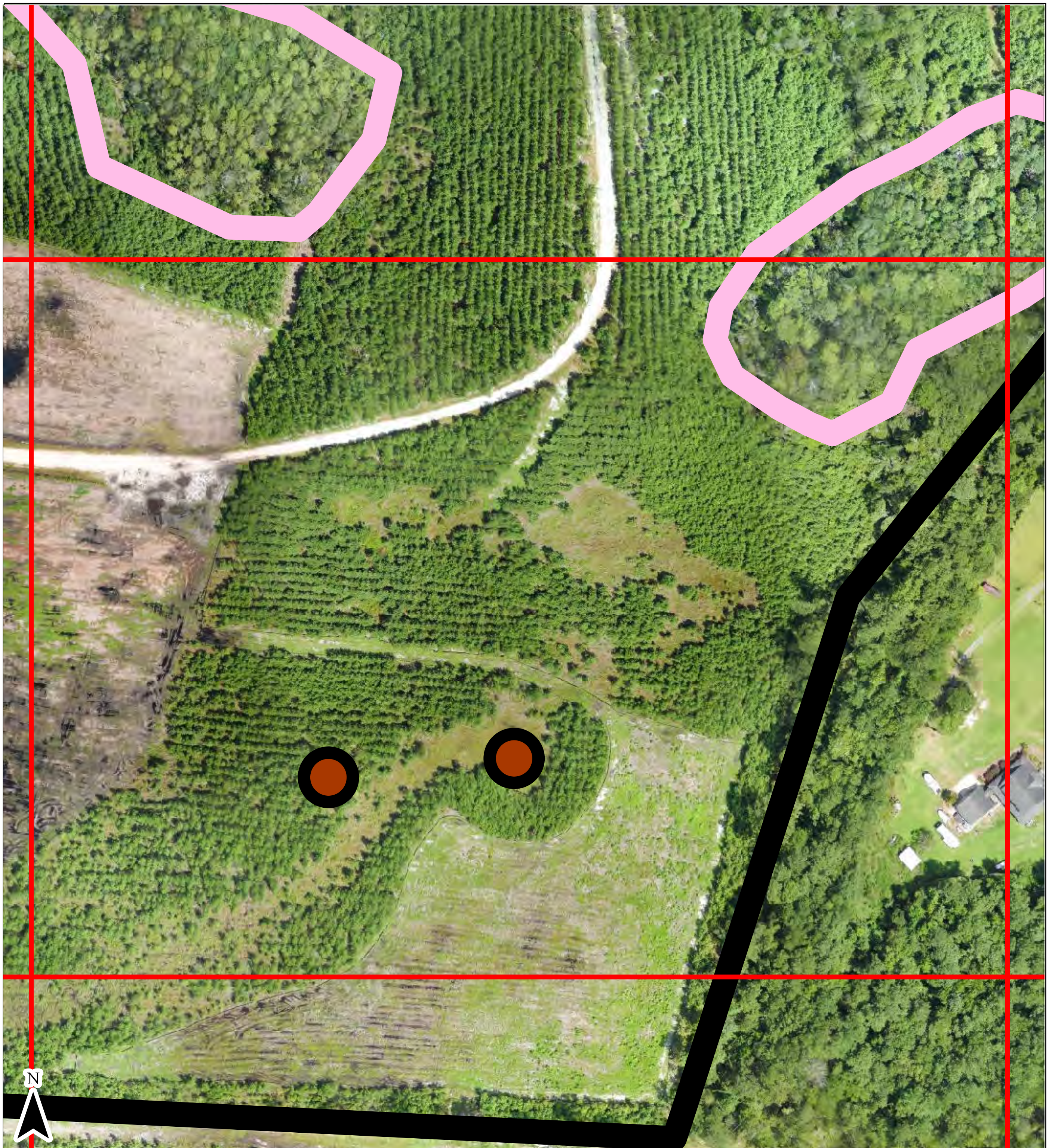
LEGEND

- POTENTIAL SINKHOLE
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

110 55 0 110 Feet

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\SinkholeMonPrg_20201110.mxd	POTENTIAL SINKHOLES - H8	DATE: 11/18/2020
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X



LEGEND

POTENTIAL SINKHOLE
LOW AREA (PALEO KARST?)
INTERPRETED KARST FEATURE
AMC PROPERTY
ROADS
STREAMS

110 55 0 110 Feet

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\SinkholeMonPrg _20201110.mxd	POTENTIAL SINKHOLES - H9	DATE: 11/18/2020
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X

Appendix II.

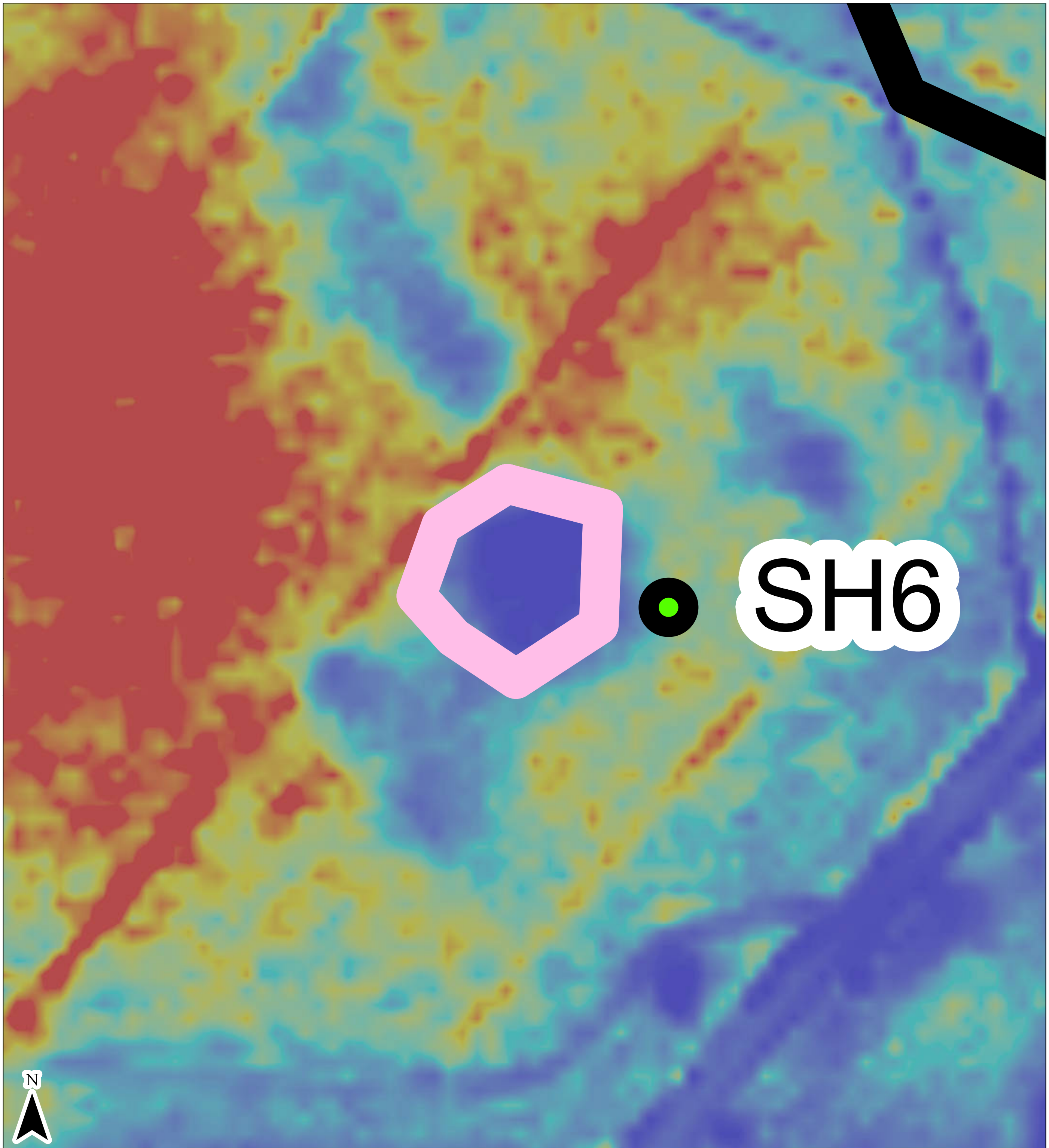
Database and Maps of On-Site Depressions Visited for Ground-Truthing

Pot_SH	Grid_Block	Long_SCSP	Lat_SCSP	Diameter_ft	Comments	Investigate	Map_ID
PSH3	E3	735739	185176.6	90	elongated/2 side-by-side? Different trees in imagery	yes	1
PSH5	G3	736221.1	185209.7	200	slightly off property. stream valley? Different trees in imagery	yes	2
PSH6	C4	735182	185009	120	l	yes	3
PSH7	D4	735256.2	185063.6	100	l	yes	4
PSH8	E4	735625.5	185027	55	Elongated /2 side-by-side?	yes	5
PSH9	C5	735080.3	184601.4	140	l	yes	6
PSH10	C5	735173.2	184620.5	90	Larger trees in imagery	yes	7
PSH11	D5	735536.6	184731.5	135	Convergense of 3 trails/fence/linear features	yes	8
PSH13	F5	736096.7	184695.5	200	Group of trees in cleared field	yes	9
PSH14	G5	736475.4	184695.5	140	Low lying area. Different trees in imagery. Trails winds around feature.	yes	10
PSH15	G5	736520.3	184791	160	Different trees in imagery. White tree tops	yes	11
PSH16	H5	736608.5	184635.5	180	Different trees in imagery	yes	12
PSH18	F6	736186.6	184429.5	85	Different trees in imagery. Few white tops	yes	13
PSH19	G7	736536	184306.6	85	Different trees in imagery	yes	14
PSH20	H7	736819.2	184304.4	135	Different trees in imagery	yes	15
PSH22	D8	735378.3	184051.2	75	Just off path/road. Man-made/cuased?	yes	16
PSH25	H8	736819.7	183948.4	175	Different trees in imagery. White tops.	yes	17
PSH26	H8	736812.1	184030	75	Different trees in imagery. Large trees surrounded by replanted trees	yes	18
PSH27	F9	736060.9	183641.4	65	Depression in cleared field	yes	19
PSH28	F9	736135.8	183647.6	180	Different trees in imagery. Very large trees	yes	20
PSH31	H9	736708.1	183678.2	60	Standing water in depression	yes	21
PSH33	D10	735461.3	183411.5	85	Just off road	yes	22

Appendix III.

Aerial Photographs, LIDAR Images, and Field Photographs of On-Site Sinkhole Ponds 6, 7, and 8.

Pot_SH	Grid_Block	Long_SCSP	Lat_SCSP	Longitude	Latitude	Diameter_ft	Comments	Investigate	Map_ID	Sinkhole_ID
SH1	D10			-79.645067	33.481195	unknown	Previously Truthed	yes	SH1	Sinkhole 1
SH2	D10			-79.644801	33.480468	unknown	Previously Truthed	yes	SH2	Sinkhole 2
SH3	D10			-79.644650	33.480300	unknown	Previously Truthed	yes	SH3	Sinkhole 3
SH4	E10			-79.644472	33.480027	unknown	Previously Truthed	yes	SH4	Sinkhole 4
SH5	D9			-79.645394	33.482533	unknown	Previously Truthed	yes	SH5	Sinkhole 5
PSH20	H7	736819.2	184304.4	-79.630490	33.487640	135	Different trees in imagery	yes	15	Sinkhole 6
PSH31	H9	736708.1	183678.2	-79.632160	33.482150	60	Standing water in depress	yes	21	Sinkhole 7
PSH33	D10	735461.3	183411.5	-79.645590	33.479860	85	Just off road	yes	22	Sinkhole 8



LEGEND

- SINKHOLES
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

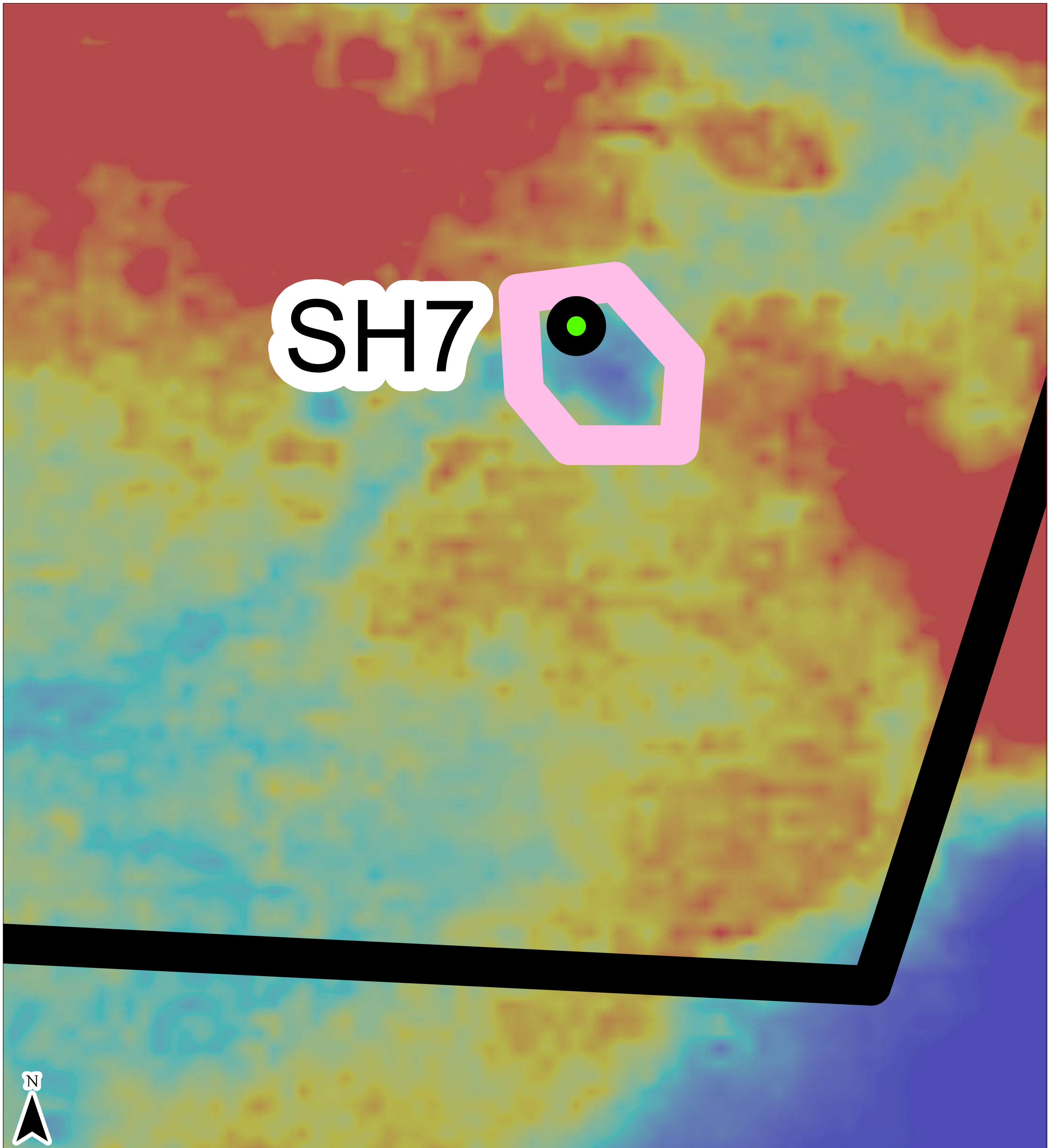
Feet

50 0 50 100

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\ZoomedImge_LIDAR_20210118.mxd	Sinkholes 6, Zoomed LIDAR	DATE: 1/18/2021
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X

Ground-Truth Feature #15: Location N33.48764, W79.63049. Assigned as Sinkhole #6



LEGEND

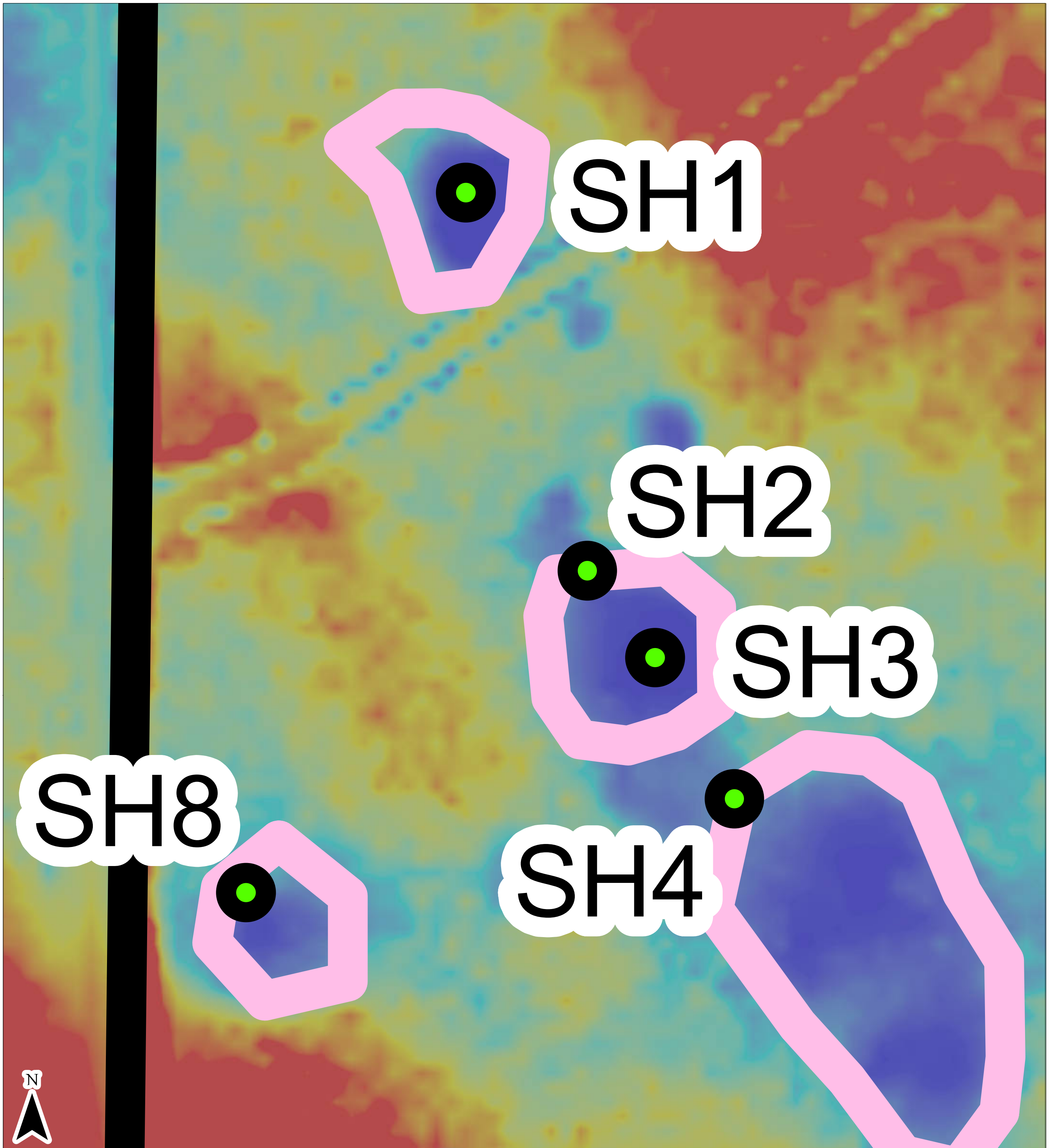
- SINKHOLES
- LOW AREA (PALEO KARST?)
- INTERPRETED KARST FEATURE
- AMC PROPERTY
- ROADS
- STREAMS

Feet
50 0 50 100

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\ZoomedImge_ LIDAR_20210118.mxd	Sinkholes 7, Zoomed LIDAR	DATE: 1/18/2021
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	FIGURE X

Ground-Truth Feature #21 – Location: N33.48215, W79.63216. Assigned as Sinkhole #7



LEGEND

SINKHOLES
LOW AREA (PALEO KARST?)
INTERPRETED KARST FEATURE
AMC PROPERTY
ROADS
STREAMS

Feet
50 0 50 100

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\ZoomedImge_LIDAR_20210118.mxd

Sinkholes 1, 2, 3, 4, and 8, Zoomed LIDAR

DATE: 1/18/2021

PROJECT NO. 163703

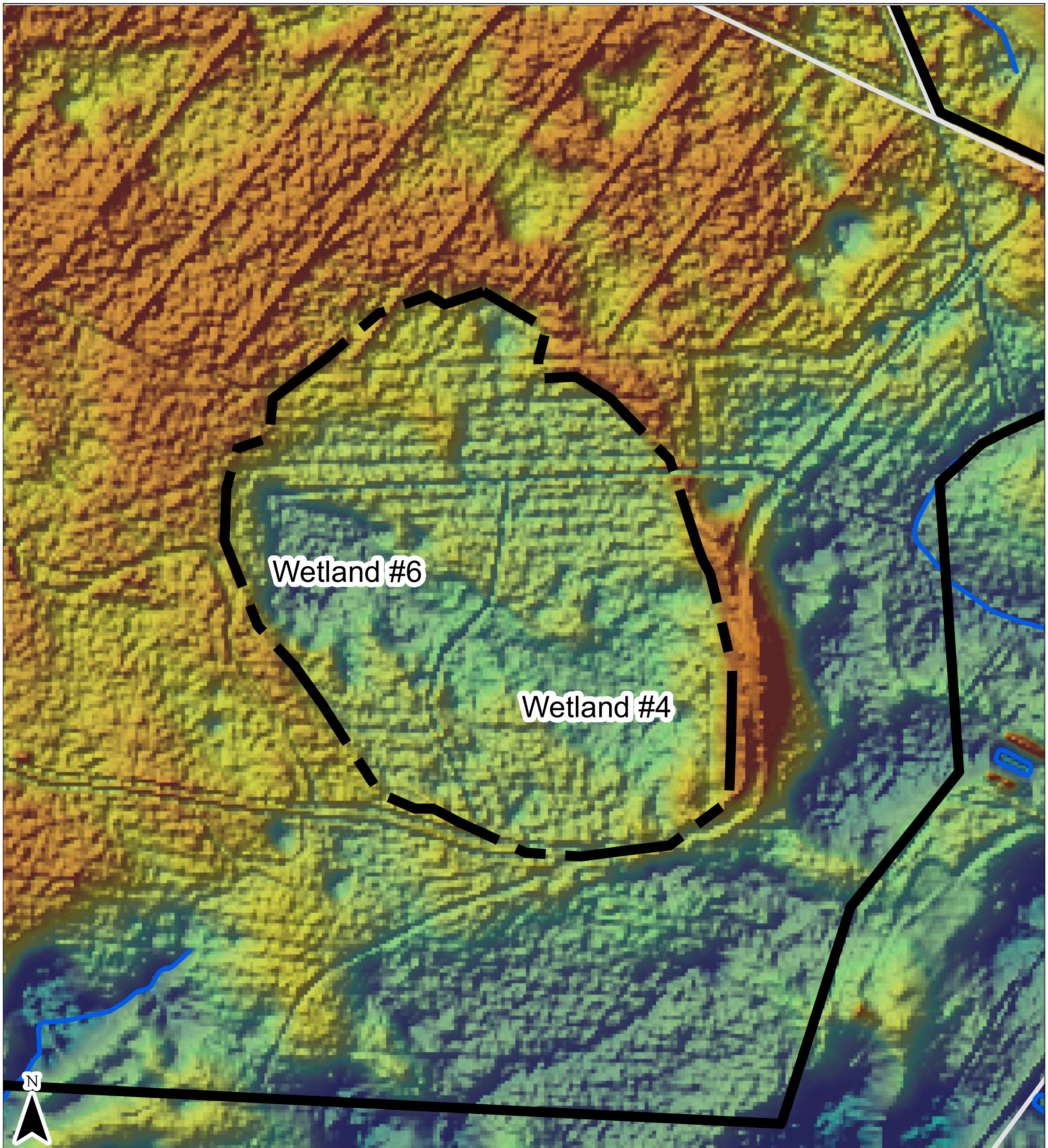
AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC

FIGURE X

Ground-Truth Feature #22: Location N33.47986, W79.64559. Assigned as Sinkhole #8

Appendix IV.

LIDAR Image of Wetlands 4 and 6 Showing GMA's Inferred Carolina Bay Outline.



LEGEND

CAROLINA BAY

AMC PROPERTY

ROADS

STREAMS

Feet
200 0 200 400

GMA

Path: Z:\Drawings\163703-AMC Sinkhole Monitoring\AppendixIV_ Carolina Bay.mxd	CAROLINA BAY FEATURE	DATE: 1/20/2021
PROJECT NO. 163703	AMERICAN MATERIALS COMPANY TRACT, WILLIAMSBURG CO., SC	