

Final

Former Lockbourne Air Force Base Landfill

Proposed Plan

FUDS Property: G05 OH0007

Prepared for:



**US Army Corps
of Engineers**

Contract No. W91236-07-D-0012
Delivery Order No. CY01

Prepared by:

CH2MHILL®

April 2011

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Acronyms and Abbreviations

AFB	Air Force Base
AOC	Area of Concern
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	constituent of concern
CRAA	Columbus Regional Airport Authority
DoD	Department of Defense
ERA	ecological risk assessment
FFS	focused feasibility study
FUDS	Formerly Used Defense Site
HHRA	human health risk assessment
HI	hazard index
IDA	intermediate-depth aquifer
LAW	Law Engineering and Environmental Services, Inc.
O&M	operation and maintenance
OAC	Ohio Administrative Code
Ohio EPA	Ohio Environmental Protection Agency
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
RAO	remedial action objective
RI	remedial investigation
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UWBZ	upper water-bearing zone
VOC	volatile organic compound

1. Introduction

The former Lockbourne Air Force Base (AFB) landfill is a site that was used to dispose of wastes generated at the former base. The site is located east of Interstate 71 in Franklin County, just east of the village of Lockbourne, Ohio (Figure 1). The Department of Defense (DoD) used the landfill for waste disposal from approximately 1951 until 1979, and subsequently transferred the property to the Rickenbacker Port Authority (now the Columbus Regional Airport Authority [CRAA]). As a result, the landfill is considered a **Formerly Used Defense Site (FUDS)**. The DoD is responsible for evaluating and cleaning up DoD-generated environmental contamination at FUDS properties. The U.S. Army oversees the FUDS program for DoD, and the U.S. Army Corps of Engineers (USACE) manages the evaluation and cleanup of these properties. USACE investigated the DoD-generated environmental contamination at the former Lockbourne AFB landfill and is proposing to clean up the site. USACE is the lead agency for the site cleanup activities, which means they are responsible for determining and conducting the cleanup activities at the site. The **Ohio Environmental Protection Agency (Ohio EPA)** is the lead regulatory agency for the site, overseeing cleanup activities.

USACE, in coordination with Ohio EPA, prepared this **Proposed Plan** to gain input from the public on the proposed cleanup actions. This Proposed Plan summarizes the environmental investigations performed to date at the site; presents the evaluation of USACE's proposed cleanup alternatives for the site; and provides rationale for the preferred **cleanup actions**. USACE is seeking public input on these cleanup alternatives and encourages the public to review this Proposed Plan and provide comments. Comments on the Proposed Plan can be submitted during the public review period, which runs from April 21, 2011 until May 21, 2011. After reviewing and considering the public comments received during this review period, the USACE, in coordination with Ohio EPA, will select the cleanup actions that will be conducted at the site.

More detailed information about the investigations conducted at the site and the cleanup alternatives considered can be found in other documents. Detailed information about the environmental studies performed at the site is in the **Remedial Investigation (RI) Report** (CH2M HILL 2010). Detailed information about the different cleanup



Location of Information Repository

Information used in selecting the recommended cleanup alternative in this Proposed Plan is available for public review from April 21 to May 21, 2011 online at:

<http://bit.ly/LockbourneAFB>

Copies of this document and supporting documents are also available at the following information repository:

*Columbus Metropolitan Library, Southeast Branch
3980 S. Hamilton Road
Groveport, Ohio 43125
(614) 645-2275*

*Hours: Monday through
Thursday: 9 a.m. to 9 p.m.
Friday: 9 a.m. to 6 p.m.
Saturday: 9 a.m. to 6 p.m.
Sunday: 1 p.m. to 5 p.m.*

alternatives is in the *Focused Feasibility Study (FFS) Report* (CH2M HILL 2011). These and other supporting documents can be found online at <http://bit.ly/LockbourneAFB> and at the Columbus Metropolitan Library, Southeast Branch (address on previous page). USACE and Ohio EPA encourage the public to review these documents to gain a more comprehensive understanding of the site and activities that have been conducted to date.

The U.S. Army is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the **Comprehensive Environmental Response, Compensation, and Liability Act** (CERCLA) of 1980, as amended by the **Superfund Amendments and Reauthorization Act** of 1986 and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (*40 Code of Federal Regulations*, Part 300). The words and phrases that appear in bold in this Proposed Plan are defined in the glossary in Section 12.

2. Site Background

From 1951 until 1979, the former Lockbourne AFB landfill was used to dispose of wastes from the former Lockbourne AFB. The types of waste disposed of at the site included general trash from base housing and other administrative buildings, construction and demolition debris, and lime sludge from the base water treatment plant. Historical documents suggest the landfill may also have received pesticides and herbicides, ammunition, airplane parts, and **hazardous materials**. Wastes reportedly were buried in trenches, up to approximately 10 feet deep, and dispersed on the ground surface (Law Engineering and Environmental Services, Inc. [LAW] 1995).

Between 1986 and 2008, several investigations were conducted to evaluate environmental contamination at the site. The **U.S. Environmental Protection Agency** (USEPA) conducted a site screening investigation in 1986 (Ecology and Environment, Inc. 1986), during which they looked for obvious signs of contamination at the site. The investigations conducted by USACE between 1995 and 1998 focused on determining if the site was contaminated and, if present, the types of contamination. The results of these investigations indicated that additional investigations were needed. Therefore, USACE conducted additional studies between 1998 and 2008 to more fully characterize the extent of the contamination. During these investigations, landfill gas, soil, sediment, **surface water**, and **groundwater** samples were collected. Some of these investigations also included collecting **geophysical survey** measurements and digging test pits (to determine the extent of buried waste at the site) as well as sampling **seeps** at the site. As a result of these investigations, contaminants including, but not limited to, **polynuclear aromatic hydrocarbons** (PAHs), **polychlorinated biphenyls** (PCBs), **dioxins/furans**, and metals were detected in soil, surface water, sediment, and groundwater on or near the landfill.

The site was divided into two investigation areas, Area of Concern (AOC) 1 and AOC 2 (Figure 2). AOC 1 is approximately 105 acres and occupies the western half of the parcel where waste disposal occurred. AOC 2 is approximately 40 acres and is located on the eastern side of the site. Although there is scattered inert debris at this portion of the site, no buried waste was found at AOC 2 during test pitting activities (CH2M HILL 2009). In this Proposed Plan, “landfill” and “site” are used interchangeably to refer to the area consisting of both AOC 1 and AOC 2.

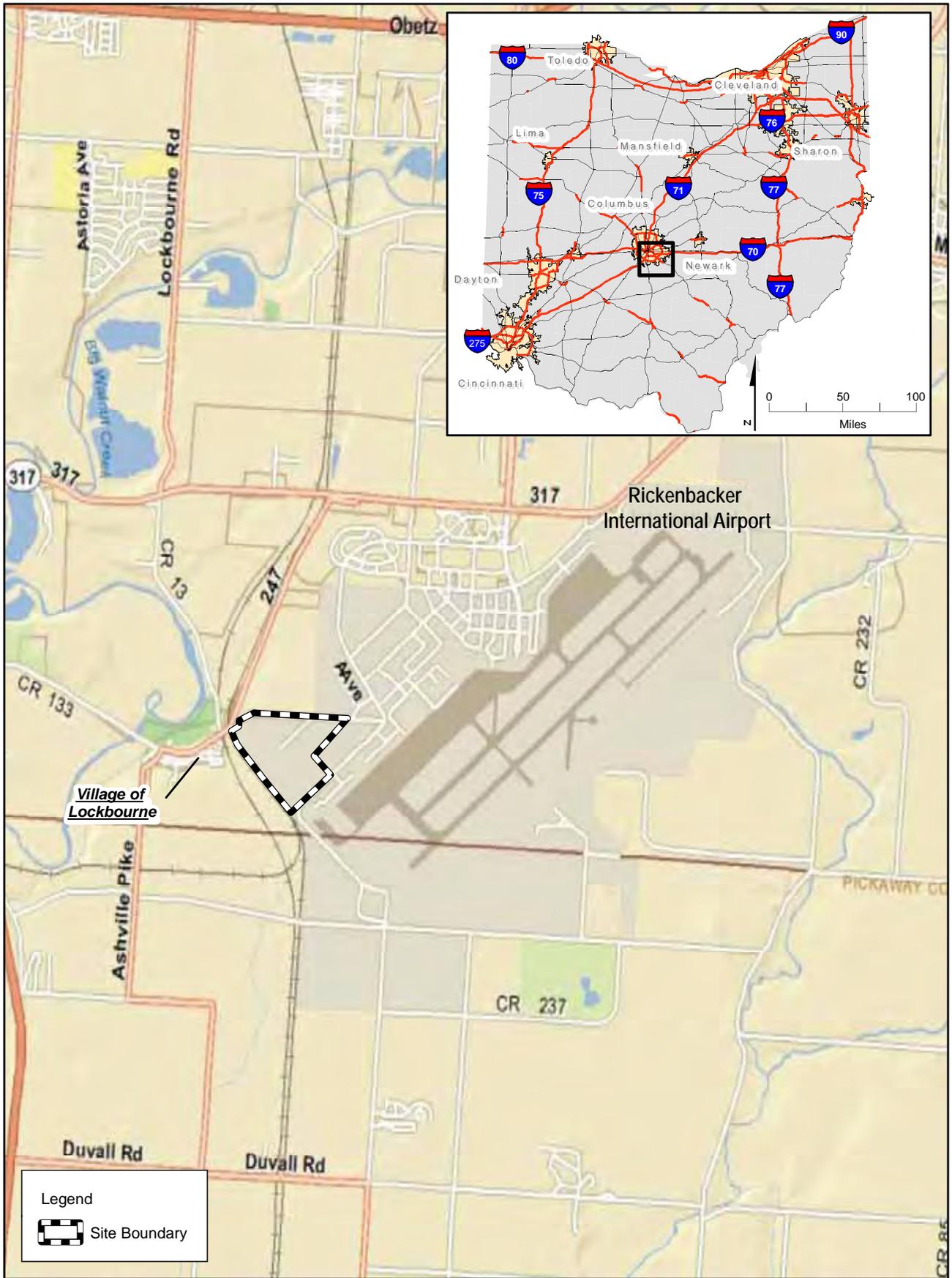


FIGURE 1
 Site Location Map
 Proposed Plan
 Former Lockbourne Air Force Base Landfill

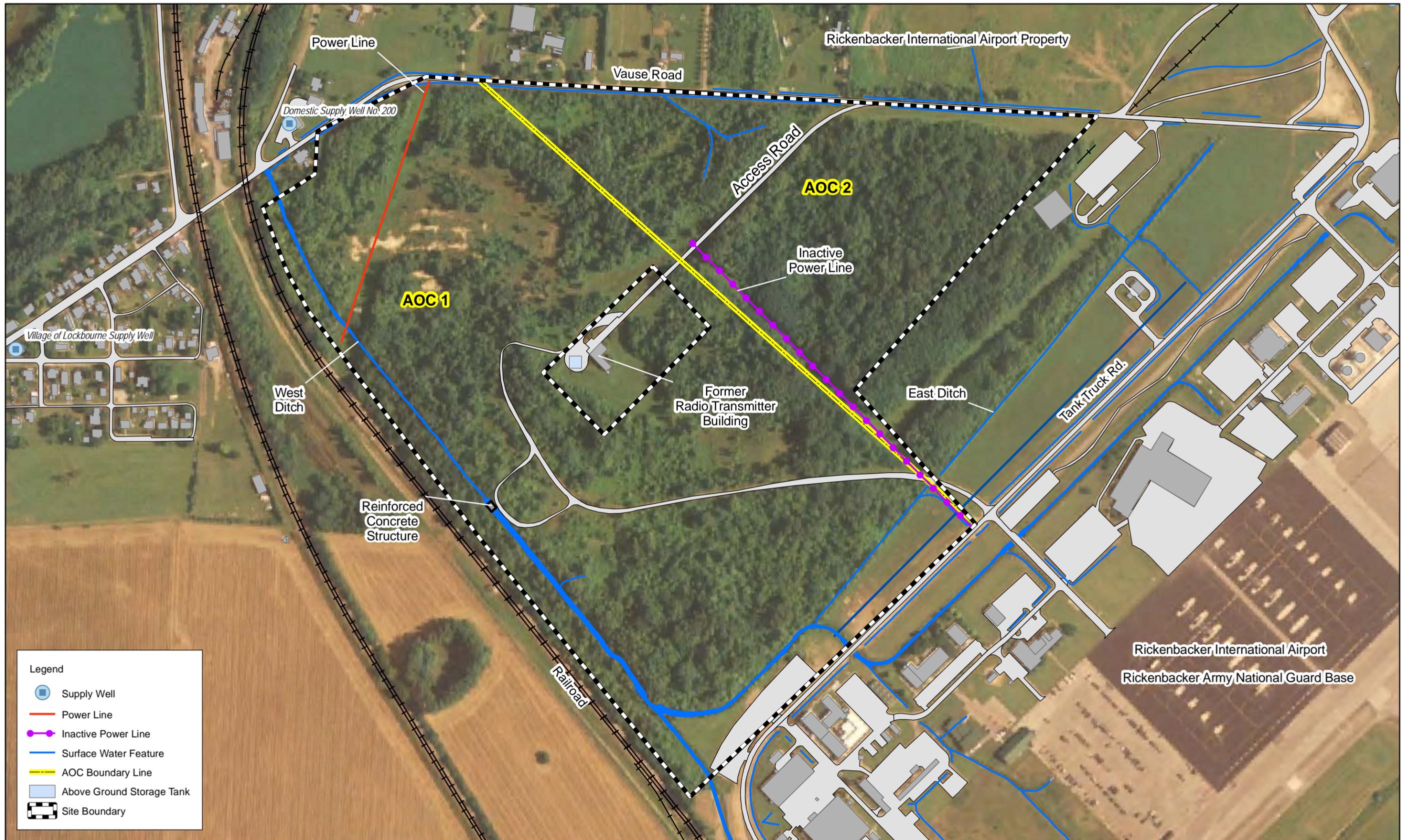


Figure 2
 Site Features Map
 Proposed Plan
 Former Lockbourne Air Force Base Landfill, Lockbourne, Ohio

Public involvement for the former Lockbourne AFB began in the early 1990s, specifically for the environmental cleanup program at the adjacent Rickenbacker Air National Guard Base. In 1995, the U.S. Air Force prepared a Community Relations Plan for the Rickenbacker Air National Guard Base (Air Force Center for Environmental Excellence 1995). In January 1994, the Restoration Advisory Board was established and, until 2002, met quarterly to update the public on the current progress at the environmental cleanup sites at the Rickenbacker Air National Guard Base and the former Lockbourne AFB. While the focus of this board was the cleanup of sites adjacent to the landfill, the landfill was discussed occasionally during the board's public meetings. Since 2002, public involvement activities specifically regarding the former Lockbourne AFB landfill have consisted primarily of meetings with the current property owner and Ohio EPA.

3. Site Characteristics

The site is bordered by Vause Road to the north, Tank Truck Road to the southeast, and railroad tracks to the southwest. A high-tension power line crosses the northwest side of the site, and an inactive power line corridor runs from Tank Truck Road through the site, ending shortly after crossing the main site access road. Land use north of the site consists of residential and industrial development. Land use south/southwest of the site is primarily agricultural. Rickenbacker Air National Guard Base and Rickenbacker International Airport are located east/southeast of the site, and the village of Lockbourne is located west of the site. These features are shown on Figure 2. The site surrounds an approximately 5.5-acre parcel of land containing a former radio transmitter building (no longer in operation). The former transmitter building area is not included in the landfill cleanup project because the DoD transferred this parcel of land after 1986, which means it is not eligible for cleanup under the FUDS program.

The former Lockbourne AFB landfill is now owned by the CRAA. The landfill is in an undeveloped area west of the developed portion of the former Lockbourne AFB (Figure 2) and covers 145 acres, of which, approximately 50 acres reportedly were used for disposing of wastes from the former AFB. There are patchy, open areas of the site that are surrounded by densely wooded and overgrown areas. The open areas have tall dense brush, or grass and low weeds. The U.S. Fish and Wildlife Service National Wetlands Inventory map identifies eight potential wetland areas at the site. Some construction and demolition debris is visible on the ground surface. The ground surface is generally uneven, with low areas and mounded higher areas. Water sometimes collects in the low areas on the ground surface after rainfall.

The site is located approximately 0.75 mile from Big Walnut Creek (at its closest point). Surface water drains to a man-made perimeter ditch along the eastern and western boundaries of the site and ultimately drains to Big Walnut Creek. The eastern portion of this ditch is referred to as the East Ditch, while the western portion is referred to as the West Ditch. The ditches are used to manage stormwater for the site and for adjacent properties. The West Ditch contains a reinforced concrete structure that was formerly used by the Lockbourne AFB as a flow control structure for surface water runoff.

Geologically, the site is underlain by silty clay from the ground surface to depths ranging from approximately 55 feet to more than 80 feet below ground surface (bgs). Sand and gravel deposits occur below the silty clay, followed by a clay unit at a depth of approximately 130 feet bgs, and then bedrock at 200 feet bgs. Groundwater beneath the site is generally present

in three distinct water-bearing zones or layers, the first, the **upper water-bearing zone** (UWBZ), occurs at depths ranging from 0 to 50 feet bgs. Within this zone, a shallow water table has been observed from approximately 4 to 16 feet bgs. Within the UWBZ, groundwater flows west and southwest in interbedded sand lenses within the primarily silty clay unit. The second zone, the intermediate depth aquifer (IDA) occurs at depths from approximately 50 to 130 feet bgs. The third zone, the **deep aquifer**, occurs at a depth of approximately 130 to 200 feet bgs; however, it can occur at shallower depths in areas of the county where bedrock is closer to the ground surface. The shallow zones generally do not produce much water; therefore, the deep aquifer is the zone typically used as a ground water source in the county.

Groundwater at the former Lockbourne AFB landfill is not used for drinking water. The village of Lockbourne receives drinking water from the Columbus municipal water system. The city of Columbus uses surface water from the Scioto River, Big Walnut Creek, and Hoover and Alum Creek reservoirs for its supply, along with groundwater from the south wellfield area in southeast Franklin County. The south wellfield area is approximately 4 miles from the site. Several residents in Lockbourne obtain drinking water from private wells; however, the majority of residents are connected to the municipal water system. Seeps have been inconsistently observed along the western boundary of the site during the investigations.

At AOC 1, PAHs, PCBs, dioxins/furans, and metals (including lead, silver, and thallium) were detected in surface soil samples above human health screening levels established by USEPA. PAHs, PCBs, dioxins/furans, and metals (including aluminum, mercury, and thallium) were detected in subsurface soil samples above human health screening levels. Surface soil samples were collected from 0 to 1 foot bgs, and subsurface soil samples were collected from 1 to 10 feet bgs. PAHs, bis(2-ethylhexyl)phthalate, dioxin/furans, and metals (including aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, thallium, and vanadium) were detected above their respective screening levels in groundwater.

Bis(2-ethylhexyl)phthalate, dioxins/furans, and metals (including arsenic, lead, and thallium) were detected above their respective screening levels in surface water collected from the East and/or West Ditches. In sediment, PAHs and metals (including aluminum, arsenic, cobalt, iron, manganese, and thallium) were detected above their respective screening levels.

At AOC 2, PAHs, dioxins/furans, and metals (including cobalt, manganese, and thallium) were detected above their respective screening levels in surface soil samples. One metal (arsenic) exceeded its screening level in subsurface soil. PAHs, dioxins/furans, and metals (including aluminum, arsenic, cobalt, iron, lead, manganese, nickel, and vanadium) were detected above their respective screening levels in groundwater. Two **volatile organic compounds** (VOCs) (methylene chloride and trans-1,3-dichloropropene) and naphthalene were detected in soil above their respective screening levels for protection of indoor air.

Landfill gas samples were collected from various locations around the site. The landfill gas sampling results show that methane concentrations were consistently detected below USEPA's action level of 1.25 percent (methane in air).

To determine the limits of waste buried at the site, USACE reviewed historical aerial photographs and dug test pits at the site. These investigations characterized the horizontal

limits of the waste materials shown on Figure 3. Other investigation data indicate the waste is present at varying depths in the landfill, from the ground surface down to approximately 10 feet bgs.

4. Scope and Role of the Cleanup

This Proposed Plan addresses the evaluation of the preferred cleanup alternatives for AOC 1 and AOC 2 only. It does not include or directly affect any other sites at the former Lockbourne AFB. The cleanup proposed at the site represents the final action for AOC 1 and AOC 2, which will address all impacted media (soil, groundwater, sediment, and surface water) and will mitigate unacceptable threats to human health and the environment.

5. Summary of Site Risks

This section presents an overview of the risks associated with the current and future use of the site. Risks were evaluated separately for human health and ecological populations (plants and animals) at the site. A detailed discussion of potential risks at the site and the risk evaluation process is in the RI report (CH2M HILL 2010).

5.1 Human Health Risks

A human health risk assessment (HHRA) was performed to evaluate potential risks and hazards to humans on or near the site. The HHRA was prepared following USEPA guidance (including *Risk Assessment Guidance for Superfund* Parts A, D, E, and F [USEPA 1989, 2002a, 2002b, 2004, 2009]), as well as Ohio EPA guidance (Ohio EPA 2004).

The HHRA uses the concentrations of contaminants found during the investigations in site soil, groundwater, surface water, and sediment. The concentrations of these contaminants are compared to past scientific studies on the effects these contaminants have had on people (or animals, when human studies are unavailable). Comparing the site-specific contaminant levels to the levels reported in past studies helps USACE determine which contaminants are most likely to pose the greatest threat to humans.

The HHRA also considers the people who potentially could come in contact with the contaminants that were found at the site. It evaluates risks to people currently using the site as well as those who might use the site in the future. The types of people evaluated included onsite maintenance workers, future facility workers, future construction workers, industrial workers, trespasser/visitors, and offsite residents. The HHRA did not evaluate risks to potential future residents living on the landfill because land use at the site is expected to remain industrial.

The HHRA then considers the different ways that people might come in contact with the contaminants. These are called **exposure pathways**. Under current land use conditions, the exposure pathways evaluated were maintenance worker exposures to surface soil, industrial worker exposures to particulate emissions from surface soil, and trespasser/visitor exposures to surface soil, sediment, and surface water. Under future land use conditions, the exposure pathways evaluated were onsite facility worker exposures to surface soil and indoor air; future maintenance worker exposures to surface soils, construction worker exposures to soil,

sediment, surface water, and shallow groundwater; and offsite residents' exposures to groundwater and indoor air. Maintenance worker, industrial worker, and trespasser/visitor exposures were assumed to be the same under future land use conditions as those under current land use conditions.

Two types of risks to humans are evaluated in the HHRA: cancer risk and noncancer risk. For cancer risks, the likelihood of any kind of cancer resulting from a site is generally expressed as an upper-bound probability; for example, a "1 in 10,000 chance." In other words, for every 10,000 people that could be exposed, one extra cancer case may occur as a result of exposure to site contaminants. An "extra" cancer case means that one more person could get cancer than would normally be expected to from all other causes. In the United States, the "normal" chance of contracting cancer is about 1 in 2 for men and 1 in 3 for women (American Cancer Society 2010). Noncancer health effects are expressed in terms of a "**hazard index**" (HI). The key concept here is that a "**threshold level**" (measured usually as an HI of less than 1) exists below which adverse, noncancer health effects are no longer predicted.

In accordance with CERCLA, cancer risks are determined to be at an "unacceptable" level when the probability is more than 1 in 10,000 (that is, 10^{-4}). Therefore, if the cancer risks at a site are more than 10^{-4} , a cleanup action generally is required (USEPA 1991). If cancer risks are less than 10^{-4} , cleanup action generally is not required, but may be warranted. Ohio EPA's target risk level is 1 in 100,000 (or 10^{-5}) (Ohio EPA 2004). For noncancer health effects, risks are considered acceptable if the HI is less than 1, and generally considered unacceptable when the HI is greater than 1. The HHRA results for each AOC are discussed below.

5.1.1 AOC 1

At AOC 1, the HHRA determined that under current land use conditions, surface soil may pose an unacceptable cancer risk (risk greater than 1×10^{-4}) to maintenance workers and youth trespasser/visitors from PAHs and PCBs. Under future land use conditions, risks from surface soil to maintenance workers and youth trespasser/visitors from PAHs and PCBs are the same as that under current land use conditions. Total soil (that is, both surface and subsurface soil) also poses an unacceptable cancer risk (risk greater than 10^{-4}) to construction workers from PAHs and PCBs. Exposure to lead in site soil may result in unacceptable risk to children.

Future use of groundwater may also pose an unacceptable cancer risk to offsite residents, primarily because of PAHs and dioxins/furans, and to a lesser extent from metals and bis(2-ethylhexyl)phthalate. Future exposure to groundwater may pose an unacceptable noncancer risk (HI greater than 1) for future construction workers from dioxins/furans. Future use of groundwater may also pose an unacceptable noncancer risk to offsite residents from, dioxins/furans, PAHs, and metals (including arsenic, iron, lead, manganese, and thallium).

5.1.2 AOC 2

At AOC 2, no unacceptable noncancer or cancer risks were identified under current land use conditions. Under future land use conditions, exposure to groundwater by construction workers may pose an unacceptable noncancer risk (HI greater than 1) from dioxins/furans.

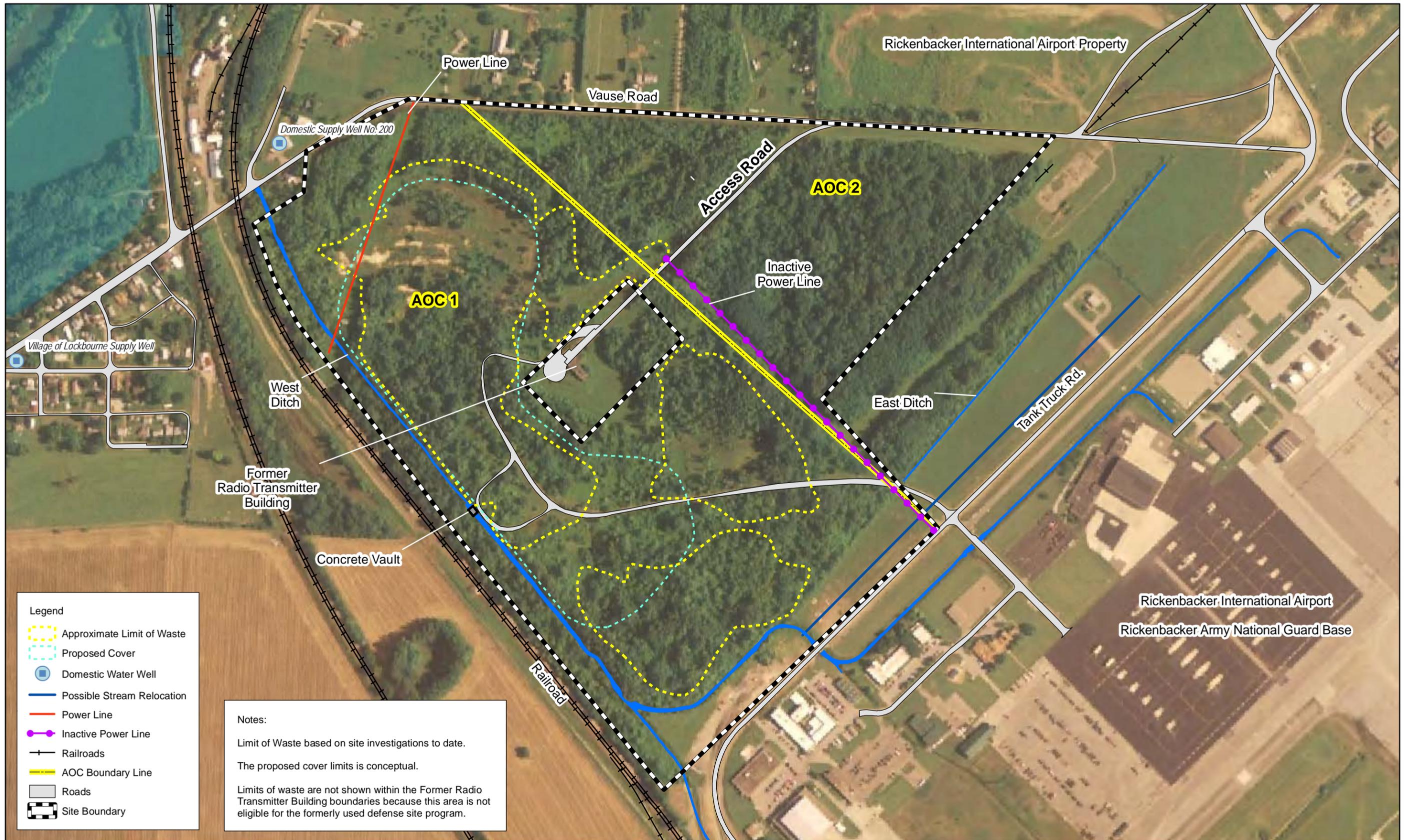


Figure 3
 Proposed Soil Cover Area
 Proposed Plan
 Former Lockbourne Air Force Base Landfill, Ohio

5.2 Ecological Risks

An ecological risk assessment (ERA) was conducted to assess the potential risks to ecological populations (plants and animals) from exposure to site-related contaminants at AOCs 1 and 2. The ERA also identified the East and West Ditches located along the eastern and western portions of the site as separate exposure areas. The ERA was conducted in accordance with USACE's *Engineering Manual 200-1-4, Risk Assessment Handbook: Volume II – Environmental Evaluation* (USACE 1996) and Ohio EPA's *Ecological Risk Assessment Guidance Document* (Ohio EPA 2008).

The ERA follows a multistep approach, similar to the HHRA. The ERA identified where contamination was found during the site investigations (for example, in soil, surface water, and sediment). The ERA considered the food sources (plants) and animals, as well as the ecological habitats known to be present on or near the site. The ERA considered the different ways these animals might be exposed to the contamination. Then a risk screening was performed, during which potential exposures to plants and animals were estimated, and the concentrations of contaminants at which an effect may occur were evaluated. The risk characterization used all of this information to estimate the ecological risk.

The receptors identified for evaluation at the former Lockbourne AFB landfill include lower-trophic **receptors**, such as plants, earthworms, and **benthic invertebrates** (animals without backbones that live in aquatic bottoms or sediment habitats) and upper-trophic terrestrial and aquatic receptors (animals that live on land or in water such as birds and mammals). The upper-trophic receptors were selected as representative species for other species that have comparable feeding habits. Key upper-trophic receptors include the deer mouse, American robin, mourning dove, short-tailed shrew, red-tailed hawk, red fox, mallard, marsh wren, muskrat, belted kingfisher, and mink. For the terrestrial mammals analyzed, the ERA assumed they would be present at the site 100 percent of the time.

Potential unacceptable ecological risks identified by the ERA at AOC 1 included risks to terrestrial mammals from metals (only thallium), PAHs, PCBs, and dioxins/furans; to birds from lead and PCBs; and to lower-trophic receptors from metals, pesticides, PCBs, PAHs, and dioxins/furans. Potential unacceptable ecological risks also were identified for lower-trophic receptors from PAHs, dioxins/furans, metals, pesticides, and PCBs in the West Ditch and PAHs in the East Ditch. However, the East and West Ditches provide a low quality habitat for aquatic receptors, and it is unlikely the ditches can support a viable fish population or provide a significant source of food for upper-trophic populations.

No unacceptable risk was identified for ecological receptors at AOC 2.

5.3 Constituents of Concern

As indicated in Sections 5.1 and 5.2, unacceptable human health and/or ecological risks were identified at AOC 1 for surface soil, subsurface soil, groundwater, sediment (East and West Ditches), and surface water (West Ditch). For AOC 2, unacceptable human health risks were identified for groundwater. The contaminants that are responsible for the unacceptable risks at AOCs 1 and 2 are called "**constituents of concern**" (COCs). Based on the HHRA and ecological risk assessment results, the COCs identified for AOC 1 and AOC 2 are summarized below:

AOC / Exposure Pathway	Human Health COCs	Ecological COCs
AOC 1		
Surface soil	PAHs and PCBs	Aluminum, chromium, lead, mercury, selenium, thallium, zinc, PAHs, PCBs, dioxins/furans, and DDT
Subsurface soil	PAHs, PCBs, and lead	None
Groundwater	PAHs, arsenic, cobalt, iron, lead, manganese, thallium, dioxins/furans and bis(2-ethylhexyl)phthalate	None
East Ditch sediment	None	PAHs
West Ditch surface water	None	Dioxins/furans
West Ditch sediment	None	Arsenic, DDD, DDE, DDT, PCBs, PAHs, and dioxins/furans
AOC 2		
Groundwater	PAHs and dioxins/furans	None

6. Remedial Action Objectives

The **remedial action** objectives (RAOs) for the former Lockbourne AFB landfill are to:

- Eliminate unacceptable human and ecological risks due to potential exposure to constituents of concern (see Paragraph 5.3) in soil
- Eliminate unacceptable risk from exposure to constituents of concern (see Paragraph 5.3) in groundwater at the site
- Eliminate unacceptable transfer of contaminants to nearby surface water resources
- Beneficially reuse of site materials to complete landfill closure and provide for sustainability
- Allow for beneficial reuse of the site through creative site closure design, construction, and restoration

7. Summary of Cleanup Alternatives

USACE considered several cleanup alternatives for the site that would address the human health and ecological risks identified during the risk assessment. Because buried waste is located at AOC 1 and not at AOC 2, different cleanup alternatives were evaluated for each AOC. This section summarizes these cleanup alternatives.

7.1 AOC 1

When considering cleanup alternatives for AOC 1, USACE applied the results of studies performed by USEPA to help streamline the process for identifying cleanup alternatives at similar landfills, called a “presumptive remedy.” A presumptive remedy is a cleanup technology that USEPA identifies, based upon its past experience and research, would be

appropriate for cleanup of certain types of sites. USEPA determined the presumptive remedy for landfills, such as the former Lockbourne AFB landfill, is containment. For this site, the containment presumptive remedy includes a landfill cover or cap to prevent direct contact by humans or ecological receptors with contaminated materials and reduce the **migration** of contamination from soil to surface water and groundwater (USEPA 1993, 1996).

For AOC 1, three remedial alternatives were developed, as summarized below.

7.1.1 Alternative 1—No Action

Alternative 1 is required under CERCLA to provide a baseline for comparing remedial alternatives. Under this alternative, no cleanup action would be conducted.

Alternative 1—Estimated Cost	
2010 capital cost	\$0
Lifetime operation and maintenance (O&M) cost	\$0
Lifetime present-worth capital and O&M cost	\$0

7.1.2 Alternative 2—Consolidation, Construction of a Compacted Clay Cap, Long-Term Management, and Institutional Controls

Alternative 2 involves constructing a compacted clay cap over the landfill waste, conducting long-term management, including long-term groundwater and landfill gas monitoring, and implementing institutional controls. The size of the landfill would be reduced to approximately 40 acres by consolidating waste across AOC 1 under the capped area. The clay cap consists of a 24-inch-thick compacted clay layer with 6 inches of topsoil. The topsoil is needed to support vegetation growth on the landfill. The cap would be sloped to promote surface water drainage and prevent ponding. Groundwater will be monitored to assess potential migration of groundwater contamination. Groundwater will be monitored at an appropriate frequency to establish baseline conditions over a period of time sufficient to observe seasonal trends, responses to recharge, and to estimate **attenuation rates** for key contaminants. Environmental covenants would be implemented to restrict the future use of AOC 1, restrict exposure to groundwater beneath AOC 1, and prevent intrusive activities on the landfill cap.

Alternative 2—Estimated Cost	
2010 capital cost	\$12,983,800
Lifetime O&M cost	\$2,498,400
Lifetime present-worth capital and O&M cost	\$15,482,200

7.1.3 Alternative 3—Consolidation, Construction of a Soil Cover, Long-Term Management, and Institutional Controls

Alternative 3 involves constructing a compacted soil cover over the landfill waste, conducting long-term management, including long-term groundwater and landfill gas monitoring, and implementing institutional controls. The size of the landfill would be reduced to approximately 40 acres by consolidating waste across AOC 1 under the covered area. The soil cover consists of a 24-inch-thick soil cover and 6 inches of topsoil. The topsoil is needed to support vegetation

growth on the landfill. The cover would be sloped to promote surface water drainage and prevent ponding. Groundwater will be monitored to assess potential migration of groundwater contamination. Groundwater will be monitored at an appropriate frequency to establish baseline conditions over a period of time sufficient to observe seasonal trends, responses to recharge, and to estimate attenuation rates for key contaminants. Environmental covenants would be implemented to restrict the future use of AOC 1, restrict exposure to groundwater beneath AOC 1, and prevent intrusive activities on the landfill cover.

Alternative 3—Estimated Cost	
2010 capital cost	\$10,437,800
Lifetime O&M cost	\$2,478,200
Lifetime present-worth capital and O&M cost	\$12,916,000

7.1.4 Applicable or Relevant and Appropriate Requirements

Applicable or relevant and appropriate requirements (ARARs) are federal and state cleanup standards, standards of control, and other substantive environmental statutes or regulations that are either “applicable” or “relevant and appropriate” to the cleanup action. A selected cleanup alternative must comply with ARARs or provide reasons for a waiver from these requirements. The primary ARARs include the following:

1. **Ohio Administrative Code (OAC) 3745-27-08 – Construction specifications for sanitary landfills.** Specifies the minimum requirements for the soil/clay layers, granular drainage layer, geosynthetics, **leachate** management system, gas monitoring system, etc. Describes minimum standards for construction of sanitary landfill facilities.
2. **OAC 3745-27-10 – Groundwater monitoring program for a sanitary landfill facility.** Requires groundwater monitoring program for all sanitary landfill facilities. Requires that the system consist of a sufficient number of wells that are located so that samples indicate both upgradient (background) and downgradient water samples. Details minimum requirements that the system must be designed to meet. Details sampling and analysis procedures. Specifies procedures for assessment and correction of contamination.
3. **OAC 3745-27-11 (G) and (H) - Final closure of sanitary landfill facilities.** Requires closure of a landfill in a manner which minimizes the need for post-closure maintenance and minimizes post-closure formation and release of leachate and explosive gases to air, soil, groundwater, or surface water. Specifies acceptable cap design; barrier layer, granular drainage layer, soil and vegetative layer. Provides for use of comparable materials to those specified with approval of Director.
4. **OAC 3745-27-13(H), Sections 7 and 8 – Disturbances where hazardous or solid waste facility was operated.** Describes substantive limitations on any proposed filling, grading, excavating, building, drilling, or mining on land where a hazardous waste facility or solid waste facility was operated and how the activities will be accomplished.
5. **OAC 3745-17-08B - Restriction of emission of fugitive dust.** Requires dust control measures by stating that no person shall cause or permit a fugitive dust source to be

operated; or materials to be handled, transported, or stored; or a building or its appurtenances or a road to be used, constructed, altered, repaired, or demolished without taking or installing reasonably available control measures to prevent fugitive dust from becoming airborne.

Alternatives 2 and 3 will require waivers for three of the ARARs as follows:

- **OAC 3745-27-08 – Construction specifications for sanitary landfills.** This ARAR is waived because based on the nature and extent of impacts at the site, many of the specific requirements are not needed and the standard of performance can be achieved with alternate designs. This ARAR will be waived, per the National Contingency Plan 300.430(f)(1)(ii)(C)(4)), because these alternatives will obtain a standard of performance that is equivalent to that required under OAC 3745-27-08.

Specifically, Alternatives 2 and 3 with a compacted clay cap and soil cover, respectively, will meet the same performance standard for the site as the composite cap specified in OAC 3745-27-08. The composite cap, as specified in OAC 3745-27-08, is designed to prevent human contact with the landfill waste and other contamination, eliminate runoff of contaminants from contaminated soil, and block **leaching** to groundwater and subsurface soil. Alternatives 2 and 3 caps will prevent direct contact with waste and contaminated soil, eliminate runoff of contaminants from contaminated soil, and reduce leaching to groundwater and subsurface soil. At this site, the additional redundancy provided by the composite cap for reducing leaching is not needed because leaching to groundwater is not a significant migration pathway. The soil cover and clay cap would both adequately protect groundwater from further contamination. Furthermore, the composite cap includes additional elements that are not needed to protect human health and the environment at the site, such as an explosive gas control system. Because of the particular COCs at this site, Alternatives 2 and 3 caps are as protective as the composite cap prescribed by OAC 3745-27-08. The composite cap required by OAC 3745-27-08 would cost an additional \$125,000 to \$220,000 per acre. Because both Alternatives 2 and 3 provide an equivalent level of performance specific to this site, there would be no benefit to incur the additional cost of implementing the composite cap as compared to the cost-benefit of applying a waiver.

- **OAC 3745-27-10 – Groundwater monitoring program for a sanitary landfill facility.** The specific monitoring requirements of this regulation are unnecessary because the monitoring system that is planned will obtain a standard of performance that is equivalent to those requirements. This ARAR will be waived per the National Contingency Plan 300.430(f)(1)(ii)(C)(4)), because these alternatives will obtain a standard of performance that is equivalent to that required under OAC 3745-27-10.

Specifically, the proposed Alternatives 2 and 3 will include groundwater monitoring. However, OAC 3745-27-10 includes additional monitoring requirements that are not needed to protect human health and the environment at this site. For example, OAC 3745-27-10 requires analysis of over 200 parameters, many of which are not COCs at the site. Given the age of this landfill, the contaminants shown to drive risk in groundwater at this site are well known. The long term management proposed for the site would be more tailored to the risk drivers documented at the site and, therefore, be significantly less

expensive than the monitoring program specified in OAC 3745-27-10. As a result, it will achieve a standard of performance that is equivalent to OAC 3745-27-10.

- **OAC 3745-27-11 (H) - Final closure of sanitary landfill facilities.** Several of the specific final closure elements included in this subpart will be met through alternate methods that will obtain a standard of performance that is equivalent to those requirements. Therefore, an ARAR waiver will be used for Alternatives 2 and 3, per the NCP 300.430(f)(1)(ii)(C)(4)), because these alternatives will obtain a standard of performance that is equivalent to that required under OAC3745-27-11 (H). Specifically, the proposed surface water control design features and long-term management program, including groundwater and landfill gas monitoring for Alternatives 2 and 3 will achieve a standard of performance that is equivalent to the intent of these closure requirements identified in OAC 3745-27-11 (H).

7.2 AOC 2

For AOC 2, two remedial alternatives were developed, as summarized below.

7.2.1 Alternative 1—No Action

Alternative 1 is required under CERCLA to provide a baseline for comparing remedial alternatives. Under this alternative, no cleanup action would be conducted.

Alternative 1—Estimated Cost

2010 capital cost	\$0
Lifetime O&M cost	\$0
Lifetime present-worth capital and O&M cost	\$0

7.2.2 Alternative 2—Implementation of Environmental Covenants

Alternative 2 involves implementing environmental covenant restricting exposure to groundwater beneath AOC 2.

Alternative 2—Estimated Cost

2010 capital cost	\$6,000
Lifetime O&M cost	\$0
Lifetime present-worth capital and O&M cost	\$6,000

8. Evaluation of Alternatives

8.1 Evaluation Criteria

CERCLA defines an approach that USACE must use to evaluate and compare cleanup alternatives. This approach involves nine evaluation criteria to facilitate a comparison of the relative performance of the alternatives and provide a way to identify their advantages and disadvantages. The nine criteria are divided into three categories, threshold criteria, balancing criteria, and modifying criteria. A cleanup alternative must meet the threshold criteria in order to be considered further. The balancing criteria are used to compare one

EVALUATION CRITERIA FOR CLEANUP ALTERNATIVES

Threshold Criteria

Overall Protection of Human Health and Environment—A selected cleanup action must be protective of human health and the environment. A cleanup action is protective if it adequately eliminates, reduces, or controls current and potential risk posed by the site through each exposure pathway.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) ARARs are federal and state cleanup standards, standards of control, and other substantive environmental statutes or regulations that are either “applicable” or “relevant and appropriate” to the cleanup action. A selected cleanup alternative must comply with ARARs or provide reasons for a waiver from these requirements.

Balancing Criteria

Long-Term Effectiveness and Permanence—Long-term effectiveness and permanence are measured by how much risk remains after the cleanup is completed.

Reduction of Toxicity, Mobility, or Volume through Treatment—Under CERCLA, the preference is for a cleanup action that uses treatment to reduce the toxicity, mobility, and volume of contamination.

Short-Term Effectiveness—Refers to the speed with which the cleanup action achieves protection, as well as the cleanup action’s potential to create adverse effects on human health and the environment during the construction and implementation period.

Implementability—Deals with the difficulties of constructing and operating an alternative and the availability of materials and services required.

Cost—Includes capital costs and operation and maintenance costs.

Modifying Criteria

State Acceptance—This evaluation criterion evaluates the issues and concerns that Ohio EPA may have regarding each of the alternatives.

Community Acceptance—Will be assessed after a thorough review of the public comments received on the Proposed Plan.

alternative to another. State and community acceptance of a proposed remedial action or, modifying criteria, are important elements in selecting a cleanup action and are evaluated during the public review of this Proposed Plan. The nine criteria are summarized above.

The FFS report provides a detailed analysis and evaluation of the cleanup alternatives based on criteria 1 through 8 (CH2M HILL 2011). Criterion 9 will be evaluated after considering the public’s comments received during the comment period.

8.2 Comparison of Cleanup Alternatives

Table 1 summarizes how each alternative satisfies each criterion and how it compares to the other alternatives for AOC 1 and AOC 2. As shown in Table 1, at AOC 1, Alternative 1 (No Action) does not meet the threshold criteria to protect human health and the environment. Alternative 2 (Consolidation, Construction of Compacted Clay Cap, Long-Term Management, and Institutional Controls), and Alternative 3 (Soil Cover, Long-Term Management, and Institutional Controls) both meet the threshold criteria for protection of

Table 1 Comparative Analysis of Alternatives					
Criteria	AOC 1			AOC 2	
	Alternative 1	Alternative 2	Alternative 3	Alternative 1	Alternative 2
Overall Protection of Human Health and the Environment					
Compliance with Applicable or Relevant and Appropriate Requirements	NA	(1)	(1)	NA	NA
Long-Term Effectiveness and Permanence					
Reduction of Toxicity, Mobility or Volume Through Treatment					
Short-Term Effectiveness					
Implementability	NA			NA	
Cost	\$0 ⁽²⁾	\$15,482,000 ⁽²⁾	\$12,916,000 ⁽²⁾	\$0 ⁽²⁾	\$6,000 ⁽²⁾
State/Support Agency Acceptance					
Community Acceptance	To Be Determined	To Be Determined	To Be Determined	To Be Determined	To Be Determined

Ranking: Well satisfies criterion Moderately satisfies criterion Poorly satisfies criterion Does not meet criterion

AOC 1
 Alternative 1 – No Action
 Alternative 2 – Clay Cap, ICs, and Long-Term Management
 Alternative 3 – Soil Cover, ICs, and Long-Term Management

AOC 2
 Alternative 1 – No Action
 Alternative 2 – ICs

1 – There are no chemical and location-specific ARARs, and specific waivers are requested for action-specific ARARs.
 2 – Cost is the total present-worth value; cost accuracy ranges from -30% to +50%.
 NA – This criterion does not apply to this alternative.

human health and the environment and compliance with ARARS. In addition, the two capping alternatives provide comparable performance relative to balancing criteria: long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; and short-term effectiveness. Alternative 3 has slightly greater implementability than Alternative 2 due to ease of handling and compaction of these materials compared with imported clays. Cost is approximately 16 percent less for Alternative 3. Alternative 2 will provide greater protection against infiltration of precipitation into the underlying waste materials than Alternative 3. If Alternative 2 were implemented, it would be difficult to meet RAOs to provide for sustainability and to maximize beneficial reuse through creative site closure design, construction, and restoration. This is related to the difficulty of establishing native grasses and deeper-rooted plants in 6 inches of topsoil over a 24-inch compacted clay cap. Alternative 3 is the most cost-effective alternative that meets the RAOs to promote beneficial reuse and/or greater sustainability.

For AOC 2, Table 1 illustrates that Alternative 1 (No Action) does not meet the threshold criteria to protect human health and the environment. Alternative 2 (Implementation of Institutional Controls) meets the threshold criteria for protection of human health and the

environment and compliance with ARARs. Alternative 2 involves placing an environmental covenant restricting exposure to groundwater beneath AOC 2.

If Alternative 1 were implemented, it would not ensure that the RAO of preventing potential exposure to COCs in groundwater at AOC 2 would be met. Alternative 2 is the most effective alternative because it meets the threshold criteria for protection of human health and the environment. For Alternative 2, the action-specific ARARs do not apply because this alternative involves only the administrative implementation of the environmental covenant.

9. Preferred Alternative

USACE, in coordination with Ohio EPA, is recommending that a soil cover, long-term management, including long-term groundwater and landfill gas monitoring, and institutional controls (through the use of environmental covenants) be implemented as the cleanup action for AOC 1 and that institutional controls (through the use of environmental covenants) be implemented for AOC 2. This recommendation is not a final decision. USACE, in coordination with Ohio EPA, will make its final decision after reviewing and considering all comments submitted during the public comment period.

9.1 AOC 1

At AOC 1, Alternative 3 (Consolidation, Construction of a Soil Cover, Long-Term Management, and Institutional Controls) is the Preferred Alternative. The soil cover will address threats to humans by preventing contact with contaminated soil and waste and by reducing the migration of contaminated surface soil to surrounding areas via surface water runoff. The soil cover also would reduce leaching to groundwater by reducing the amount of surface water infiltration. The institutional controls proposed for AOC 1 restrict the future use of AOC 1, restrict exposure to groundwater beneath AOC 1, and prevent intrusive activities on the landfill cover, which will help limit potential contact with the landfill and prevent exposure to the groundwater. Groundwater monitoring would be effective in documenting that contaminants are not moving off the site.

The main components of Alternative 3 include the following:

- Clearing of approximately 75 acres of AOC 1.
- Consolidating waste within the area of the proposed cover, which is approximately 40 acres. The approximate average depth of excavation during consolidation of wastes is assumed to be 6 feet based on the previous investigations. Only the area outside the proposed cover will be excavated, and the excavated material will be brought within the landfill cover area. The area of the cover is an estimate; the actual area will be determined during the landfill cover design.
- Installing 2 feet of soil cover and 6 inches of cover material, suitable for establishing and supporting the vegetation selected for the cover, over the wastes in AOC 1. The cover will be sloped to promote surface water runoff and reduce infiltration of rain and snow melt. In addition, the cover area will be seeded, mulched (1 inch thick), and watered. The topsoil

will be seeded with an appropriate seed mixture suitable for short-rooted, drought-resistant plant species. The mature vegetation will serve as a barrier to burrowing animals.

- Installing vents in the landfill cover to prevent accumulation of landfill gases.
- Five existing monitoring wells will be abandoned and new monitoring wells will be installed as part of the long-term management program for the landfill.
- Installing a drainage swale around along the perimeter of the covered landfill.
- Removing the reinforced concrete structure to the extent that is necessary to restore the ditch to a more natural condition and improve surface water drainage at the landfill while maintaining structural integrity of the landfill slope and future cover.
- Reusing the cleared vegetation to the maximum extent possible (for example, creating mulch out of chipped wood.)
- Implementing environmental covenants, including land use and groundwater use restrictions and cover maintenance as needed.
- Performing long-term operation and maintenance measures to ensure the protectiveness of the soil cover.
- Performing long-term groundwater quality monitoring. A detailed description of the monitoring program will be included in the long-term management plan, which will be prepared after the **Decision Document** is signed.
- Conducting **5-year reviews**.

Based on information currently available, the lead agency believes the Preferred Alternative for AOC 1 meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. USACE expects the Preferred Alternative to be protective of human health and the environment; comply with ARARs; be cost-effective; and utilize permanent solutions and sustainable options to the maximum extent practicable.

9.2 AOC 2

The components of the preferred alternative for AOC 2 include the following:

- Implementing an environmental covenants to restrict exposure to groundwater
- Conducting 5-year reviews

Based on information currently available, the lead agency believes the Preferred Alternative for AOC 2 meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria.

10. Community Participation

USACE and Ohio EPA provide information to the public regarding the cleanup of the former Lockbourne AFB landfill through public meetings, the **Administrative Record File** for the site (online at <http://bit.ly/LockbourneAFB>), the **Information Repository** (at the

Columbus Metropolitan Library, Southeast Branch), and an announcement published in the local newspaper. USACE and Ohio EPA encourage the public to gain a more comprehensive understanding of the site and the cleanup activities proposed for it by participating in these community participation activities.

The **public comment period** provides time to review and comment on the information provided in the Proposed Plan. The public comment period for this Proposed Plan is April 21 until May 21, 2011.

Comments on the Proposed Plan or other relevant issues can be submitted in writing via email or mail (postmarked no later than May 21, 2011) to the following addressee:



During the comment period, interested parties may submit written comments to the following address:

Brooks Evens
 U.S. Army Corps of Engineers,
 Louisville District CELRL-ED-E-E
 P.O. Box 59
 Louisville, KY 40201-0059
 Andrew.B.Evens@usace.army.mil

During the public comment period, USACE will hold a public meeting, which will provide an additional opportunity for the public to learn about the proposed cleanup actions and to comment on the Proposed Plan. The public meeting will be held on April 28, 2011, at the Hamilton Township Community Center (address to right).

USACE will develop a transcript of the public meeting, and a copy of the transcript will be placed in the Administrative Record File. All comments received on the Proposed Plan during the public meeting and comment period will be summarized, and responses will be provided in the **Responsiveness Summary** section of the Decision Document. The Decision Document will present the selected remedy and will be included in the Administrative Record File.

USACE will review and consider the public's input as part of the process before reaching a final decision on the most appropriate cleanup action to be taken.



Mark Your Calendar for the Public Meeting

Date: April 28, 2011
 Time: 7:30 p.m. to 9:30 p.m.
 Location: Hamilton Township
 Community Center
 Address: 6400 Lockbourne Road
 Lockbourne, OH 43137

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12. Glossary of Terms

administrative record file: A file containing information that is used to make decisions about an environmental site, including work plans, verified sampling data, final reports and studies, maps, and public health assessments. This file is available for public review.

applicable or relevant and appropriate requirements (ARARs): Federal and/or state environmental laws and regulations that determine the cleanup levels or cleanup parameters of a remediation under CERCLA, along with the protection of human health and the environment.

attenuation rate: Rate of decrease in concentrations of contaminants.

benthic invertebrates: Animals that live on the bottom of a water body (or in the sediment) and have no backbone.

cleanup actions: Those actions taken to address a release or threatened release of hazardous substances that could affect public health or the environment. For example, a cleanup action can include installing a fence at a site, digging up contaminated soil, and/or capping a landfill.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA): The federal law, commonly known as Superfund, passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). It requires responsible parties to clean up releases of hazardous substances and certain pollutants and contaminants and sets out a process for investigating and making decisions about sites that may need to be cleaned up.

constituents of concern (COCs): Site-specific chemical substance that potentially poses significant human health or ecological risks. COCs are typically further evaluated for remedial action.

Decision Document: A legal document issued following the RI and feasibility study that sets forth the selected remedy for cleanup of a site as decided by the lead federal agency.

deep aquifer: The deepest of the three water-bearing zones present at the landfill. This aquifer consists of sand and gravel overlain by a clayey, silty till and is typically present at the site at a depth of approximately 130 feet bgs.

dioxins/furans: Manmade chemicals that are by-products of the manufacture of other chemicals, during waste incineration and burning fuels such as wood and coal.

exposure pathways: The way chemicals come into contact with the body. The most common routes of exposure are through the skin, mouth, or by inhalation.

5-year review: The regular checkup on a CERCLA site where waste was left behind after a cleanup action, to make sure that the site is still safe and that the cleanup action is continuing to protect people and the environment. Public notices announce the beginning and end of the review and availability of the report. The public has a chance to provide information about any changes or problems they may have noticed at the site.

Formerly Used Defense Site (FUDS) Program: The Department of Defense program that cleans up environmental contamination still remaining at properties formerly owned by,

leased to, or otherwise possessed by the United States and under the jurisdiction of the Secretary of Defense. A property is eligible for cleanup under the FUDS program if the DoD transferred the property before October 17, 1986. The Army is the executive agent for the program, and the U.S. Army Corps of Engineers is responsible for carrying out the program. FUDS policy is defined in USACE Engineer Regulation 200-3-1, *Formerly Used Defense Sites (FUDS) Program Policy*, May 2004.

geophysical survey: Study of the earth's structure, including objects buried under the ground, often conducted without disturbing the surface of the ground, using ground-penetrating radar or instruments that measure disturbances in the earth's electromagnetic field; may include soil borings.

groundwater: Water found beneath the ground surface that fills spaces between sand, soil and rock. In aquifers, groundwater occurs in sufficient quantities that can be used as a source of water for drinking, irrigation and other purposes.

hazard index: This is the term for the measurement of adverse health effects to humans associated with exposure to noncancer causing contaminants. Non-cancer hazards are expressed as a ratio of the average daily intake of a chemical to its reference dose (a threshold level of exposure below which no adverse health effects are likely to occur). When this number is equal to or less than the USEPA acceptable hazard threshold of 1, no adverse health effects are anticipated. However, if it exceeds 1, the potential for noncancer effects exists.

hazardous materials: Any material that may pose a threat to public health or the environment.

information repository: Under CERCLA, an information repository is a collection of copies of all the information related to a cleanup action that has been made available to the public (40 *Code of Federal Regulations* 300.430). This contrasts with the Administrative Record, which contains only those documents that form the basis for selecting a response action.

leachate: The liquid that drains or 'leaches' from a landfill; it can vary widely in composition depending on the age of the landfill and the type of waste the landfill contains.

leaching: Natural process by which water-soluble substances are washed out from soil or wastes. These leached out chemicals cause pollution of surface and subsurface water

migration: The means by which contaminants can move over time from a hazardous waste site to other areas. Possible pathways include air, surface water, underlying groundwater, plants, and animals.

Ohio Environmental Protection Agency (Ohio EPA): The state agency responsible for enforcement of state laws protecting the environment.

polynuclear aromatic hydrocarbons (PAHs): A group of contaminants that form from the incomplete combustion of hydrocarbons, such as coal and gasoline. PAHs are an environmental concern because they are toxic to aquatic life and because several are suspected to cause cancer in humans.

polychlorinated biphenyls (PCBs): A group of contaminants used in the manufacture of plastics, as lubricants, and dielectric fluids in transformers, in protective coating for wood, metal and concrete, and in adhesives, wire coating and so forth. They are toxic to aquatic life

and persist in the environment for long periods of time. They can accumulate in food chains and may produce harmful side-effects at high concentrations.

Proposed Plan (PP): A plan for a site cleanup that is available to the public for comment.

public comment period: A reasonable time period, of at least 30 days, for the public to review and comment on various documents and actions.

receptor: Human being or non-human organism that might be exposed to a contaminant, by coming in contact with air, water, soil, or other material containing the contaminant.

remedy: Cleanup action.

remedial action: The cleanup of environmental contamination; the actual construction or implementation of the selected cleanup alternative at a site.

remedial investigation (RI): Extensive and detailed studies of the nature and extent of the contamination at the site, including field testing and sampling, site characterization, and conducting formal risk assessments. This phase in the CERCLA process occurs after a site inspection reveals a real or potential threat to human health and the environment exists. The RI is used to determine whether or not clean up is required and provides data for a feasibility study of cleanup alternatives.

responsiveness summary: A summary of oral and written public comments received during a public comment period. The responsiveness summary is a key part of the decision document, highlighting community concerns.

seeps: Areas where groundwater may exit at the ground surface.

surface water: Bodies of water that are above the ground, such as rivers, lakes, and streams.

Superfund: Superfund is the name given to the environmental program established by USEPA to address abandoned hazardous waste sites. It is also the name of the fund established by CERCLA, and is often a term used interchangeably with CERCLA. The fund allows USEPA to clean up such sites and to require the responsible parties to perform cleanups or reimburse the government for USEPA-lead cleanups.

Superfund Amendments and Reauthorization Act of 1986: The law that refined and expanded CERCLA in 1986, formally establishing the Defense Environmental Restoration Program and its funding mechanism, the Defense Environmental Restoration Account.

threshold level: This is the point after which radical changes are likely to occur.

U.S. Environmental Protection Agency (USEPA): The independent federal agency, established in 1970, that regulates federal environmental matters and oversees the implementation of environmental laws.

upper water-bearing zone (UWBZ): This is the shallowest of the three water-bearing zones present at the landfill. UWBZ groundwater exists at depths ranging between 4 and 16 feet bgs in interbedded sand lenses of the upper clayey, silty till.

volatile organic compounds (VOCs): Contaminants that evaporate into the air easily, such as paint thinners or industrial solvents.