Final

Record of Decision
for Soil, Sediment, and Surface Water
at CC RVAAP-68 Electric Substations (East, West, No. 3)

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912QR-15-C-0046

Prepared for:

U.S. Army Corps of Engineers
Louisville District

Prepared by:

Leidos
8866 Commons Boulevard, Suite 201
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April 6, 2017

REPORT DOCUMENTATION PAGE	Form Approved OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
06-04-2017	Technical	Feb 2011 - Apr 2017

4. TITLE AND SUBTITLE

Final
Record of Decision for Soil, Sediment, and Surface Water
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5a. CONTRACT NUMBER
W912QR-15-C-0046

5b. GRANT NUMBER
NA

5c. PROGRAM ELEMENT NUMBER
NA

6. AUTHOR(S)
Blanton, Barry, N.

5d. PROJECT NUMBER
NA

5e. TASK NUMBER
NA

5f. WORK UNIT NUMBER
NA

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

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8. PERFORMING ORGANIZATION REPORT NUMBER
17-003(E)/040517

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

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10. SPONSOR/MONITOR'S ACRONYM(S)
USACE

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
NA

12. DISTRIBUTION/AVAILABILITY STATEMENT

Reference distribution page.

13. SUPPLEMENTARY NOTES

None.

14. ABSTRACT

This Record of Decision documents the selection of No Further Action (NFA) with respect to soil, sediment, and surface water to attain Unrestricted (Residential) Land Use at Electric Substations (East, West, No. 3). In addition, this document presents the physical characteristics, geology, and hydrogeology of Electric Substations (East, West, No. 3). This document also summarizes nature and extent of contamination in soil, sediment, and surface water; contaminant fate and transport; and human health and ecological risk assessments. These evaluations indicate there are no chemicals of concern (COCs) that pose unacceptable risk.

15. SUBJECT TERMS

record of decision, no further action, land use, chemicals of concern

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Nathaniel Peters, II
U	U	U	U	52	19b. TELEPHONE NUMBER *(Include area code)* 502.315.2624

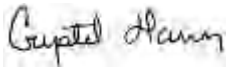
CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Leidos has completed the Record of Decision for Soil, Sediment, and Surface Water at CC RVAAP-68 Electrical Substations (East, West, No. 3) at the Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of data quality objectives; technical assumptions; methods, procedures, and materials to be used; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing U.S. Army Corps of Engineers policy.

4/6/2017

Barry Blanton, Jr.
Study/Design Team Leader

Date



4/6/2017

Crystal Hann
Independent Technical Review Team Leader

Date

Significant concerns and the explanation of the resolution are as follows:

Internal Leidos Independent Technical Review comments are recorded on a Document Review Record per Leidos standard operating procedure ESE A3.1 Document Review. This Document Review Record is maintained in the project file. Changes to the report addressing the comments have been verified by the Study/Design Team Leader. As noted above, all concerns resulting from independent technical review of the project have been considered.

4/6/2017

Lisa Jones-Bateman
Senior Program Manager

Date

Ohio Environmental Protection Agency

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

May 30, 2017

Re: US Army Ravenna Ammunition PLT RVAAP
Remediation Response
Project Records
Remedial Response
Trumbull County
267000859221

Mr. Mark Leeper
Restoration/Cleanup Program Manager
Army National Guard Directorate
ARNGD-ILE Clean Up
111 South George Mason Drive
Arlington, VA 22203

Subject: Final Record of Decision for RVAAP-68, Electrical Substations (East, West, No.3), May 9, 2016

Dear Mr. Leeper:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the "Final Record of Decision for RVAAP-68, Electrical Substations (East, West, No.3)," document for the Ravenna Army Ammunition Plant (RVAAP), Portage/Trumbull Counties. The document, dated May 9, 2017, was received at the Northeast District Office (NEDO) on May 9, 2017. This letter serves to document Ohio EPA's approval regarding the proposal of No Further Action (NFA) for the for RVAAP-68, Electrical Substations (East, West, No.3) site as discussed in the Final Record of Decision (ROD).

Based on investigative findings documented in the Final Remedial Investigation report, human health risk assessment, and ecological risk assessment, the information contained in the Final Proposed Plan, other investigation documents/reports, and Ohio EPA's oversight participation during the investigation, Ohio EPA approves the ROD for the RVAAP-68, Electrical Substations (East, West, No.3).

A public meeting was held on November 29, 2016 that was public noticed through radio stations, television stations, and newspapers. A 30-day public comment period was held between November 14, 2016 and December 14, 2016. No comments were received; therefore, the ROD contains no significant changes from the Final PP.

Received
31 MAY 2017

If you have any questions concerning the above, please feel free to contact Ed D'Amato at (330) 963-1170.

Sincerely,

Michael Proffitt, Chief
Division of Environmental Response and Revitalization

ED/nvr

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DOCUMENT DISTRIBUTION
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at CC RVAAP-68 Electric Substations (East, West, No. 3)
Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

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ARNG = Army National Guard.
CO = Central Office.
DERR = Division of Environmental Response and Revitalization.
IED = Installation and Environment Division.
NEDO = Northeast District Office.
OHARNG = Ohio Army National Guard.
Ohio EPA = Ohio Environmental Protection Agency.
REIMS = Ravenna Environmental Information Management System.
USACE = U.S. Army Corps of Engineers.

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ACRONYMS/ABBREVIATIONS

amsl	above mean sea level
AOC	Area of Concern
Army	U.S. Department of the Army
bgs	below ground surface
BUSTR	Bureau of Underground Storage Tank Regulations
Camp Ravenna	Camp Ravenna Joint Military Training Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Act Information System
COC	Chemical of Concern
COPC	Chemical of Potential Concern
COPEC	Chemical of Potential Ecological Concern
ERA	Ecological Risk Assessment
FGDC	Federal Geographic Data Committee
FWCUG	Facility-wide Cleanup Goal
HHRA	Human Health Risk Assessment
HRR	Historical Records Review
IRP	Installation Restoration Program
ISM	Incremental Sampling Methodology
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PCB	Polychlorinated Biphenyl
PP	Proposed Plan
RI	Remedial Investigation
ROD	Record of Decision
RVAAP	Ravenna Army Ammunition Plant
SRC	Site-related Contaminant
SVOC	Semi-volatile Organic Compound
TAL	Target Analyte List
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USP&FO	U.S. Property and Fiscal Officer

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PART I: THE DECLARATION

A SITE NAME AND LOCATION

This Record of Decision (ROD) addresses soil, sediment, and surface water contaminants at CC RVAAP-68 Electric Substations (East, West, No. 3) within the former Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio (Figures 1 and 2).

The former RVAAP is now known as Camp Ravenna Joint Military Training Center (Camp Ravenna). Camp Ravenna, consisting of 21,683 acres, is federally owned and is located in northeastern Ohio within Portage and Trumbull counties, approximately 4.8 kilometers (3 miles) east/northeast of the city of Ravenna and approximately 1.6 kilometers (1 mile) northwest of the city of Newton Falls. As of September 2013, administrative accountability for the entire acreage of the facility has been transferred to the U.S. Property and Fiscal Officer (USP&FO) for Ohio and subsequently licensed to the Ohio Army National Guard (OHARNG) for use as a military training site (Camp Ravenna).

The three separate, inactive electric substations that together comprise the CC RVAAP-68 Electric Substations (East, West, No. 3) area of concern (AOC) are all located within the facility. These former substations were key distribution points for electrical power throughout the facility. The West Substation and Substation No. 3 are located in the south-central portion of Camp Ravenna. The East Substation is located in the east-central portion.

The Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) identifier for RVAAP is OH5210020736.

B STATEMENT OF BASIS AND PURPOSE

The U.S. Department of the Army (Army) is the lead agency and has chosen the selected remedy for Electric Substations (East, West, No. 3) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on information contained in the Administrative Record file for the AOC.

The Ohio Environmental Protection Agency (Ohio EPA), the support agency, concurred with the *Remedial Investigation Report CC RVAAP-68 Electric Substations (East, West, No. 3)* (USACE 2015) and *Proposed Plan for Soil, Sediment, and Surface Water at CC RVAAP-68 Electric Substations (East, West, No. 3)* (USACE 2016). The Remedial Investigation (RI) Report evaluated contaminated soil, sediment, and surface water at Electric Substations (East, West, No. 3) and recommended no further action for these media. The decision that no further action is required for soil, sediment, and surface water at Electric Substations (East, West, No. 3) satisfies the requirements of the Ohio EPA *Director's Final Findings and Orders*, dated June 10, 2004 (Ohio EPA 2004).

C DESCRIPTION OF THE SELECTED REMEDY

No further action is necessary for soil, sediment, and surface water at Electric Substations (East, West, No. 3) for Unrestricted (Residential) Land Use. Consequently, no further action is necessary for the future use of the site (Military Training). Groundwater at Electric Substations (East, West, No. 3) will be addressed under future CERCLA decisions. Land use controls will not be implemented as part of this decision, as no CERCLA-related chemicals of concern (COCs) were identified in soil, sediment, or surface water for the Resident Receptor.

D STATUTORY DETERMINATIONS

The recommendation of no further action for soil, sediment, and surface water is protective of human health and the environment and meets the statutory requirements for cleanup standards established in Section 121 of CERCLA. Because the CERCLA-related contamination present in soil, sediment, and surface water at Electric Substations (East, West, No. 3) does not pose a potential risk to human health or the environment, five-year reviews will not be required.

E AUTHORIZING SIGNATURE

1 May 2014

Erik T. Gordon
COL, GS
Chief, Installation and Environment (I&E)

Date

PART II: DECISION SUMMARY

A SITE NAME, LOCATION, AND DESCRIPTION

When the RVAAP Installation Restoration Program (IRP) began in 1989, RVAAP (CERCLIS Identification Number OH5210020736) was identified as a 21,419-acre installation. In 2002 and 2003, OHARNG surveyed the property and the total acreage of the property was found to be 21,683 acres. The RVAAP IRP encompasses investigation and cleanup of past activities over the entire 21,683-acre former RVAAP.

As of September 2013, administrative accountability for the entire acreage of the facility has been transferred to the USP&FO for Ohio and subsequently licensed to OHARNG for use as a military training site (Camp Ravenna). The Army is the lead agency for any remediation, decisions, and applicable cleanup at Electric Substations (East, West, No. 3). These activities are being funded and conducted under the IRP. Ohio EPA is the support agency.

Camp Ravenna is located in northeastern Ohio within Portage and Trumbull counties, approximately 4.8 km (3 miles) east-northeast of the city of Ravenna and approximately 1.6 km (1 mile) northwest of the city of Newton Falls. The RVAAP portions of the property are solely located within Portage County. References in this document to RVAAP relate to previous activities at the facility as related to former munitions production activities or to activities being conducted under the restoration/cleanup program.

Camp Ravenna is a parcel of property approximately 17.7 km (11 miles) long and 5.6 km (3.5 miles) wide, bounded by State Route 5 and the CSX System Railroad on the south; Garret, McCormick, and Berry roads on the west; the Norfolk Southern Railroad on the north; and State Route 534 on the east (see Figures 1 and 2). Camp Ravenna is surrounded by several communities: Windham 11.2 km (7 miles) to the north, Garrettsville 9.6 km (6 miles) to the north, Newton Falls 1.6 km (1 mile) to the southeast, Charlestown 3.6 km (5.7 miles) to the southwest, and Wayland 4.8 km (3 miles) to the south.

The three separate, inactive electric substations that together comprise the CC RVAAP-68 Electric Substations (East, West, No. 3) AOC are all located within the facility. The West Substation and former Substation No. 3 are located relatively close to each other. The West Substation is located northwest of Load Line 5 on Fuze and Booster Road. Substation No. 3 is located in the Fuze and Booster Service Area southeast of Fuze and Booster Spur Road between Load Lines 10 and 11. The East Substation is located several miles to the east of the other two former substations, in the east-central portion of the facility along the south side of Remalia Road, approximately 325 ft southwest of the intersection with Load Line No. 2 Road.

The East Substation is located adjacent to Building 25-27, the West Substation is located near Building 28-28, and Substation No. 3 was not associated with an operational support structure. Figures 2 and 3 depict the location of these AOCs.

East Substation – The East Substation comprises an area of approximately 12,300 ft^2. The only remaining structure at the former East Substation is Building 25-27 (former Switch House). The exterior area of the substation now consists of gravel and an open field that is regularly mowed. Aboveground electrical lines run south of the East Substation, paralleling the rail line. A ditch is located along the northern boundary of the East Substation, paralleling Remalia Road.

West Substation – The West Substation comprises an area of approximately 3,000 ft^2 and is located immediately southwest of the previous location of Building 52-15 (former Power House) that was demolished in 2010. That plot of land is currently an open field. The only remaining structure at the West Substation is Building 28-28. The area immediately north of the West Substation is mainly a wooded area with rail lines. Part of this exterior area is now gravel and grass with a small ditch that is parallel to the west side of the building and intersects with the ditch parallel to Fuze and Booster Road.

Substation No. 3 – Substation No. 3 comprises an area of approximately 10,000 ft^2. There was no building associated with Substation No. 3. The only features that remain are the concrete foundations for the transformers, other electrical equipment, and stumps from former utility poles.

B SITE HISTORY AND ENFORCEMENT ACTIVITIES

RVAAP was constructed in 1940 and 1941 for depot storage and ammunition assembly/loading and placed on standby status in 1950. The primary purpose of the former RVAAP was to load medium and major caliber artillery ammunition (i.e., bombs, mines, fuze and boosters, primers, and percussion elements) and store finished components. Load Lines 5 through 11 produced fuzes, boosters, primers, detonators, and percussion elements.

The three former substations were key distribution points for electrical power throughout the facility. Electricity for the facility was purchased from the Ohio Edison Company and was supplied from Newton Falls and Garrettsville, Ohio. Distribution of electricity occurred through the substations, each at approximately 24,000 volts.

East Substation – The East Substation was in use from the 1940s through 1993, servicing Load Lines 1, 2, 3, 4, and 12, as well as providing power for miscellaneous buildings and operations on the eastern side of the facility. While in use, the East Substation consisted of a brick Switch House (Building 25-27) of approximately 1,170 ft^2, constructed on a 6-inch thick reinforced concrete floor. The interior of the building was divided into a general area for the switch gear panel and a smaller room used for storing lead acid batteries for backup power. The switch gear panel was connected to two pad-mounted 3,000 kilovolt-ampere transformers and 36 high voltage capacitors located outside the building. A metal fence surrounded the building and exterior equipment.

West Substation – The West Substation serviced the Fuze and Booster Hill area, including Load Lines 5 through 11, the Administration Area, and George Road Area. The layout of the West Substation was similar to the East Substation, featuring a 964 ft^2 brick building (Building 28-28) with a switch gear panel room and battery storage room (currently in use by OHARNG), with two pad-

mounted transformers and other electrical equipment surrounded by a metal fence. Equipment was removed from service in 1993. Salvage operations, including removal of the fence, occurred in 1997.

In 1997, approximately 1,500 gal of transformer oil were spilled during salvage operations at the West Substation. The Army removed 449 tons of contaminated soil under the oversight of Ohio EPA. Analytical results were compared to the state of Ohio's Bureau of Underground Storage Tank Regulations (BUSTR) which confirmed the area to be clean (Diamond 1997).

Substation No. 3 – There was no building associated with Substation No. 3. Transformers and other electrical equipment located here were used to service the western portion of the facility, including the Depot Area.

The use of several hazardous and regulated materials was documented during the operation of the three substations, including petroleum products (fuels and oils), polychlorinated biphenyls (PCBs), and lead acid batteries. Annual PCB inventory inspections were conducted on a facility-wide basis to document quantities of PCB oil located throughout the facility. The results of the inspections were documented in annual PCB inventory reports, which listed all PCB-containing items, including transformers, capacitors, contaminated soil, and hydraulic equipment containing contaminated oil.

C COMMUNITY PARTICIPATION

Using the RVAAP community relations program, the Army and Ohio EPA have interacted with the public via news releases, public meetings, reading materials, direct mailings, an internet website, and receiving and responding to public comments. Specific items in the community relations program include the following:

Restoration Advisory Board – The Army established a Restoration Advisory Board in 1996 to promote community involvement in U.S. Department of Defense environmental cleanup activities and allow the public to review and discuss the progress with decision makers. Board meetings are generally held every two or three months and are open to the public.

Community Relations Plan – The *Community Relations Plan* (Vista 2016) was prepared to establish processes to keep the public informed of activities at RVAAP. The plan is available in the Administrative Record at Camp Ravenna.

Internet Website – The Army established an internet website in 2004 for RVAAP. It is accessible to the public at www.rvaap.org.

In accordance with CERCLA Section 117(a) and National Oil and Hazardous Substances Pollution Contingency Plan Section 300.430(f)(2), the Army released the *Proposed Plan for Soil, Sediment, and Surface Water at CC RVAAP-68 Electric Substations (East, West, No. 3)* (USACE 2016) to the public on November 14, 2016. The proposed plan (PP) and other project-related documents were made available to the public in the Administrative Record maintained at Camp Ravenna and in the Information Repositories at Reed Memorial Library in Ravenna, Ohio, and Newton Falls Public

Library in Newton Falls, Ohio. A notice of availability for the PP was sent to radio stations, television stations, and newspapers (e.g., *Youngstown Vindicator, Warren Tribune-Chronicle, Akron Beacon Journal,* and *Ravenna Record Courier*), as specified in the Community Relations Plan. The notice of availability initiated the 30-day public comment period beginning November 14, 2016, and ending December 14, 2016.

The Army held a public meeting on November 29, 2016, at the Shearer Community Center, 9355 Newton Falls Road, Ravenna, Ohio 44266 to present the PP. At this meeting, representatives of the Army provided information and were available to answer any questions. A transcript of the public meeting is available to the public and has been included in the Administrative Record. Responses to any verbal comments received at this meeting and written comments received during the public notification period are included in the Responsiveness Summary, which is Part III of this ROD.

The Army considered public input from the public meeting on the PP when selecting the remedy.

D SCOPE AND ROLE OF RESPONSE ACTIONS

The overall program goal of the IRP at the former RVAAP is to clean up previously contaminated lands to reduce contamination to concentrations that are not anticipated to cause risks to human health or the environment. In 1997 at the West Substation, the Army excavated and removed 449 tons of contaminated soil and performed confirmation sampling in response to a transformer spill. No other cleanup activities have been required or performed at Electric Substations (East, West, No. 3) to date.

This ROD addresses soil, sediment, and surface water. The CERCLA-related contamination at Electric Substations (East, West, No. 3) is at concentrations considered protective of human health and does not represent a risk to the environment. Therefore, these media are already protective for Unrestricted (Residential) Land Use, and the program goal of the IRP at RVAAP has been met for Electric Substations (East, West, No. 3).

E SITE CHARACTERISTICS

This section presents site characteristics, nature and extent of contamination, and the conceptual site model for Electric Substations (East, West, No. 3). These characteristics and findings are based on investigations conducted from 1978–2012 and are further summarized in the *Final Remedial Investigation Report CC RVAAP-68 Electric Substations (East, West, No. 3)* (USACE 2015).

E.1 Physical Characteristics

This section describes the topography/physiology, geology, hydrogeology, and ecological characteristics of Camp Ravenna and Electric Substations (East, West, No. 3) that were key factors in identifying the potential contaminant transport pathways, receptor populations, and exposure scenarios to evaluate human health and ecological risks.

E.1.1 Topography/Physiography

The topography of Camp Ravenna is gently undulating with an overall decrease in ground elevation from a topographic high of approximately 1,220 ft above mean sea level (amsl) in the far western portion of the facility to low areas at approximately 930 ft amsl in the far eastern portion.

East Substation – The topography at the East Substation is generally flat with a slight grade to the north-northwest, such that the area drains toward the roadside ditch along Remalia Road. The approximate surface elevation of the site is 994 ft amsl. The area comprises approximately 12,300 ft^2 and is covered with grass and some low-growing shrubs. The gravel pad adjacent to Building 25-27, where the former transformers were located, was present during the 2013 field sampling event. Building 25-27 was a brick building on a concrete slab foundation and was approximately 47 by 28 ft (USACE 2015).

There are no wetlands, creeks, streams, or other water bodies within the East Substation. The only surface water feature within the East Substation area is a ditch that parallels Remalia Road along the site's northern boundary. Based on the topography map of the site, the ditch flows from east to west only during periods of sustained precipitation. The nearest wetland downgradient of this ditch is located approximately 0.25 miles to the west (USACE 2015). Site features are depicted in Figure 3 and 4.

West Substation – The topography at the West Substation is generally flat, with an approximate surface elevation of 1,115 ft amsl. While the larger area surrounding the West Substation drains generally to the north, the localized AOC area drains to the south to the small ditch that runs parallel to the southwest side of the building and along the southeast boundary parallel to Fuze and Booster Road (SAIC 2011).

When it was active, the substation comprised an area of approximately 3,000 ft^2. Grass now surrounds the area where the transformers were located and around Building 28-28. In addition, there is a gravel area west of Building 28-28 used for parking by OHARNG personnel. The concrete slab foundations for the transformers still exist at the AOC (USACE 2015).

There are no wetlands, creeks, streams, or other water bodies within the West Substation. The only surface water feature within the West Substation is an artificial ditch that parallels the southwest boundary of the site and joins the ditch located along Fuze and Booster Road, along the site's southeastern boundary. Based on the topography map of the site, this ditch flows only during periods of sustained precipitation to a ditch parallel to Fuze and Booster Road. The nearest wetland downgradient of this ditch is located approximately 800 ft to the northeast (USACE 2015). Site features are depicted in Figures 3 and 5.

Substation No. 3 – The topography at Substation No. 3 is generally flat with an approximate surface elevation of approximately 1,090 ft amsl. This AOC drains to the southeast toward a large wetland and an unnamed tributary to Sand Creek.

The substation comprised an area of approximately 10,000 ft^2. There is an approximately 12-inch corrugated metal culvert pipe located along the driveway to the northeast. The AOC is located in an open field and is surrounded by wooded areas. No buildings existed at Substation No. 3. The concrete foundations used to support the transformers still remain at the AOC.

There are no wetlands, creeks, streams, or other water bodies within Substation No. 3. However, a wetland and associated aquatic habitat are located just beyond the southeast site boundary. Based on the topography map of the site, runoff from the site flows toward this wetland. The wetland flows northeast into an unnamed tributary of Sand Creek (USACE 2015), as depicted in Figures 3 and 6.

E.1.2 Geology

The regional geology at the facility consists of horizontal to gently dipping bedrock strata of Mississippian and Pennsylvanian age overlain by varying thicknesses of unconsolidated glacial deposits. The site-specific bedrock geology has been inferred from the data presented in the Environmental Quality Management *Facility-wide Groundwater Monitoring Annual Report for 2012* (EQM 2013).

East Substation – The native soil at the East Substation was mapped by the U.S. Department of Agriculture (USDA) as Fitchville silt loam (0–2% slopes). Boring logs from the area indicate 1 ft of sandy gravel at the surface of the site. Soil below that is generally silty sand and clay, which is assumed to be Hiram Till glacial deposits or fill material from site construction. Figure 4 depicts the soil types at the East Substation.

Although borings at the site have not been advanced to the top of bedrock, the bedrock beneath the site is assumed to be the Sharon Sandstone Member of the Pennsylvanian Pottsville Formation (EQM 2013) (Figure 7).

West Substation – The native soil at the West Substation was mapped by USDA as Mahoning silt loam (2–6% slopes). Boring logs from the area indicate approximately 0.5 ft of sandy gravel at the surface of the site. Soil below that is generally silty clay with a few thin layers of sand or gravel. This soil is assumed to be Hiram Till or fill material [slag noted at 4 ft below ground surface (bgs) in one boring] (USACE 2015). Figure 5 depicts the soil types at the West Substation.

Although borings at the site have not been advanced to the top of bedrock, the bedrock beneath the site is assumed to be the Mercer Shale Member of the Pennsylvanian Pottsville Formation (Figure 7). The Mercer Shale consists of silty to carbonaceous shale with abundant thin, discontinuous sandstone lenses in the upper portion. Regionally, the Mercer Shale has been noted to also contain interbeds of coal.

Substation No. 3 – The native soil at Substation No. 3 was mapped by USDA as Wadsworth silt loam (2% slope). Boring logs from the area indicate approximately 0.5 ft of sandy gravel at the surface of the site. Soil below that is generally silty clay with a few thin layers of silty sand. This soil is assumed to be Hiram Till or fill material. The native soil in the area of the sediment and surface

water sampling at this AOC was mapped as the Holly silt loam. It is unclear whether this area has been disturbed by site activity (USACE 2015). Figure 6 depicts the soil types at Substation No. 3.

Although borings at the site have not been advanced to the top of bedrock, the bedrock beneath the site is assumed to be the Mercer Shale Member of the Pennsylvanian Pottsville Formation or the underlying Sharon Shale Member (based on bedrock borings near the site (Figure 7). Mercer Shale consists of silty to carbonaceous shale with abundant thin, discontinuous sandstone lenses in the upper portion. Regionally, Mercer Shale has been noted to also contain interbeds of coal. Sharon Shale is a gray to black sandy to micaceous shale containing thin coal, underclay, and sandstone lenses (USACE 2015).

E.1.3 Hydrogeology

The hydrogeology for CC RVAAP-68 Electric Substations (East, West, No. 3) is based on data presented in the *Facility-wide Groundwater Monitoring Program 2012 Annual Report* (EQM 2013).

East Substation – No facility-wide groundwater monitoring wells are located at the East Substation. The nearest facility-wide groundwater monitoring well is LL2mw-270, located approximately 1,750 ft to the southeast within Load Line 2. This well is screened from 9.8–19.8 ft bgs in the Sharon Sandstone aquifer. Boring logs from the East Substation suggest that silty clay is predominantly present beneath the area to at least 7 ft bgs. Historical deep soil boring logs indicate that dry clay is present from 7–13 ft bgs. The East Substation is located within an area that is mapped as having no unconsolidated aquifer; the first aquifer encountered is likely in Sharon Sandstone, at depths greater than 13 ft bgs. The East Substation is located near a presumed localized groundwater high within the Sharon Sandstone Member, with a relatively flat gradient (Figure 7). While the direction of groundwater flow beneath the East Substation is difficult to predict, the overall direction of groundwater flow within the Sharon Sandstone is to the east (USACE 2015).

West Substation – No facility-wide groundwater monitoring wells are located at the West Substation. The Historical Records Review (HRR) identifies the nearest facility-wide groundwater monitoring well as SCFmw-001, located approximately 150 ft southwest of the West Substation. This well is screened from 201-211 ft bgs in the Sharon Conglomerate aquifer. The closest unconsolidated groundwater monitoring well, LL6mw-001, is located approximately 640 ft southwest of the West Substation. Historical boring logs from the West Substation indicate that, in some places, there may be a thin, perched wet zone on top of moist silty clay at approximately 4 ft bgs. The deep soil boring log suggests that silty clay is present to at least 13 ft bgs with no indication that groundwater was encountered. The West Substation is located in an area of localized high groundwater levels (mounded) with a relatively flat gradient. Therefore, groundwater flow direction beneath the West Substation could vary in the unconsolidated aquifer; however, based on the topographic map, it likely flows northeast (USACE 2015).

The elevation of the potentiometric surface in bedrock beneath the West Substation is estimated to be 1,107 ft amsl within the Homewood Sandstone Member, which is based on monitoring well SCFmw-

001. The regional bedrock groundwater flow direction near the West Substation is to the southeast (USACE 2015) (Figure 7).

Substation No. 3 – No facility-wide groundwater monitoring wells are located at Substation No. 3 AOC. The nearest facility-wide groundwater monitoring well is LL11mw-001, approximately 1,350 ft northwest of Substation No. 3. This well is screened from 11.4–21.4 ft bgs within the unconsolidated aquifer. Historical borings logs from Substation No. 3 indicate that a wet, silty sand layer may exist at approximately 5 ft bgs. In one of the borings, moist silty clay is present below the silty sand layer at approximately 6 ft bgs; in another boring, the silty sand layer was not encountered. This suggests that the wet layer is likely small in lateral extent and thin in vertical extent. Based on the topographic map, the unconsolidated groundwater beneath Substation No. 3 likely flows east-southeast (USACE 2015). The regional bedrock groundwater flow direction near Substation No. 3 is to the east-northeast.

E.1.4 Ecology

Numerous plant community and wildlife studies have been conducted at the facility since 1993 (AMEC 2008). Plant communities have been mapped for the entire facility, including CC RVAAP-68 Electric Substations (East, West, No. 3), using two classification systems:

- Anderson's Classification Scheme (Anderson 1982) in 1993 (ODNR-DNAP 1993).
- The Federal Geographic Data Committee (FGDC) Vegetation Classification Standard (National Spatial Data Infrastructure 1997) in 1999 (SAIC 1999).

The FGDC Vegetation Classification Standard is the approved standard for vegetation classification on federal land. Plant communities in and around CC RVAAP-68 Electric Substations (East, West, No. 3) were mapped using the FGDC Vegetation Classification Standard. However, the three former electric substations themselves represent small areas (less than 1 acre total) of the facility. Therefore, the gravel areas and mowed lawns that represent the dominant land cover at the electric substations do not appear on the vegetation maps. Plant communities in the greater vicinity of the electric substations were mapped as:

- East Substation
  - Dry mid-successional cold-deciduous shrubland
  - Dry early-successional herbaceous field
  - Red maple (*Acer rubrum*) successional forest
- West Substation
  - Dry early-successional herbaceous field
  - Dry mid-successional cold-deciduous shrubland
  - Mixed cold-deciduous successional forest
- Substation No. 3
  - Dry mid-successional cold-deciduous shrubland
  - Red maple (*Acer rubrum*) successional forest

- Red maple (*Acer rubrum*) and green ash (*Fraxinus pennsylvanica*) Seasonally Flooded Forest Alliance
- Cattail (*Typha spp.*) and sedge (*Scirpus spp.* to *Juncus spp.*) Seasonally Flooded Herbaceous Alliance

Land cover is dominated by gravel and maintained lawn, which are not considered habitat. Vegetated portions of the site are dominated by dry early-successional herbaceous field and dry late-to-mid successional cold-deciduous shrubland.

Wildlife studies have not been conducted specifically for the Electric Substations (East, West, No. 3). The gravel and mowed lawn land cover that dominates the AOC does not constitute habitat. However, the vicinity of the AOC, with its mix of herbaceous fields, shrubland, forest edge, and wetland habitats provides habitat for various wildlife species.

E.2 Site Investigations

The use of several hazardous and regulated materials was documented during the operation of the three former substations, including petroleum products (fuels and oils), PCBs, and lead acid batteries. The facility's disposal practices for PCBs were documented in the facility standard operating procedure, and inventories of PCB material were maintained on the annual PCB inventory logs. Annual PCB inventory inspections were conducted on a facility-wide basis to document quantities of PCB oil located throughout the facility. The results of the inspections were documented in annual PCB inventory reports. These reports documented all PCB-containing items, including transformers, capacitors, contaminated soil, and hydraulic equipment containing contaminated oil. In August 1993, the transformers were drained and moved to Building 854 for disposal.

E.2.1 Historical Records Review

A summary of the findings detailed in the *Historical Records Review Report for the 2010 Phase I Remedial Investigation Services at Compliance Restoration Sites (9 Areas of Concern)* (SAIC 2011) for this AOC is provided below.

East Substation – Building 25-27 at the East Substation contained a bank of lead acid batteries to provide backup power to the switch gear. The number of lead acid batteries stored at Building 25-27 is unknown; however, in the HRR, interviewees recalled approximately 80 batteries being stored at the location at any one time. No documented evidence of a release from the batteries was found during the completion of the HRR.

Further investigation was recommended at the East Substation due to the potential for unreported spills/leaks from the electrical equipment at the substation. The target analytes recommended were target analyte list (TAL) metals, PCBs, and semi-volatile organic compounds (SVOCs) for surface and subsurface soil and dry sediment along the drainage ditches (SAIC 2011).

During the property visit at the East Substation, four rusted 55-gal drums were observed. Based on historical information, the empty drums were used for salvage operations by the salvage contractors and left empty in the building following their use. They were not known to contain chemicals or hazardous materials while on site. Empty drums are also used along this road as part of training operations along the Improvised Explosive Device lane. The presence of these rusted drums does not constitute a potential release (SAIC 2011).

West Substation – In 1997, approximately 1,500 gal of transformer oil was spilled during salvage operations. A large transformer tipped when lifted off the concrete pad and one or more cooling fins cracked when the transformer impacted the building. Due to a concern that the oil could reach the surface water, the facility conducted a voluntary cleanup of the spill under the oversight of Ohio EPA. Approximately 449 tons of soil were excavated and transported to a soil remediation plant in Lowellville, Ohio (SAIC 2011). Samples were collected and results were compared against the state of Ohio's BUSTR. Sample results were below BUSTR action levels and remediation was complete. However, no documentation of approval from Ohio EPA was discovered during the completion of the HRR, though according to the historical annual PCB inventory reports, the transformer oil from the West Substation was tested for PCBs and determined to be non-PCB containing oil.

According to the HRR, a former facility employee indicated that an old transformer at the West Substation began leaking in the early 1980s. The employee recalled that the soil in and around the leak was remediated, and the soil was tested. However, no documentation of a leak in the early 1980s was found, and there is no documentation of remediation or soil testing associated with this leak (SAIC 2011).

Further investigation was recommended at this substation based on the findings of the HRR. Additional sampling of surface and subsurface soils around the transformer pads and dry sediment within the drainage swales was recommended to be analyzed for TAL metals, PCBs, and SVOCs.

Substation No. 3 – No documented evidence of a release at Substation No. 3 was discovered during the HRR or during the property visit. Surface soil around the transformer and equipment pads and wet sediment and surface water within the wetland and Sand Creek tributary were recommended to be sampled and analyzed for TAL metals, PCBs, and SVOCs (SAIC 2011).

E.2.2 Remedial Investigation

Subsequent to the HRR, an RI was conducted in 2015. The RI consisted of surface and subsurface soil sampling using incremental sampling methodology (ISM) and composite sampling methods. In addition, wet sediment and surface water sampling were conducted at Substation No. 3 using discrete sampling methods. Wet sediment and surface water are not present at the East and West Substations. The sampling and results are discussed further in Section E.3.

E.3 Nature and Extent of Contamination

The media sampled as part of the RI included surface soil (0–1 ft bgs), subsurface soil (1–13 ft bgs), wet sediment, and surface water. Sample results were used to define the nature and extent of contamination, conduct fate and transport soil screening analyses, and support human health risk assessments (HHRAs) and ecological risk assessments (ERAs). Investigative samples were collected using ISM, discrete, and composite methods. All samples were analyzed for TAL metals, including mercury, SVOCs, and PCBs. In addition, one surface soil and three subsurface soil samples also were analyzed for the full suite of analytes [i.e., TAL metals, SVOCs, PCBs, organochlorine pesticides, volatile organic compounds, and explosives/propellants].

The majority of site-related contaminants (SRCs) identified were SVOCs and metals, which were retained as SRCs in surface and subsurface soil from all three former electric substations and in wet sediment downgradient of Substation No. 3 (wet sediment and surface water are not present near the East and West Substations). Some of the SVOCs and metals detected in sediment and surface water downgradient of Substation No. 3 were not detected in surface or subsurface soil at the substation and, therefore, were not retained as SRCs. Although the two volatile organic compounds (carbon disulfide and styrene) and one propellant (nitrocellulose) identified in soil at the East and West substations were retained as SRCs, the presence of these compounds is not related to historical operations at those areas. PCBs, organochlorine pesticides, and explosives were not identified in any of the samples analyzed.

E.4 Conceptual Site Model

Conceptual site model elements are discussed in this section, including primary and secondary contaminant sources and release mechanisms, contaminant migration pathways and discharge or exit points, and potential human receptors and ecological resources.

E.4.1 Primary and Secondary Contaminant Sources and Release Mechanisms

Primary contaminant sources (from former electrical equipment and lead acid batteries) have been removed from the substations at CC RVAAP-68 Electric Substations (East, West, No. 3). Secondary sources (contaminated media) identified in the RI are described in the following sections.

Historical data indicate that soil at the three substations may have been potentially impacted by former operations (SAIC 2011). Surface and subsurface soil sampling was conducted during the RI to define the nature and extent of any potential contamination.

Open ditches leave the East and West Substations, thereby providing area-wide drainage during precipitation events. Historical information indicates that dry sediment in the ditches at the East and West Substations may have been impacted by former operations (SAIC 2011). Therefore, dry sediment (i.e., surface soil) sampling was conducted in these ditches to define the nature and extent of any potential contamination during the RI.

There are no wetlands, creeks, streams, or other water bodies within Substation No. 3. However, a wetland and associated aquatic habitat are located just beyond the southeast site boundary. Based on the topography map of the site, runoff from the site flows toward this wetland. Wet sediment and surface water samples were collected within the wetland and associated aquatic habitat during the RI.

E.4.2 Contaminant Migration Pathways and Exit Points

The potential for soil and sediment contaminants to impact groundwater was evaluated in a fate and transport evaluation presented in the RI Report (USACE 2015). Contaminants in surface soil may migrate to surface water via drainage ditches in the dissolved phase following a storm event, or as particulates in storm water runoff. Based on topographical elevations shown, the wetland and associated aquatic habitat receive a portion of the storm water runoff from Substation No. 3. Leaching of contaminants in soil to groundwater via vertical migration is also a potential migration pathway.

The fate and transport modeling concluded that all SRCs in soil should be eliminated as potential risks to groundwater. Final contaminant migration chemicals of concern were not identified at any of the three substations.

E.4.3 Potential Human Receptors and Ecological Resources

In February 2014, the Army and Ohio EPA amended the risk assessment process to address changes in the RVAAP restoration program. The *Final Technical Memorandum: Land Uses and Revised Risk Assessment Process for the RVAAP Installation Restoration Program* (ARNG 2014) identified the following three Categorical Land Uses and Representative Receptors to be considered during the RI phase of the CERCLA process.

1. Unrestricted (Residential) Land Use – Resident Receptor (Adult and Child) (formerly called Resident Farmer).
2. Military Training Land Use – National Guard Trainee.
3. Commercial/Industrial Land Use – Industrial Receptor [U.S. Environmental Protection Agency (USEPA) Composite Worker].

An evaluation was performed using Resident Receptor (Adult and Child) facility-wide cleanup goals (FWCUGs) to provide an Unrestricted (Residential) Land Use evaluation. Unrestricted (Residential) Land Use is considered protective for all categories of Land Use at Camp Ravenna. Additional human health receptors associated with Camp Ravenna are the National Guard Trainee and Industrial Receptor. No COCs were identified as requiring remediation in surface soil (0–1 ft bgs), subsurface soil (1–13 ft bgs), and sediment to be protective for the Resident Receptor or Unrestricted (Residential) Land Use. Surface water was not evaluated in the HHRA because no SRCs were identified in that medium.

These sites contain wetlands, wooded areas, and/or scrub-shrub habitat. Wildlife inhabiting the AOC would be potential receptors to contamination in soil, sediment, and/or surface water.

F CURRENT AND POTENTIAL FUTURE LAND USES

The Electric Substations (East, West, No. 3) are currently managed by the Army National Guard/OHARNG. The AOC is not currently being utilized for training purposes. The future use of the Electric Substations (East, West, No. 3) is Military Training. The Resident Receptor was evaluated in the HHRA to assess an Unrestricted (Residential) Land Use scenario. This ROD discusses future Land Use and potential soil, sediment, and surface water impacts to human health, the environment, and groundwater.

G SUMMARY OF SITE RISKS

The HHRA and ERA estimated risks to human receptors and ecological resources; identified exposure pathways; identified COCs and chemicals of potential ecological concern (COPECs), if any; and provided a basis for remedial decisions. This section of the ROD summarizes the results of the HHRA and ERA, which are presented in detail in the *Final Remedial Investigation Report CC RVAAP-68 Electric Substations (East, West, No. 3)* (USACE 2015) and *Proposed Plan for Soil, Sediment, and Surface Water at CC RVAAP-68 Electric Substations (East, West, No. 3)* (USACE 2016) located in the Administrative Record and Information Repositories.

G.1 Human Health Risk Assessment

An HHRA was performed to identify chemicals of potential concern (COPCs), COCs, and provide a risk management evaluation to determine if remediation is required under CERCLA based on potential risks to human receptors. The following media were evaluated in the HHRA for the Resident Receptor: surface soil (0–1 ft bgs), subsurface soil (1–13 ft bgs), and sediment. Surface water was not evaluated in the HHRA because no SRCs were identified in that medium. A summary of the evaluation for the Resident Receptor is below.

East Substation

The East Substation COPCs are listed below:

- Surface Soil – Chromium, benzo(a)anthracene, benzo(b)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene.
- Subsurface Soil – Benzo(a)pyrene.
- Sediment and Surface Water – Media not present.

No COCs were identified for surface soil, subsurface soil, or sediment for the Resident Receptor. Therefore, no further action is required for the protection of human health.

West Substation

The West Substation COPCs are listed below:

- Surface Soil – Chromium, cobalt, benzo(a)anthracene, benzo(b)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene.
- Subsurface Soil – Benzo(a)pyrene.
- Sediment and Surface Water – Media not present.

No COCs were identified for subsurface soil or sediment. Resident Receptor COCs in surface soil [benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene] were identified for the West Substation. However, the total cancer risk and the total hazard quotient are below the Ohio EPA and USEPA risk limits for exposure to surface soil; therefore, no further action is required for the protection of human health.

Substation No. 3

The Substation No. 3 COPCs are listed below:

- Surface Soil – Arsenic and chromium.
- Subsurface Soil – No COPCs identified.
- Sediment – Chromium and benzo(a)pyrene (downgradient from Substation No. 3).
- Surface Water – No SRCs or COPCs identified.

No COCs were identified for subsurface soil, sediment, or surface water at Substation No. 3. One COC (arsenic) is present in surface soil. The total cancer risk for the Resident Receptor is greater than the Ohio EPA risk limit, but within the USEPA acceptable risk range for surface soil at Substation No. 3. However, based on the uncertainty analysis, the arsenic exposure point concentration for surface soil is essentially equal to the background concentration for arsenic; therefore, arsenic is eliminated as a COC, and no further action is required for the protection of human health.

As presented in Table 1, the concentrations of the remaining COCs were only slightly above the Resident Receptor Adult FWCUG or the facility background concentration. In addition, there is no known use of these chemicals at this AOC. In summary, the HHRA did not identify COCs from previous Army activities requiring remediation under CERCLA to be protective of the Resident Receptor.

Table 1. Electric Substations (East, West, No. 3) Chemicals of Concern

Media	Chemical of Concern	Maximum Detected Concentration (mg/kg)	Resident Receptor Adult FWCUG (HQ=1, TR=10^{-5}) (mg/kg)	Background Concentration (mg/kg)
East Substation				
No chemicals of concern				
West Substation				
Surface soil	Benzo(a)pyrene	0.33	0.221	0
	Benzo(b)fluoranthene	0.52	2.21	0
	Dibenz(a,h)anthracene	0.057	0.221	0
Substation No. 3				
Surface soil	Arsenic	16	4.25	15.4

Note: Background calculations for benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene were not established in the facility-wide background study. Accordingly, the concentration of 0 mg/kg is used in the data screening process.
FWCUG = Facility-wide cleanup goal.
HQ = Hazard quotient.
mg/kg = Milligrams per kilogram.
TR = Target risk.

G.2 Ecological Risk Assessment

The ERA was conducted to evaluate the potential for chemical constituents detected in surface soil, sediment, and surface water to adversely affect ecological receptors. Maximum detected concentrations were compared to background screening values and to conservative ecological screening benchmarks for generic receptors to identify COPECs. The list of COPECs was subsequently refined on a COPEC-by-COPEC basis. Considering site-specific factors, and taking into account mitigating uncertainties, it is not likely that exposure to surface soil would adversely affect communities or populations of common ecological receptors or individuals of state-listed species at the Electric Substations (East, West, No. 3).

For surface soil, risks are unlikely to result from any of the detected COPECs. For surface water, risks are unlikely to result for all COPECs to communities or populations of common ecological receptors or individuals of state-listed species in the Electric Substations (East, West, No. 3). Considering the conservative assumptions incorporated into the ERA and the limited ecological value of the Electric Substations (East, West, No. 3), further evaluations are not expected to identify any actionable risk to ecological receptors.

No further investigation (e.g., Level III baseline ERA) or removal action is considered necessary for environmental media at the Electric Substations (East, West, No. 3) for the protection of ecological receptors.

H DOCUMENTATION OF NO SIGNIFICANT CHANGE

The *Proposed Plan for Soil, Sediment, and Surface Water at CC RVAAP-68 Electric Substations (East, West, No. 3)* (USACE 2016) was released for public comment on November 14, 2016. The PP recommends no further action for soil, sediment, and surface water at Electric Substations (East,

West, No. 3). After the public comment period, no significant changes were necessary or appropriate following the conclusion of the public comment period.

PART III: RESPONSIVENESS SUMMARY FOR PUBLIC COMMENTS ON THE ARMY PROPOSED PLAN FOR CC RVAAP-68 ELECTRICAL SUBSTATIONS (EAST, WEST, NO. 3).

A OVERVIEW

On November 14, 2016, the Army released the *Proposed Plan for Soil, Sediment, and Surface Water at CC RVAAP-68 Electric Substations (East, West, No. 3)* (USACE 2016) for public comment. A 30-day public comment period was held from November 14, 2016, to December 14, 2016. The Army hosted a public meeting on November 29, 2016 to present the PP and take questions and comments from the public for the record.

For soil, sediment, and surface water at Electrical Substations (East, West, No. 3), the Army recommended no further action. During the public meeting, Ohio EPA concurred with the recommendation of no further action. No oral comments were received at the public meeting, and no written comments were provided by the public during the public comment period.

The community voiced no objections to the no further action recommendation. All public input was considered during the selection of the final remedy for soil, sediment, and surface water at Electrical Substations (East, West, No. 3) in this ROD.

B SUMMARY OF PUBLIC COMMENTS AND LEAD AGENCY RESPONSES

B.1 Oral Comments from Public Meeting

No oral comments were provided by the public during the public comment period.

B.2 Written Comments

No written comments were received during the public comment period.

C TECHNICAL AND LEGAL ISSUES

There were no technical or legal issues raised during the public comment period.

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PART IV: REFERENCES

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FIGURES

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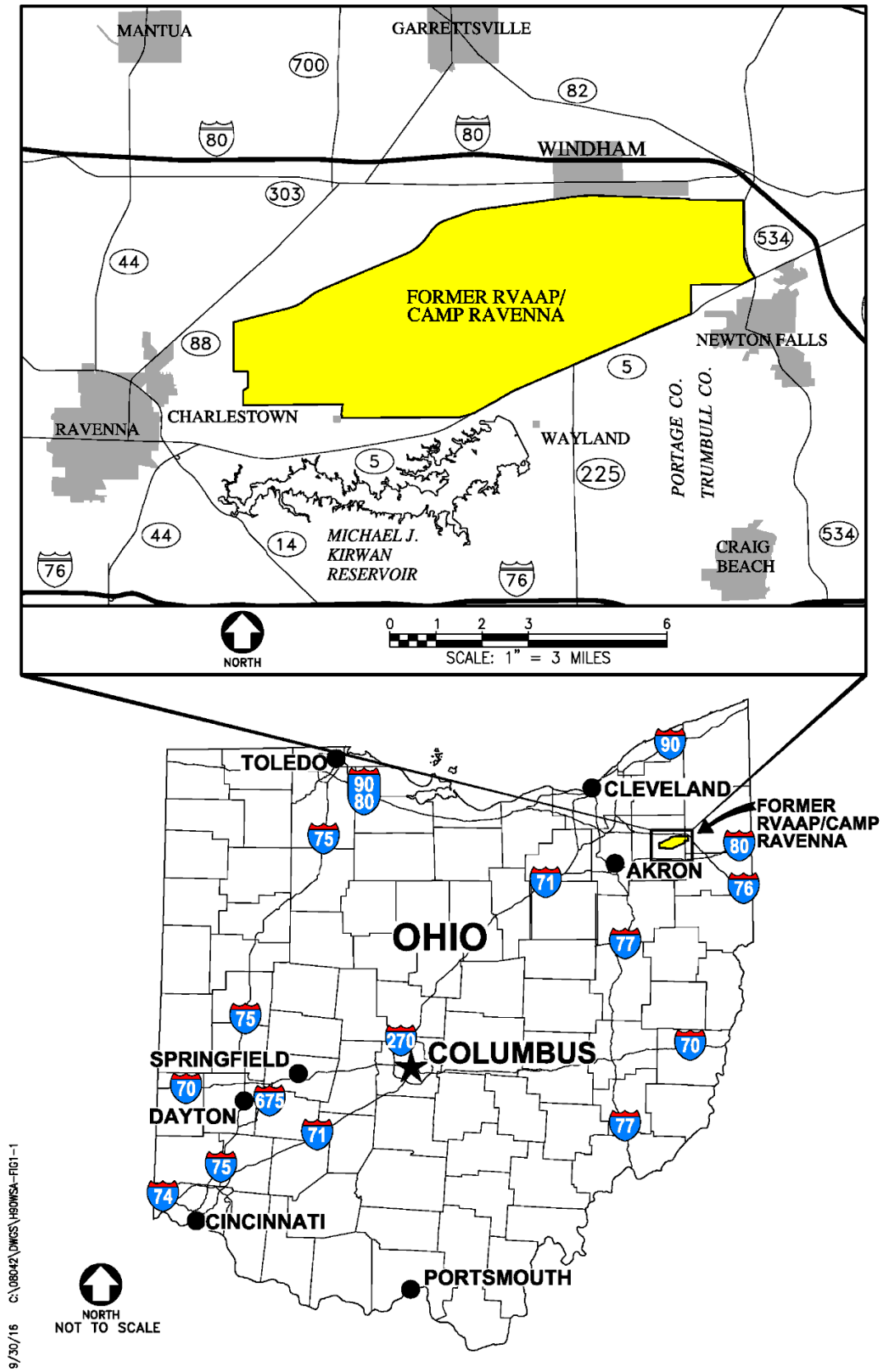


Figure 1. General Location and Orientation of RVAAP/Camp Ravenna

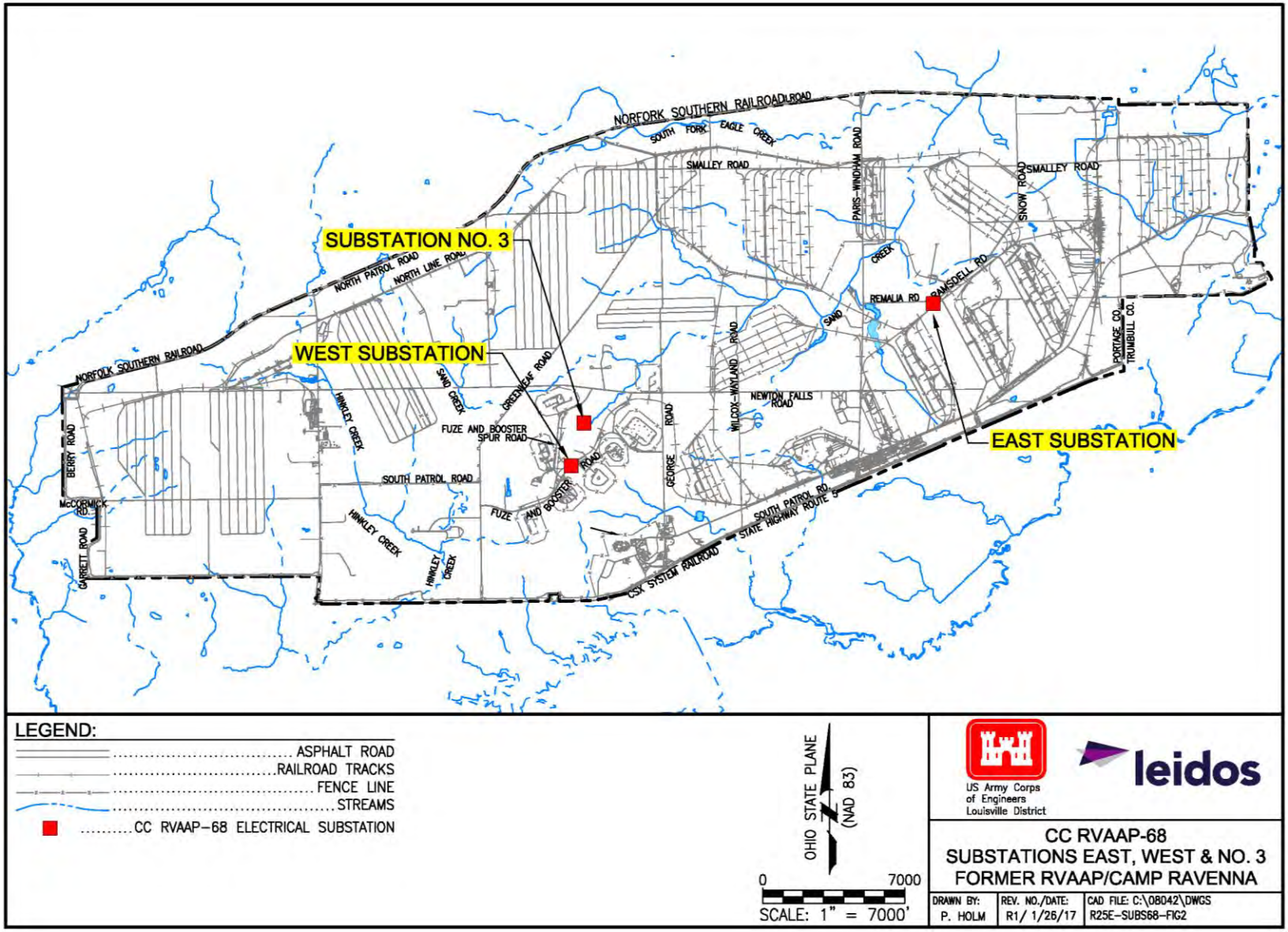
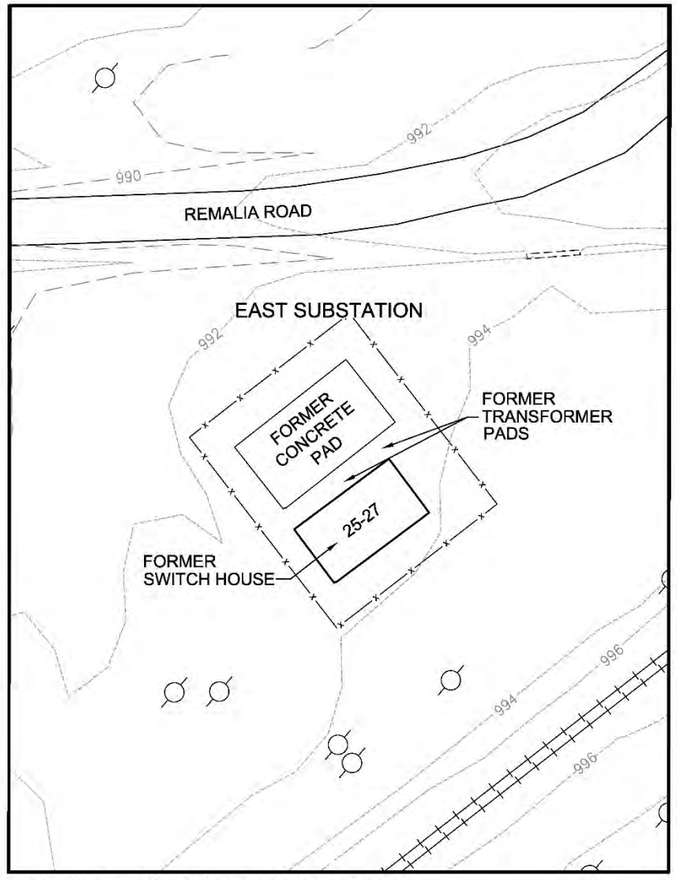
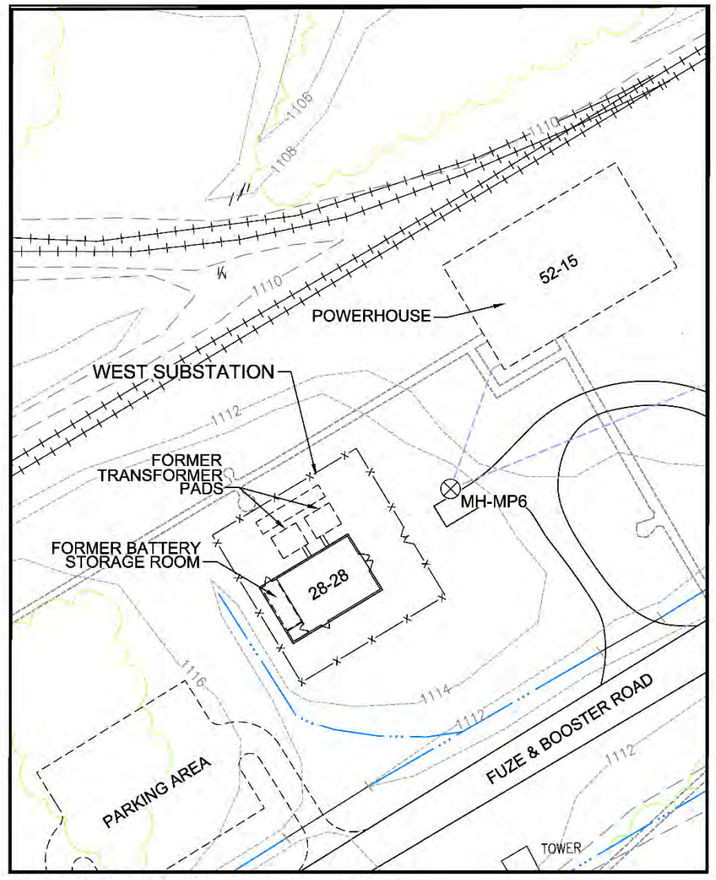


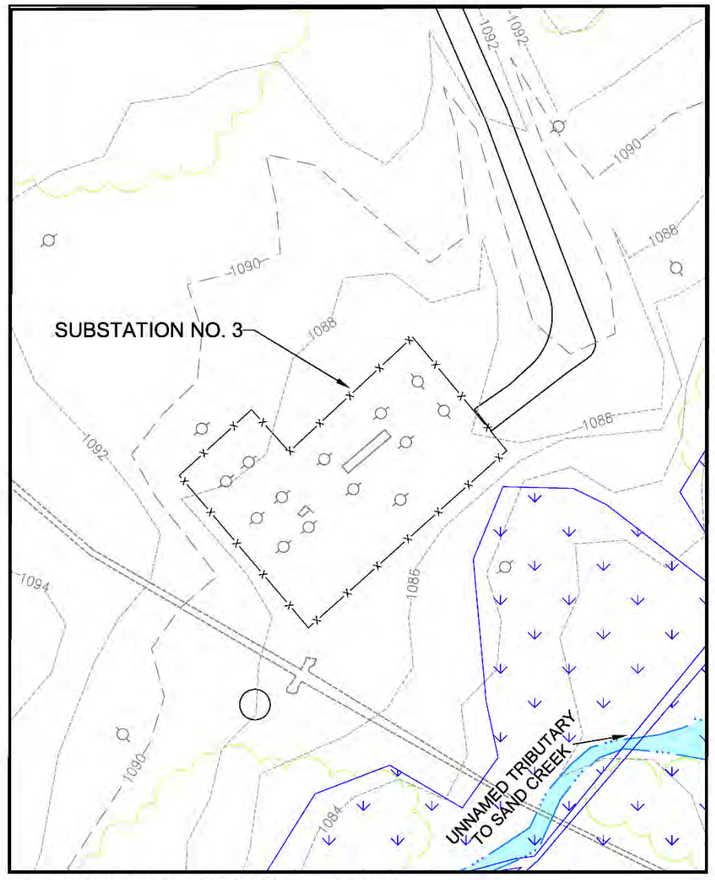
Figure 2. RVAAP/Camp Ravenna Installation Map



CC-RVAAP-68: EAST SUBSTATION



CC-RVAAP-68: WEST SUBSTATION



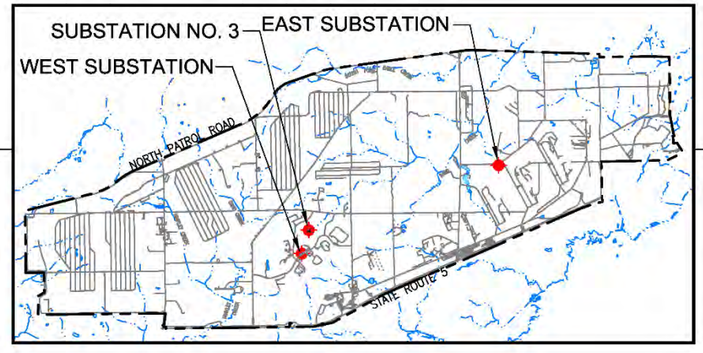
CC-RVAAP-68: SUBSTATION NO. 3

0 30 60 120
SCALE: 1" = 60'

LEGEND:
- CONCRETE PAD
- ASPHALT ROAD
- FORMER FENCE LINE
- SURFACE WATER
- VEGETATION
- GROUND CONTOUR (10-FT)
- GROUND CONTOUR (2-FT)
- FORMER UTILITY POLE
- DEMOLISHED OVERHEAD STEAM LINE
- JURISDICTIONAL WETLAND

RVAAP KEY MAP - CC-RVAAP-68: ELECTRIC SUBSTATIONS

0 1.25 2.5
SCALE:1"=2.5 MILES



OHIO STATE PLANE (NAD 83)

US Army Corps of Engineers Louisville District

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CC RVAAP-68
SUBSTATIONS EAST, WEST & NO. 3
FORMER RVAAP/CAMP RAVENNA

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Figure 3. Electrical Substations (East, West, No. 3) Site Features

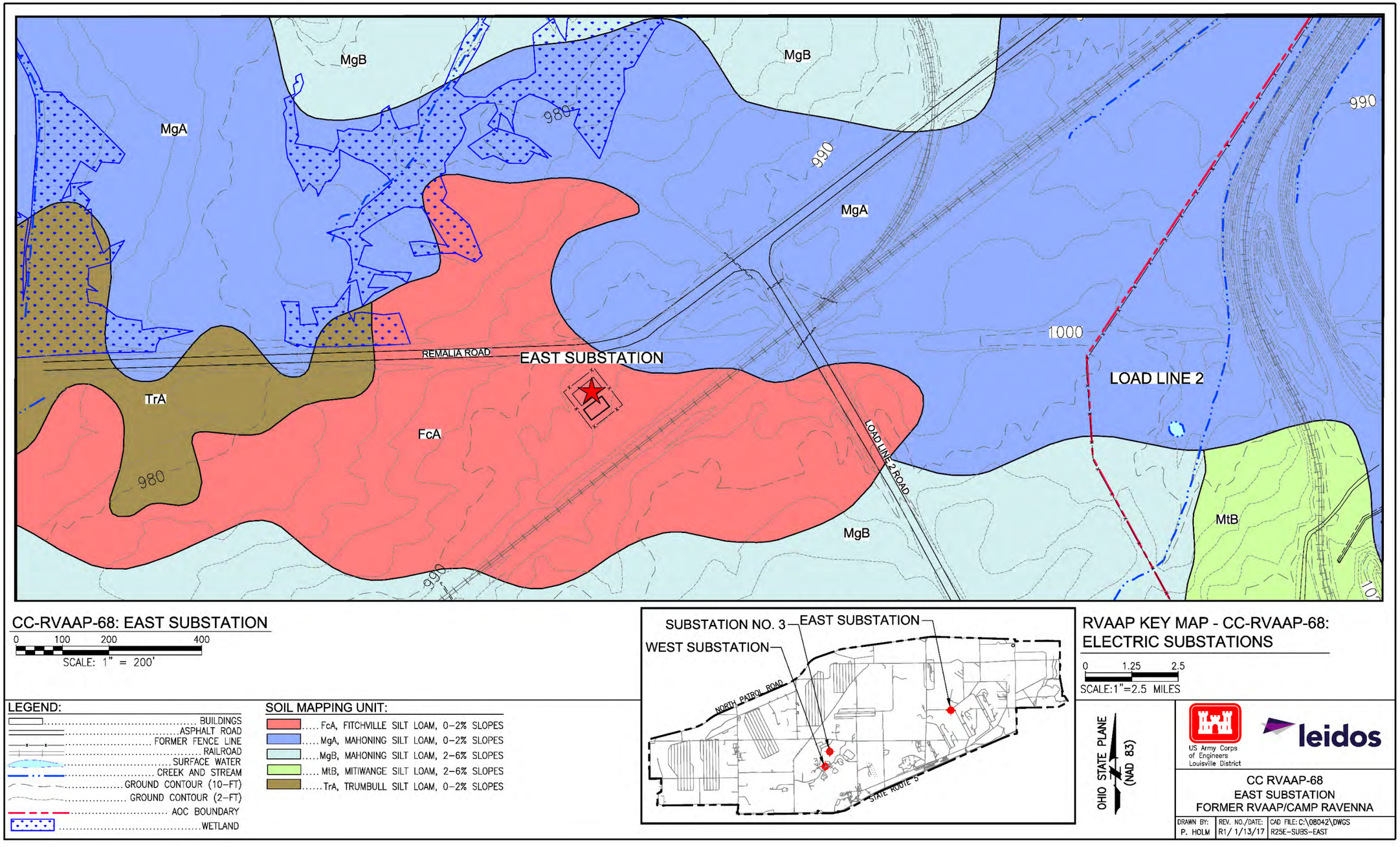

Figure 4. East Substation Soil Mapping Units

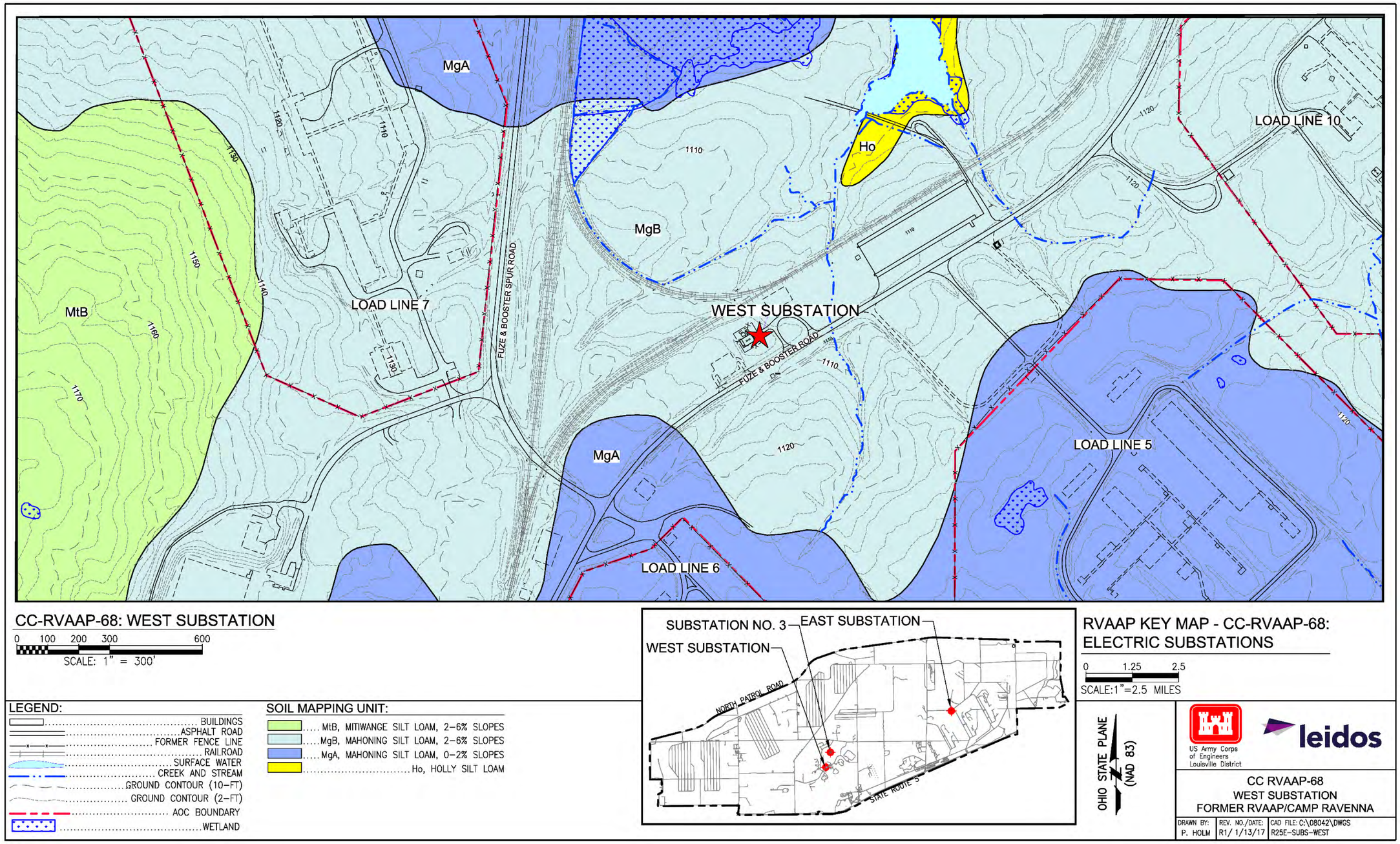

Figure 5. West Substation Soil Mapping Units

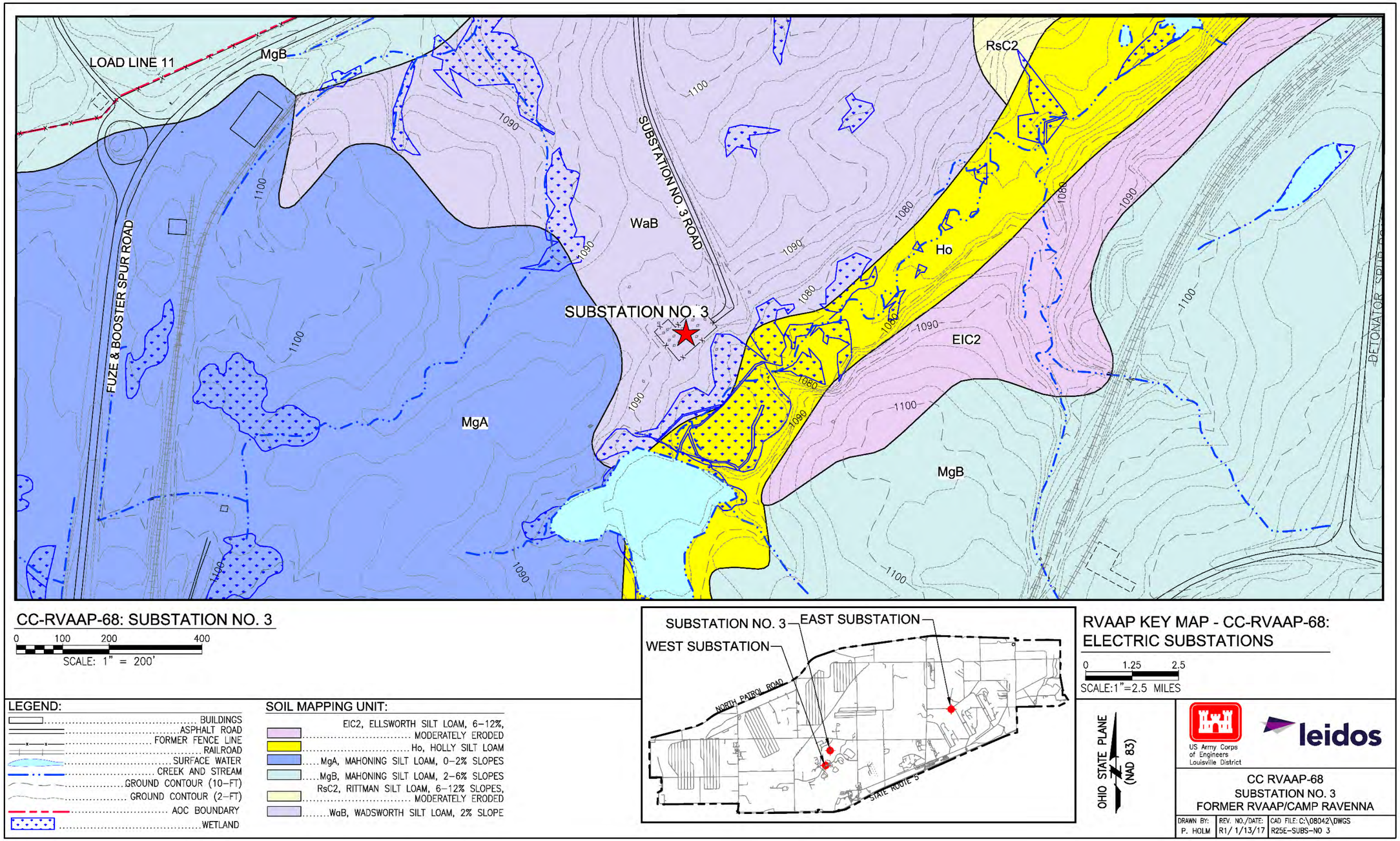

Figure 6. Substation No. 3 Soil Mapping Units

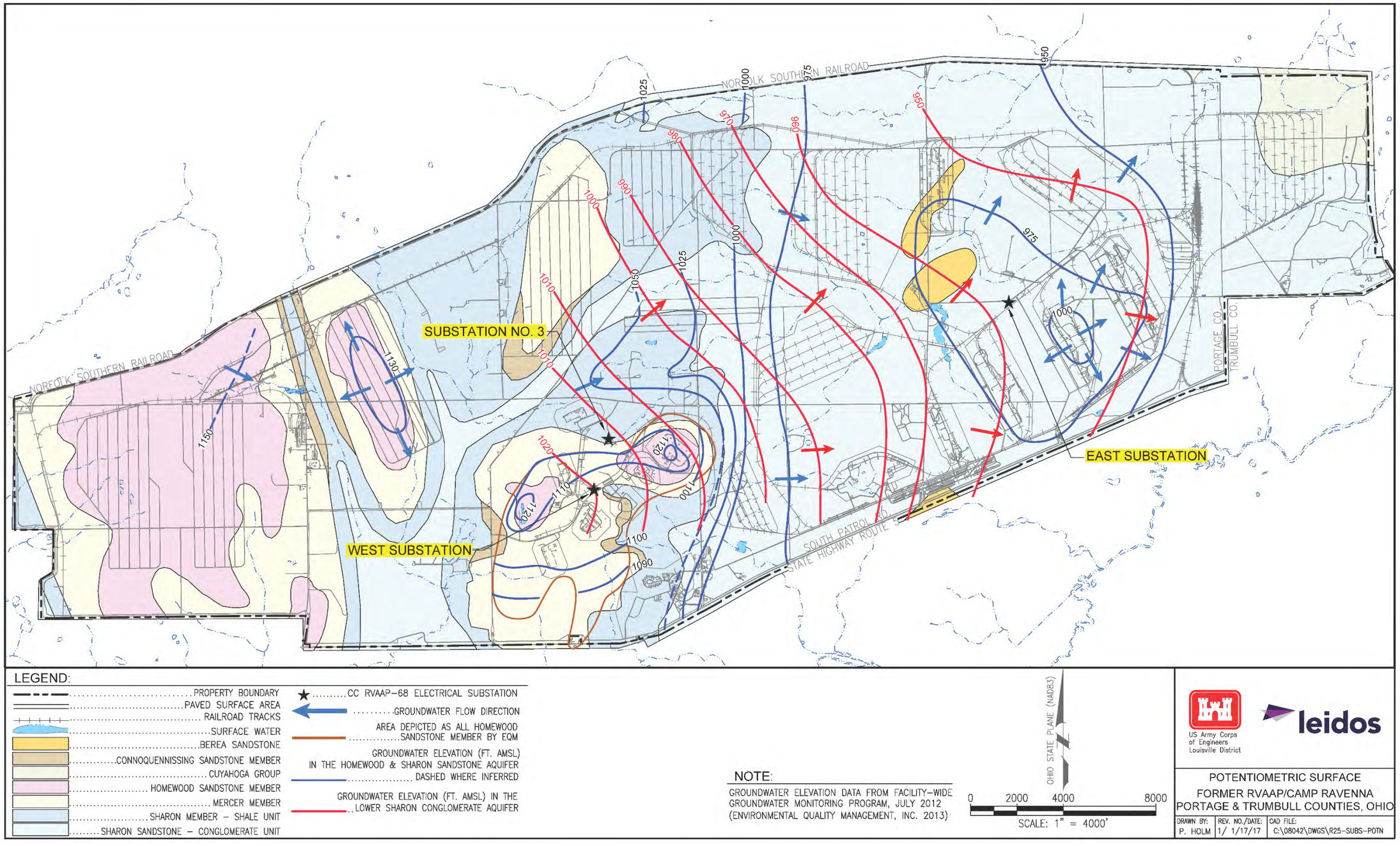

Figure 7. Electrical Substations (East, West, No. 3) Potentiometric Map

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