Final

Environmental Assessment

Air Cargo Facility Development
Cincinnati/Northern Kentucky International Airport

Prepared For
U.S. Department of Transportation
Federal Aviation Administration

February 2019

Prepared by
Landrum & Brown

This environmental assessment becomes a Federal document when evaluated, signed, and dated by the Responsible FAA Official.

Responsible FAA Official

Date

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Acronyms

ACRONYMS

The following is a list of acronyms used in the EA.

AC	Advisory Circular
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
AEDT	Aviation Environmental Design Tool
AFBR	Anaerobic Fluidized Bed Reactor
AGB	Aerated Gravel Bed
ALP	Airport Layout Plan
AMU	Adjusted Mitigation Units
APE	Areas of Potential Effects
APU	Auxiliary Power Unit
AST	Aboveground Storage Tank
ATCT	Airport Traffic Control Tower
AvGas	Low-lead aviation gasoline
BA	Biological Assessment
BMPs	Best Management Practices
BO	Biological Opinion
BTU	British Thermal Units
CAA	Clean Air Act of 1970, as amended
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended
CERFA	Community Environmental Response Facilitation Act of 1972
C.F.R	Code of Federal Regulations
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2E	Carbon Dioxide Equivalencies
CREC	Controlled Recognized Environmental Condition
CVG	Cincinnati/Northern Kentucky International Airport
CWA	Clean Water Act of 1972 (Federal Water Pollution Control Act, as amended)
Day	7:00 am to 9:59 pm
dB	Decibel
DNL	Day-Night Average Sound Level
DOW	Kentucky Division of Water
EA	Environmental Assessment
EIS	Environmental Impact Statement

ACRONYMS

EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973, as amended
E&A	Environment & Archaeology, LLC
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
FIRM	Flood Insurance Rate Maps
FPPA	Farmland Protection Policy Act of 1981
GAO	General Accounting Office
GAV	Ground Access Vehicles
GHG	Greenhouse Gas
GIS	Geographic Information System
GSE	Ground Support Equipment
H_2O	Water, Water Vapor
HDO	Houston-Donaldson Study Corridor Overlay District
HFCs	Hydrofluorocarbons
HREC	Historical Recognized Environmental Conditions
HSWA	Hazardous and Solid Waste Amendments of 1984
IBCF	Imperiled Bat Conservation Fund
ICAO	International Civil Aviation Organization
ILF	In-Lieu Fee
ITS	Institute of Transportation Studies
Jet A	Jet fuel
KCAB	Kenton County Airport Board
KDFWR	Kentucky Department of Fish and Wildlife resources
KFO	Kentucky Field Office
KHC	Kentucky Heritage Council
KPDES	Kentucky Pollutant Discharge Elimination System
KSNPC	Kentucky State Nature Preserves Commission
KYDEP	Kentucky Department of Environmental Protection
KYOSA	Kentucky Office of State Archaeology
kWh	Kilowatt Hours
KYTC	Kentucky Transportation Council
L_{max}	Maximum Noise Level
LWCF	Land and Water Conservation Fund Act of 1965

ACRONYMS

L&B	Landrum & Brown
MOA	Memorandum of Agreement
MSA	Metropolitan Statistic Area
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969, as amended
NFIP	National Flood Insurance Program
NH_3	Ammonia
NHPA	National Historic Preservation Act of 1966, as amended
Night	10:00 pm to 6:59 am
NKAPC	Northern Kentucky Area Planning Commission
NKMB	Northern Kentucky Mitigation Bank
NKSWMA	Northern Kentucky Solid Waste Management Area
NKU	Northern Kentucky University
NLR	Noise Level Reduction
NMFS	National Marine Fisheries Service
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NRHP	National Register of Historic Places
O_3	Ozone
OKI	Ohio Kentucky Indiana Regional Council on Governments
OPA	Oil Pollution Act of 1990
OTR	Ozone Transport Region
Pb	Lead
PFCs	Perfluorocarbons
PM	Particulate Matter (PM_{10} & $PM_{2.5}$)
PPA	Pollution Prevention Act of 1990
RCRA	Resource Conservation and Recovery Act of 1976, as amended
REC	Recognized Environmental Condition
RPZ	Runway Protection Zone
SARA	Superfund Amendments and Reauthorization Act of 1986
SD1	Sanitation District No. 1
SDWA	Safe Drinking Water Act
SF_6	Sulfur Hexafluoride

ACRONYMS

SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SPCC	Spill Prevention Control and Countermeasure Program
TBD	To Be Determined
THPO	Tribal Historic Preservation Office
TIS	Traffic Impact Study
TSCA	Toxic Substances Control Act
$\mu g/m^3$	Micrograms per cubic meter
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USCB	United States Census Bureau
USDOI	United States Department of Interior
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compounds

Glossary of Terms

GLOSSARY

The following glossary of terms is provided to aid the reader. Not all the terms provided are used in the EA, but are included to provide context and to assist the reader since many aeronautical terms are very similar.

Aviation Environmental Design Tool (AEDT) – A ***Federal Aviation Administration*** software system that models aircraft performance in space and time to estimate fuel consumption, emissions, noise, and air quality consequences. AEDT is a comprehensive tool that provides information to ***Federal Aviation Administration*** stakeholders on each of these specific environmental impacts. AEDT facilitates environmental review activities required under ***NEPA*** by consolidating the modeling of these environmental impacts in a single tool. AEDT 2d is the latest version.

Air Traffic Control (ATC) – An FAA service operated for the public, to ensure adequate separation of aircraft and to promote the safe, orderly, and expeditious flow of air traffic. The air traffic facility with jurisdiction over mapped and designated airspace may authorize aircraft to proceed under specified traffic conditions within ***controlled airspace***.

Airport Traffic Control Tower (ATCT) – An ***airport traffic control*** facility established on an airport to provide for safe, orderly, and expeditious flow of air traffic arriving at and departing from an airport, including airport surface areas such as runways and taxiways.

Aircraft Operation – One landing or one takeoff of an aircraft.

Airport Elevation – The highest point on an airport's usable runways, expressed in feet above ***mean sea level***.

Airport Improvement Program (AIP) – A Federal funding program for airport improvements that provides grants to public agencies — and, in somecases, to private owners and entities — for the planning and development of public-use airports that are included in the National Plan of Integrated Airport Systems. AIP is periodically reauthorized by Congress with funding appropriated from the Aviation Trust Fund. Proceeds to the Aviation Trust Fund are derived from excise taxes on airline tickets, aviation fuel, etc.

Airport Layout Plan (ALP) [1] – One of the key products of a master plan is a set of drawings that provides a graphic representation of the long-term development plan for an airport. The primary drawing in this set is the Airport Layout Plan. Other drawings may also be included, depending on the size and complexity of the individual airport.

Airport Operations – The total number of aircraft take offs (departures) and landings (arrivals) from an airport.

Ambient Noise – The total sum of noise from all sources in a given place and time. *See* also ***Natural Ambient Noise***.

Aquifer – A subsurface layer of permeable rock, sand, soil or gravel capable of bearing water.

Attenuation – An acoustical phenomenon whereby ***sound*** energy is reduced between the noise source and the receiver. This energy loss can be attributed to atmospheric conditions, terrain, vegetation, other natural features, and man-made features (e.g., sound insulation).

[1] FAA Advisory Circular 150/5070-6B

GLOSSARY

A-Weighted Decibels (dBA) – A system for measuring ***sound*** energy that is designed to represent the response of the human ear to sound. Energy at frequencies more readily detected by the human ear is more heavily weighted in this measurement system, while frequencies less readily detected are assigned lower weights. A- weighted *sound* measurements are commonly used in studies where the human response to *sound* is the object of the analysis.

Base Leg – A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline.

Commuter Aircraft – Generally, aircraft of designated size or seating capacity (usually 19 or fewer seats) that support scheduled air transportation services for compensation or hire in air commerce, with a frequency of at least five round trip operations per week on at least one route according to a published flight schedule. Commuter aircraft operate pursuant to a ***Federal Aviation Administration*** air carrier certificates issued under 14 C.F.R Parts 119 and 135 of the ***Federal Aviation Regulations***. (*See* 14 C.F.R. § 119.3, *Definitions*.) ***Regional Jets*** (RJs) are not "commuters," because they are large transport category aircraft and fall within the *Federal Aviation Administration's* ***air carrier aircraf****t* category.

Contour – A contour line of a function of two variable is a curve along which the function has a constant value. For example, a noise contour line is a line of equal or constant noise level on a map. *See* ***Noise Contour Map***.

Crosswind Leg – A flight path at right angles to the landing runway off its upwind end.

Day-Night Average Sound Level (DNL) – A noise measure used to describe the average ***sound*** level over a 24-hour period, typically an average day over the course of a year. In computing DNL, an extra weight of ten ***decibels*** is assigned to noise occurring between the hours of 10:00 p.m. and 7:00 a.m. to account for increased annoyance when ambient noise levels are lower and people are trying to sleep. DNL may be determined for individual locations or expressed in noise contours. This metric is used in NEPA documents for airports in Arizona and all states other than California.

dBA - *See A-Weighted Decibel* – Decibel (dB) – A unit used to measure the intensity of a sound by comparing it with a given level on a logarithmic scale. ***Sound*** is energy and is measured by its pressure. Because of the enormous range of *sound* pressures to which the human ear is sensitive, the raw sound pressure measurement is converted to the ***decibel*** scale for purposes of description and analysis. Because the *decibel* scale is logarithmic, a ten-*decibel* increase in *sound* is perceived as a doubling of sound (or twice as loud) by the human ear.

Distance Measuring Equipment (DME) – A flight instrument that measures the line-of-sight distance of an aircraft from a navigational radio station in ***nautical miles***. As a transponder-based radio navigation system, DME measures the ***slant-range distance*** by timing the propagation delay of very high frequency (VHF) radio signals. Pilots use DME to determine the distance of their aircraft from a land-based transponder, which is typically collocated with a ***Very High Frequency Omnidirectional Radio Range (VOR) station.***

Downwind Leg – A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg.

GLOSSARY

Easement – The legal right of one party to cross or otherwise use someone else's land for a specified purpose.

Engine Run-ups – A routine procedure for testing aircraft systems by running one or more engines at a high power setting. Engine run-ups are normally conducted by airline maintenance personnel checking an engine or other on-board system following maintenance.

Enplanements – The number of revenue passengers boarding an aircraft at an airport during a given time period.

Equivalent Sound Level (Leq) – The ***A-weighted*** energy average ***sound*** level experienced over a given period of time. The metric is expressed as ten times the log of the total noise energy divided by the number of seconds during the period under consideration.

Executive Order 13807 – The Presidential Executive Order on establishing discipline and accountability in the environmental review and permitting process for infrastructure. This order provides that the federal government will make timely decisions with the goal of completing all federal environmental reviews and authorization decisions for major infrastructure projects within two years, measured from the date of the publication of a notice of intent to prepare an environmental impact statement. The federal lead, cooperating, and participating agencies for each major infrastructure project shall all record any individual agency decision in one record of decision.

Federal Aviation Administration (FAA) – One of several transportation modal federal government agencies under the United States Department of Transportation. The FAA is the Federal agency responsible for insuring the safe and efficient use of the nation's airspace and for supporting the requirements of national defense.

Fixed-Base Operator (FBO) – A business granted the right by an airport to operate at the airport and provide aeronautical services such as hangar space, fuel, flight training, repair, and maintenance to airport users.

Fleet Mix – The collection of differing types of aircraft operating in a particular airport environment.

Flight Track Utilization – The use of established routes for arrival and departure by aircraft to and from the runways at the airport.

General Aviation Aircraft – General aviation (GA) is the term for all civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire. GA aircraft generally include those U.S. registered civil aircraft, which operate, for private and non-commercial purposes and whose operations are not governed by 14 C.F.R. Parts 119, 121, 125, or 135. GA aircraft range in size from small single-engine propeller aircraft to large ***turbojet*** private aircraft.

Geographic Information Systems (GIS) – An information system that is designed for storing, integrating, manipulating, analyzing, and displaying data referenced by spatial or geographic coordinates.

Global Positioning System (GPS) – GPS equipment onboard an aircraft takes advantage of various radio navigation and/or *Global Positioning System* routes to guide the aircraft. GPS is a system of satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

GLOSSARY

Ground Access Vehicles (GAV) – Any vehicle licensed to operate on Airport roads.

Ground Effect – Noise ***attenuation*** attributed to absorption or reflection of noise by man-made or natural features on the ground surface.

Itinerant Operation – An aircraft flight that ends at an airport different from where the flight began.

Knots – A unit of measurement of speed measured as the distance in ***nautical miles*** (6,076.1 feet) covered in one hour. (Approximately equal to 1.15 statute miles per hour.)

Land Use Compatibility – The ability of land uses surrounding the airport to coexist with airport-related activities with minimum conflict.

Landing and Takeoff (LTO) Cycle – The time that an aircraft is in operation at or near an airport. An LTO cycle begins when an aircraft starts its ***final approach*** (arrival) and ends after the aircraft has made its climb-out (departure).

Ldn - *See* ***DNL***. Ldn is used in place of *DNL* in mathematical equations only.

Leq - *See* ***Equivalent Sound Level***.

Local Operation – An aircraft flight that begins and ends at the same airport.

Localizer – The component of an ***Instrument Landing System*** that provides lateral course guidance to the runway.

Maximum Noise Level (Lmax) – The maximum ***sound*** pressure for a given event adjusted toward the frequency range of human hearing.

Mean Sea Level (MSL) – The average height of the surface of the sea for all stages of the tide; used as a reference for elevations; also called sea level datum.

National Environmental Policy Act of 1969 (NEPA) – A United States federal law that establishes the environmental review process for proposed Federal actions.

National Pollutant Discharge Elimination System (NPDES) – Federal requirement under the Clean Water Act (CWA) that any discharge of a non-point source of pollution into waters of the United States be in conformance with any established water quality management plan developed under the Clean Water Act.

Nautical Mile – A measurement of distance equal to one minute of arc on the earth's surface (6,076.1 feet or 1,852 meters).

Natural Ambient Noise – ***Ambient Noise***, minus man-made sounds.

NAVAIDs (Navigational Aids) – Any electronic or visual facility used by an aircraft for navigation.

Noise Abatement – A measure or action that minimizes the amount of impact of noise on the environs of an airport. Noise abatement measures include aircraft operating procedures and use or disuse of certain runways or ***flight tracks. See also Noise Attenuation. Noise abatement reduces sound at the source.***

GLOSSARY

Noise Contour Map – A map representing average annual noise levels summarized by lines connecting points of equal noise exposure.

Noise Mitigation – A measure or action that minimizes the amount of impact of noise on the environs of an airport. Noise abatement measures include sound insulation, windows, and doors, construction of noise walls. **Noise mitigation reduces sound at the receptor.**

Profile – The position of the aircraft during an approach or departure in terms of altitude above the runway and distance from the runway end.

Propagation – ***Sound*** propagation is the spreading or radiating of sound energy from the noise source. It usually involves a reduction in sound energy with increased distance from the source. Atmospheric conditions, terrain, natural objects, and manmade objects affect sound propagation.

Public Use Airport – An airport open to public use without prior permission, and without restrictions within the physical capabilities of the facility. It may or may not be publicly-owned.

Regional Jet – A jet aircraft that falls within the air carrier aircraft category because of size and payload. For use in air commerce, the ***regional jet*** must be operated pursuant to an air carrier certificate pursuant to an air carrier certificate issued under 14 C.F.R. Parts 119 and 121 of the ***Federal Aviation Regulations***. (*See* 14 C.F.R. § 119.3, for Domestic, Flag, and Supplemental operations). *Regional jets* are not operated as commuter aircraft pursuant to 14 C.F.R. Part 135. *Regional jets* are typically jet aircraft, with approximately 35 to 90 seats. The next-generation *regional jet*s are expected to seat 100 passengers.

Run-up – A routine procedure for testing aircraft systems by running one or more engines at a high power setting. ***Engine run-ups*** are normally conducted by airline maintenance personnel checking an engine or other on board systems following maintenance.

Runway Protection Zone (RPZ) – An area, trapezoidal in shape and centered about the extended runway centerline, designated to enhance the protection of people and property on the ground. It begins 200 feet (60 M) beyond the end of the area usable for takeoff or landing. The RPZ dimensions are functions of the aircraft, type of operation, and visibility minimums. (Formerly known as the clear zone.)

Runway Safety Area (RSA) – A defined surface surrounding the runway prepared or suitable for reducing the risk ordamage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

Runway Threshold – The beginning of that portion of the runway usable for landing.

Single event – One noise event. For many kinds of analysis, the ***sound*** from single events is expressed using the ***Sound Exposure Level*** metric.

Slant-Range Distance – The line-of-sight between two points, which are not at the same level relative to a specific datum. Slant-range distance is typically measured between an aircraft and a navigational radio station.

GLOSSARY

Sound – Sound is the result of vibration in the air. The vibration produces alternating bands of relatively dense and sparse particles of air, spreading outward from the source in the same way as ripples do on water after a stone is thrown into it. The result of the movement is fluctuation in the normal atmospheric pressure or sound waves.

Sound Exposure Level (SEL) – A standardized measure of a ***single (sound) event***, expressed in ***A-weighted decibels***, that takes into account all sound above a specified threshold set at least ten ***decibels*** below the maximum level. All sound energy in the event is integrated over one second.

Standard Instrument Departure Procedure (SID) – A planned ***Instrument Flight Rules air traffic control*** departure procedure published for pilot use in graphic and textual form. SIDs provide transition from the terminal to the en route *air traffic control* structure.

Standard Terminal Arrival Route (STAR) – A planned ***instrument flight rules air traffic control*** arrivals procedure published for pilot use in graphic and textual form. STARs provide a transition from the en route ***air traffic control*** structure to an ***outer fix*** or an ***instrument approach*** fix in the terminal area.

Statute Mile – A measure of distance equal to 5,280 feet.

Time Above (TA) – The amount of time that ***sound*** exceeds a given ***decibel*** level during a 24-hour period (e.g., time in minutes that the sound level is above 75 ***decibels***).

Thrust Settings – Settings on jet powered aircraft that control the power applied to the engines.

Traffic Pattern – The traffic flow prescribed for aircraft landing at, taxiing on, or taking off from an airport. The components of a typical traffic pattern are ***upwind leg***, ***crosswind leg***, ***downwind leg***, ***base leg***, and ***final approach***.

Turbojet – An aircraft powered by a jet turbine engine. The term is customarily used in ***air traffic control*** for all aircraft, without propellers, that are powered by variants of jet engines, including turbofans.

Turboprop – An aircraft powered by a turbine engine that drives an aircraft propeller. Aircraft of this type are typically used by airlines on short routes between two relatively close locations.

Upwind Leg – A flight path parallel to the approach runway in the direction of approach.

Vector – Compass heading instructions issued by ***Air Traffic Control*** in providing navigational guidance by radar.

Yearly Day-Night Average Sound Level – *see* ***DNL***.

Chapter One

CHAPTER ONE
INTRODUCTION AND BACKGROUND

This Environmental Assessment (EA), required by the National Environmental Policy Act of 1969 (NEPA), as amended (40 CFR 1500-1508)[1] and prepared in accordance with Federal Aviation Administration (FAA) Orders 1050.1F, *Environmental Impacts: Policies and Procedures* and 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, analyzes the potential environmental effects of a Proposed Action involving the development and operation of an air cargo facility at Cincinnati/Northern Kentucky International Airport (CVG or Airport). The EA is required under NEPA because the project will require federal actions that include FAA's approval of a change to the Airport Layout Plan (ALP) for CVG.

1.1 BACKGROUND

CVG is a publicly-owned passenger and air cargo airport operated by the Kenton County Airport Board (KCAB). CVG is located in the northeast section of Boone County, Kentucky, approximately one mile south of the Ohio River and eight miles southwest of downtown Cincinnati. The Airport encompasses approximately 7,753 acres of land and is generally bounded on the north by Interstate 275, to the east by Interstate 71/75, to the west by State Route 237 (KY 237/North Bend Road), and to the south by State Route 18 (KY 18/Burlington Pike). Access to the Airport is provided via Interstate 275, State Route 212 (KY 212), and Donaldson Highway. **Exhibit 1-1, *Airport Location*** shows the general Airport location and surroundings.

The airfield system consists of four runways, of which include three parallel runways and a crosswind runway. The three parallel runways (18L/36R, 18C/36C, 18R/36L) are oriented in a north-south direction. Runway 9/27, the crosswind runway, is oriented in an east to west direction. The Main Terminal (formerly Terminal 3) is approximately 277,000 square feet and is the only terminal at the Airport. Terminal 1 and 2 were demolished in 2016. The Main Terminal serves the operations of all airlines out of two concourses, Concourse A and Concourse B. CVG also serves as the hub for DHL Worldwide Express Operations.

1.2 DESCRIPTION OF THE PROPOSED ACTION

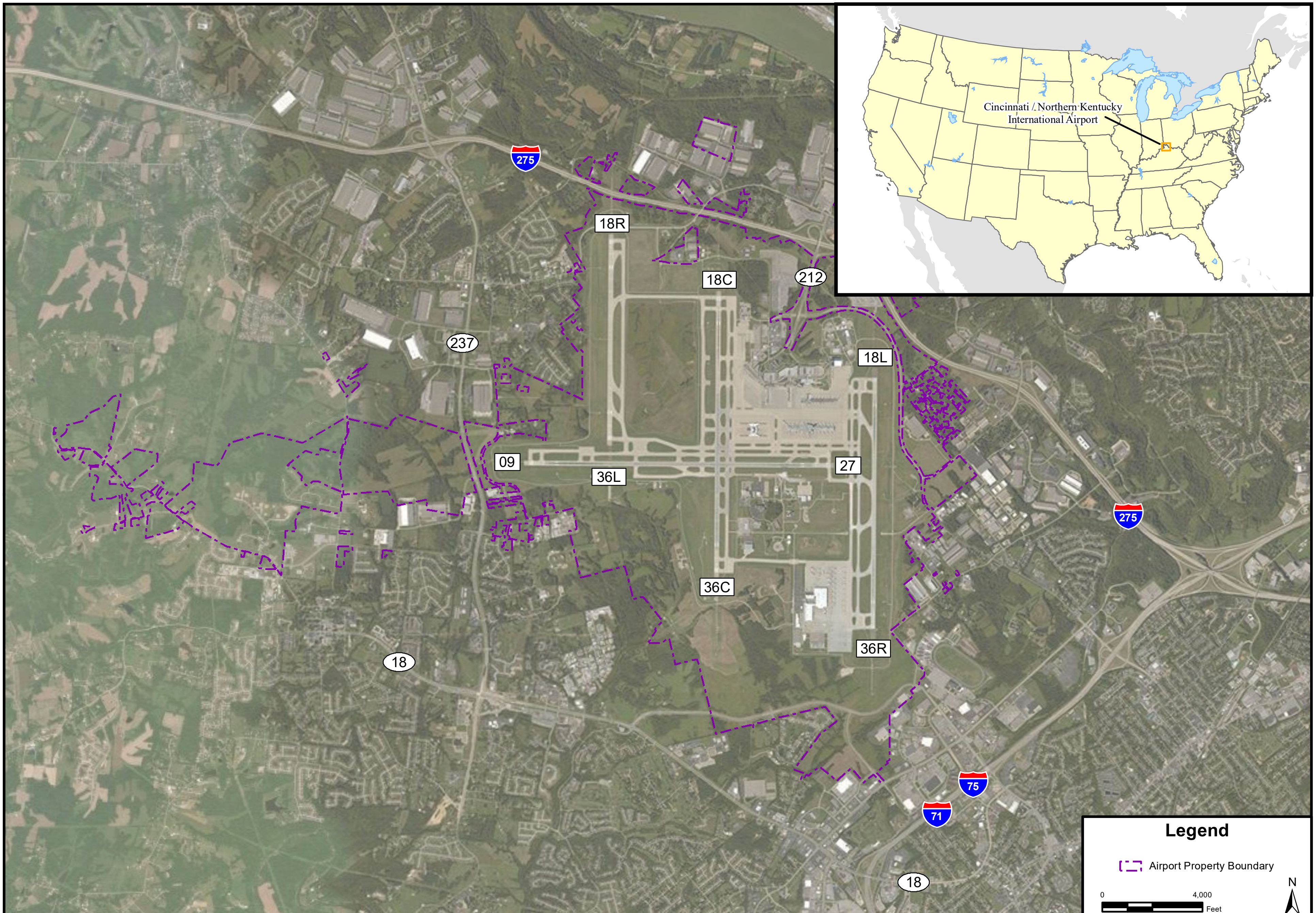
The Proposed Action consists of the development and operation of an air cargo facility at CVG. The proposed site is located on undeveloped land north of Aero Parkway and bordered on the west by Gunpowder Creek and extends east to the existing DHL facility. **Exhibit 1-2, *Project Site***, shows the general project area along with the location of the Project Site at the Airport. The Proposed Action includes the following major elements:

- Construct a primary package sortation building and support buildings (i.e., ground package sort building, equipment storage, equipment maintenance, and pilot services). The total building footprint would be up to 3.8 million square feet.
- Construct approximately 255-acre concrete aircraft parking apron and apron taxilanes.
- Construct paved employee and visitor vehicle parking garage/lots (approximately 781,000 square feet/96,000 square yards).

[1] P.L. 91-190, 42 U.S.C. 4321, et. seq., *National Environmental Policy Act*, 1969, Section 102(2)(c).

The following are supporting or enabling elements to the Proposed Action major elements:

- Prepare (clear, grub, excavate, embank, and grade) approximately 800 acres of land.
- Extend (approximately 4,200 feet in length by 60 feet wide) Wendell H. Ford Boulevard.
- Construct new on-Airport access roads that provide vehicle and truck access to the new air cargo facility.
- Improve sections of Aero Parkway, an existing four-lane divided highway, to install new entrances, turn lanes, traffic lights, and lighting.
- Transfer all or a portion of off-Airport property (totaling approximately 200 acres) to KCAB.
- Extend utilities to the project site, including electric service, natural gas, water, sanitary sewer, data/communications, and other related infrastructure.
- Modify and/or install new taxiway edge lights and airfield directional signs.
- Install exterior pole-mounted and building-mounted lighting at package sorting buildings, access roads, vehicle parking lots, truck courts, and portions of the aircraft parking aprons.
- Construct new drainage conveyances and detention ponds and/or modify the existing airfield stormwater management system.
- Install security fence and controlled-access vehicle gates and pedestrian gates.
- Expand Airport existing fueling facilities.
- Installation of up to three 60,000-gallon glycol storage tanks.
- Relocate on-Airport road south of Runway 18C/36C.



Air Cargo Facility
Environmental Assessment

Airport Location

EXHIBIT:
1-1

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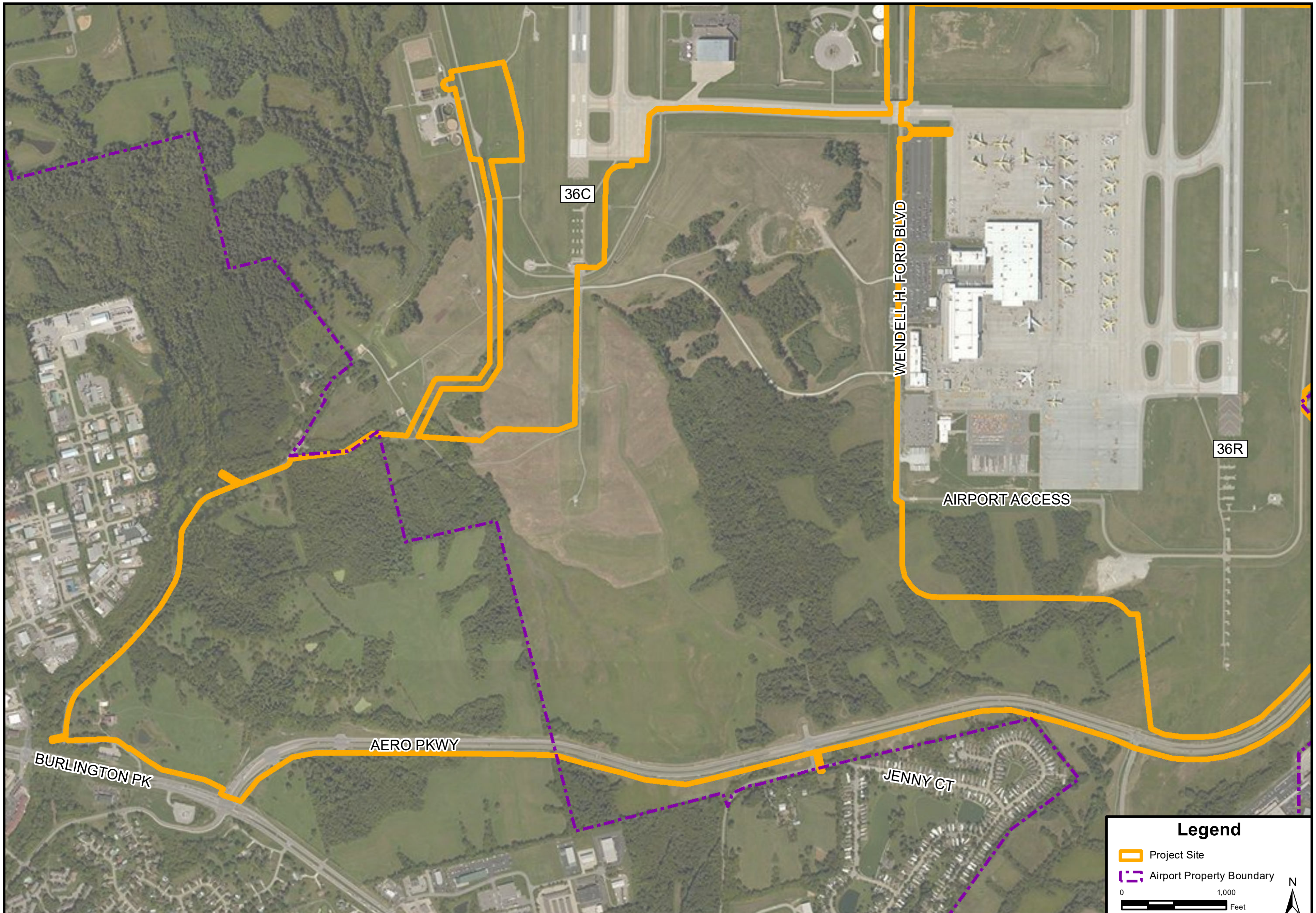

Air Cargo Facility Environmental Assessment

Project Site

EXHIBIT: **1-2**

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The following describes in more detail the conceptual elements of the Proposed Action, as shown in **Exhibit 1-3, *Proposed Action-Overview*** **and Exhibit 1-4, *Proposed Action - Detailed***. However, the facility's final design, development phasing, and construction schedule have not been finalized at the time of the preparation of this EA. Therefore, this document assumes a full build out to disclose maximum environmental impacts due to this project.

Construct a primary package sort building, ground package sort building, and support buildings with total building footprint of up to 3.8 million square feet

The Proposed Action includes the construction of multiple buildings with approximately 3.8 million square foot total footprint. The facility would sort packages that would move from air-to-air, air-to-ground, and ground-to-air. The project includes the construction of a primary sorting building and ancillary support buildings. The primary sorting building would be located on the south side of the airfield with access from Wendell H. Ford Boulevard and Aero Parkway. The support buildings include space for equipment storage, equipment maintenance, and pilot services.

Construct approximately 255-acre concrete aircraft parking apron and apron taxilanes

The Proposed Action includes the construction of an approximately 255-acre aircraft parking apron and apron taxilanes that would provide circulation and parking for up to 77 cargo aircraft. Ground support equipment, unit load devices, staging areas, and fuel and deicing pads would also be implemented.

Construct paved employee and visitor vehicle parking garage/lots (approximately 781,000 square feet/96,000 square yards)

The Proposed Action includes the construction of employee vehicle parking, truck courts, and vehicle circulation areas for additional trucks and cars moving to and from the air cargo facility. These areas would additionally include space for employee parking service areas, and trailer staging.

1.3 DOCUMENT CONTENT AND ORGANIZATION

This document is organized as follows:

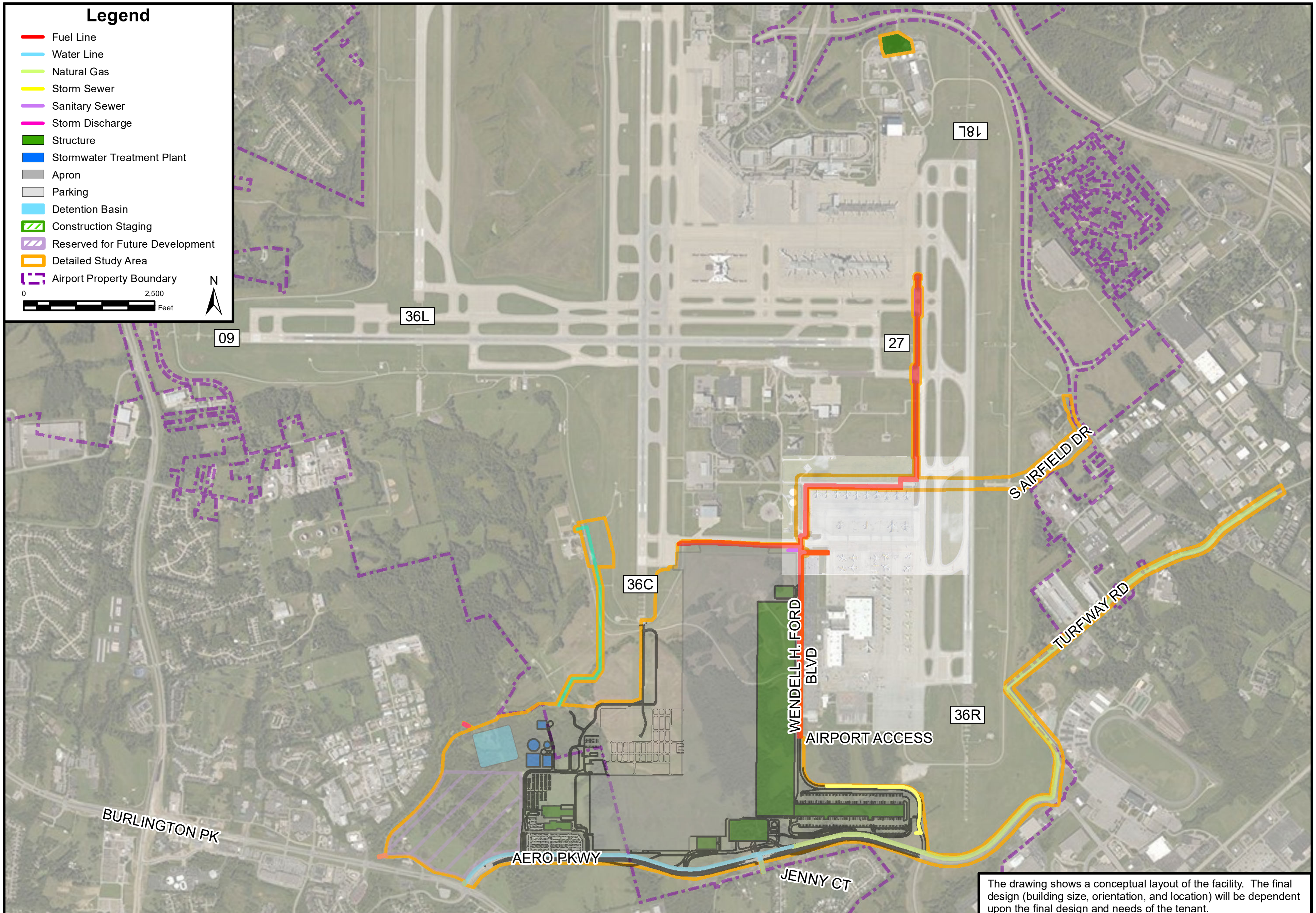
- Chapter Two describes the purpose and need for the Proposed Action
- Chapter Three describes alternatives to the Proposed Action
- Chapter Four describes the affected environment
- Chapter Five describes the potential environmental impacts of the Proposed Action and of the No Action Alternative and recommended avoidance, minimization, and/or mitigation measures
- Chapter Six describes the public involvement that was completed as part of the EA
- Chapter Seven provides a list of those responsible for preparing the EA
- Chapter Eight provides a list of references used in the preparation of the EA

An EA is a disclosure document prepared for the Federal agency (in this case the FAA) responsible for approving a proposed Federal or Federally-funded action, in compliance with the requirements set forth by the Council on Environmental Quality (CEQ) in its regulations implementing NEPA. The purpose of this EA is to investigate, analyze, and disclose the potential impacts of the Proposed Action and its reasonable alternatives. In this case, the FAA is responsible for reviewing and approving actions that pertain to airports and their operation. As such, this EA has been prepared in accordance with FAA Orders 1050.1F and 5050.4B, and consideration to guidance included in the *FAA Environmental Desk Reference for Airport Actions*.

This EA was also prepared pursuant to other laws relating to the quality of the natural and human environments, including:

- The Department of Transportation Act, 49 U.S.C., § 303 (formerly Section 4(f))
- 49 U.S.C., §40114, as amended
- 49 U.S.C., §§47101, et seq.
- Executive Order 11990, Protection of Wetlands
- Executive Order 11988, Floodplain Management
- Executive Order 11593, Protection and Enhancement of the Cultural Environment
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
- Federal Aviation Act of 1958 recodified as 49 U.S.C. §§40101, et seq.
- The Airport and Airway Improvement Act of 1982, 49 U.S.C. §47108, as amended
- National Historic Preservation Act, 16 U.S.C. §470(f), as amended
- 36 CFR Part 800, Advisory Council on Historic Preservation
- Archaeological and Historic Preservation Act, 16 U.S.C. §469(a)
- Archaeological Resource Protection Act, 16 U.S.C. §470(aa)
- Farmland Protection Policy Act, 7 U.S.C. §73, and implementing regulations at 7 CFR §658
- Clean Air Act, 42 U.S.C. §§7401 , et seq., and implementing regulations at 40 CFR. Parts 51 and 93
- Clean Water Act, 33 U.S.C. §§121, et seq., and implementing regulations at 33 CFR §§325 and 33 CFR §336
- 33 CFR Parts 320-330, Regulatory Programs of the Corps of Engineers
- Endangered Species Act, 16 U.S.C. §661, et seq., as amended
- Other laws, regulations, and policies as applicable

Notice about the subject project was published in The Cincinnati Enquirer on September 25, 2018. Copies of this document were made available at the CVG Centre, 77 Comair Blvd, Erlanger, KY 41018, the FAA's Memphis Airports District Office, and online at http://www.airportprojects.net/CVG-CargoFacility-EA.



The drawing shows a conceptual layout of the facility. The final design (building size, orientation, and location) will be dependent upon the final design and needs of the tenant.

Air Cargo Facility
Environmental Assessment

Proposed Action - Overview

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1-3

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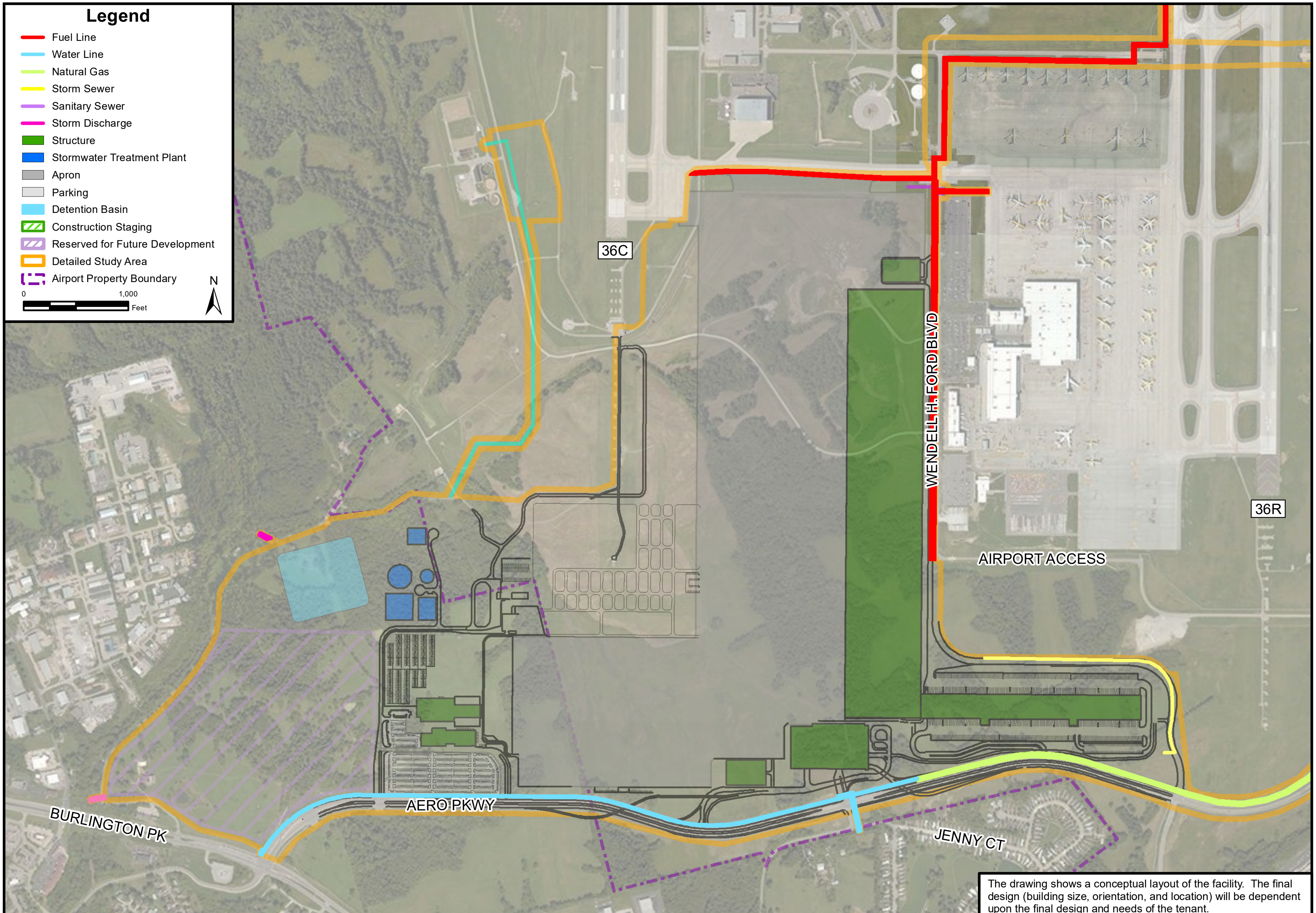

Air Cargo Facility Environmental Assessment

Proposed Action - Detailed

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Chapter Two

CHAPTER TWO
PURPOSE AND NEED

The Kenton County Airport Board (KCAB), which owns and operates the Cincinnati/Northern Kentucky International Airport (CVG or Airport), will enter into a long-term lease with an air cargo service provider for CVG to become a hub location for the provider, requiring the development and operation of an air cargo facility at CVG. The following section discusses the purpose and need for the project. The KCAB has identified needs based on the air cargo service provider's desired plans for a hub. This EA analyzes the proposed solutions (purpose) to meet the needs of the identified deficiencies.

2.1 PURPOSE AND NEED

The *purpose* of this project is to provide suitable air cargo facilities at CVG for a hub for large-scale air cargo operations on land presently owned by the KCAB (Sponsor) in a way that would be consistent with the Airport's long-term plans and meet the air cargo service provider's existing and future demands.

The *need* for the project is that the existing apron area and facilities at CVG are inadequate to meet the air cargo service provider's requirements for a delivery and sortation support facility, while still meeting the safety and design requirements of the Federal Aviation Administration (FAA).

The air cargo service provider has determined in order to meet its operational goals the integration of airside, landside, and sorting facilities is required. This integration offers limited flexibility in the variation of layout, orientation, and proximity to airside and surface transportation facilities. To meet its requirements, the air cargo service provider proposed to KCAB, at a minimum, an on-airport development site that has the following characteristics:

- A minimum of 500 contiguous acres of land;
- Direct access to the DHL cargo facility;
- Direct airfield access;
- Access to major surface transportation corridors (i.e., Interstate 71/75 and Interstate 275);
- Ability for expansion on adjacent land; and
- Constructible such that the facility would have initial operational capability in 2021.

The development of the air cargo facility would require sufficient on-airport land areas that could be co-located with existing and future air and surface transportation infrastructure. The air cargo service provider has indicated that simultaneous operations by numerous cargo aircraft, ground support, loading, and surface vehicles must occur in a highly orchestrated manner within pre-defined time-periods that are predicated on next-day delivery schedules at the company's various distribution centers. No existing facilities at CVG fully meet the air cargo service provider's operational requirements and business needs. Therefore, there is a critical need for the particular location, size, and orientation of the air cargo sorting/distribution site that meets the air cargo service provider's operational requirements. Based on the business plan for the development of the proposed air delivery and sortation support facility, the air cargo service provider determined the sorting and distribution facility must be constructed and have initial operational capability in 2021.

The development of the air cargo facility would also support KCAB's strategic goals to maintain a competitive cost structure and strong financial position and diversify airline and non-airline net revenue streams.

In addition to the purpose and need of the KCAB and of the air cargo service provider, the FAA also has specific purpose and needs to fulfill federal requirements. These are addressed in the following paragraphs.

FAA Purpose and Need

The first purpose of the federal actions necessary to implement the Proposed Action is to fulfill FAA's statutory mission to ensure the safe and efficient use of navigable airspace in the U.S. as set forth under 49 United States Code (U.S.C.) § 47101 (a)(1).

The FAA must ensure that the Proposed Action does not derogate the safety of aircraft and airport operations at CVG. Moreover, it is the policy of the FAA under 49 U.S.C. § 47101(a)(6) that airport development projects provide for the protection and enhancement of natural resources and the quality of the environment of the United States.

Additionally, the purpose of the federal actions in connection with KCAB's request to modify the existing Airport Layout Plan (ALP) is to ensure the proposed development at the airport does not adversely affect the safety, utility, and efficiency of the airport. Pursuant to 49 U.S.C. § 47107(a)(16), the FAA Administrator (under authority delegated from the Secretary of Transportation) must approve any revision or modification to an ALP before the revision or modification takes effect. The Administrator's approval reflects a determination that the proposed alterations to the airport, reflected in the ALP revision or modification, do not adversely affect the safety, utility, or efficiency of the airport.

Therefore, the need for the federal actions is to ensure that CVG operates in the safest manner possible pursuant to 49 U.S.C. § 47101(a)(1).

The second purpose of the federal actions is to fulfill the policy of the United State to support growth and development of air cargo hub airports and intermodal connections on airport property as set forth in U.S.C. § 47101 (a)(4) and (5). Additionally, specific to air cargo, 49 U.S.C. § 40101(b) further directs the FAA Administrator (under authority delegated from the Secretary of Transportation) to consider the following to be in the public interest as to air cargo transportation:

(1) encouraging and developing an expedited all-cargo air transportation system provided by private enterprise and responsive to:

(A) the present and future needs of shippers;

(B) the commerce of the United States; and

(C) the national defense.

(2) encouraging and developing an integrated transportation system relying on competitive market forces to decide the extent, variety, quality, and price of services provided.

FAA approval of the Proposed Action, and the subsequent FAA decisions related to issuing the approvals for the construction and operation of the air cargo facility would fulfill the agency's obligations and support United States national policy pursuant to 49 U.S.C. § 47101(a)(4) and (5) and 49 U.S.C § 40101(b).

2.2 IMPLEMENTATION PHASING

The air cargo facility would have initial operational capability in 2021. The construction of the sortation building would be completed under a continuous development and construction program dependent on economic an operational requirements. As discussed in Section 1.2, the project includes the construction of approximately 3.8 million square feet of building space.

2.3 REQUIRED LAND USE / ENVIRONMENTAL PERMITS AND APPROVALS

Federal

- FAA approval of modification of the ALP
- Federal environmental approval pursuant to NEPA
- Section 404/401 Permits
- Section 7
- Section 106 Compliance

State

- National Pollution Discharge Elimination System Permits (NPDES) administered by the Kentucky Division of Water

Local

- Boone County Building permits
- Stormwater
- Floodplain
- Zoning
- Cemetery Relocation approvals

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Chapter Three

CHAPTER THREE
ALTERNATIVES

The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) require that the Federal decision-makers perform the following tasks when preparing an Environmental Assessment (EA):

- Evaluate all reasonable alternatives, including alternatives not within the jurisdiction of the Federal agency, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated
- Devote substantial treatment to each alternative considered in detail, including the No Action Alternative and the Proposed Action, so that reviewers may evaluate their comparative merits

This section describes the Proposed Action and alternatives to the Proposed Action, including the No Action Alternative, and evaluates the ability of each to meet the purpose and need described in Chapter Two, *Purpose and Need*. The Proposed Action, described in Section 1.2 of this EA, would fulfill the purpose and need for the project. The No Action Alternative would not meet the purpose and need; however, it is analyzed in the EA pursuant to the requirements of the CEQ, Federal Aviation Administration (FAA) Orders 1050.1F, 5050.4B, and NEPA.

Federal and state guidelines concerning the environmental review process require that all prudent, feasible, reasonable, and practicable alternatives that might accomplish the objectives of a project be identified and evaluated. Federal agencies may consider the applicant's purposes and needs and common sense realities of a given situation in the development of alternatives.[1] Federal agencies may also afford substantial weight to the alternative preferred by the applicant, provided there is no substantially superior alternative from an environmental standpoint.

3.1 DEVELOPMENT ALTERNATIVE SITES CONSIDERED FOR FURTHER ENVIRONMENTAL REVIEW

Various development alternative sites for the air cargo facility were considered for further environmental review. If the development alternative site did not meet the stated needs described in Section 2.1 of Chapter Two, the site was eliminated from further detailed environmental review. The following summarizes the development options that were thoroughly considered as alternatives to the Proposed Action at CVG.

A multi-step evaluation process took place for this EA to evaluate the various development alternative site locations. The alternatives were evaluated against the following pass or fail criteria, which are drawn from the needs presented in Chapter Two:

- Does the alternative site provide minimum of 500 acres of contiguous land?

  In order to efficiently accommodate the operational needs of the air cargo facility, a site of at least 500 acres is needed. Air cargo facilities typically consist at a minimum of warehouse, aircraft apron, and ground support equipment (GSE) areas. A cargo warehouse is typically comprised of truck docks and doors on the landside portion of the building. On the airside of the building, vehicles have direct access to the apron and aircraft. The aircraft apron provides area for aircraft parking adjacent to the air

[1] Guidance Regarding NEPA Regulations, CEQ, 48 *Federal Register* 34263 (July 28, 1983).

cargo warehouse building and provides sufficient space for the vehicle, GSE, and unit load devise operation and storage. This space must be large enough to accommodate freighter aircraft, aircraft tugs, cargo containers and trailers, cargo vehicles, and fueling vehicles. In addition, apron space is needed for cargo sortation, large tractor trailers, and potentially space for aircraft tail-to-tail cargo transfer and bypass containers. GSE is the support equipment at airports located on the apron. The equipment is located on the apron to support the operations of the aircraft, including ground power operations, tugs, dollies, and loading devices. GSE storage areas are also needed to park and stage GSE when not in use. These areas are often located on the apron in close proximity to aircraft parking area.

The space required for each of these areas (warehouse, apron, and GSE areas) depends on the existing and forecasted air cargo volume of the air cargo service provider. The air cargo service provider has determined, through extensive planning efforts, a minimum of 500 acres of contiguous land is needed to operate an efficient air cargo facility at CVG.

- <u>Does the alternative site provide direct access to the DHL cargo facility?</u>

  It is preferred that the air cargo facility be located in proximity to the existing DHL cargo facility. The air cargo service provider has various business arrangements with DHL. It is expected the two entities would continue to maintain such arrangements in the future. A successful air cargo operation is predicated upon the efficient interaction of a number of businesses with different operating requirements and facility needs. These businesses have different levels of involvement based on the nature of the cargo and the geographies through which the cargo moves. In an ideal environment, most of these operations would be co-located on the airport, creating an efficient, integrated, air cargo community. Operating costs are lower, economies of scale can be achieved, and international goods can be cleared faster and with fewer problems.

- <u>Does the alternative site provide direct airfield access?</u>

  To minimize aircraft taxi distances and delays, the site should have direct access to taxiway(s) that allow aircraft to move efficiently between the cargo facility site and the arrival/departure runways. The airfield access should have minimal taxi times and minimal runway crossings. Flight delays have a substantial impact on delivering packages on time. Based on analysis conducted by the Institute of Transportation Studies (ITS), University of California, Berkley, the cost of flight delay per package is approximately $0.77 for a 15-minute flight delay and approximately $3.92 for a 60-minute flight delay. Because the air cargo service provider's business is time sensitive, it is imperative the site have direct airfield access to minimize taxi distances and potential delays to aircraft operations.

- <u>Does the alternative site provide access to major surface transportation corridors (i.e. Interstates 71/75 and Interstate 275)?</u>

  Sites were evaluated based on their proximity and access to the surrounding interstate roadway system. The air cargo service provider plans to conduct a sort operation at CVG. As a result, delivery trucks would enter and exit the site numerous times a day. Again, because the air cargo service provider's business is driven by time definite delivery, the site needs easy access to Interstates 71/75 and Interstate 275 to eliminate potential delays from traffic on the local roadways.

- <u>Does the alternative site allow for expansion on adjacent land?</u>

  The cargo carrier has identified the need to have additional land in the future as operational needs require expansion of the facility. Sites were evaluated based on the availability of available adjacent land to accommodate future growth.

- Does the alternative site allow for construction and operation of the facility in 2021?

  The cargo service provider's business model requires the ability to construct and become operational in 2021. Sites that would not allow that would be eliminated from consideration.

The following discussion documents the various development sites that were analyzed in the alternatives analysis and the recommendation of the alternative for further detailed environmental review in this EA. The three alternative sites evaluated are shown on **Exhibit 3-1, *Alternative Sites***. A summary of the alternatives analysis conducted as a part of this EA process is provided at the end of this section in Table 3-1. Each alternative site is included in the table along with a determination if the alternative would be carried forward for further environmental analysis.

3.1.1 ALTERNATIVE A (WEST SITE)

Alternative A would locate the proposed facility west of Runway 9/27. This site is approximately 320 acres and is located to the west of North Bend Road and outside of the Runway 9/27 Runway Protection Zone (RPZ).

- Does the alternative site provide minimum of 500 acres of contiguous land?
  - No, this site only has 320 acres.
- Does the alternative site provide direct access to the DHL cargo facility?
  - No, this site is the farthest site from DHL of all the alternative sites.
- Does the alternative site provide direct airfield access?
  - No, this site currently has no airfield access and to do so would require tunneling North Bend Road under a new taxiway. While feasible, even if a new taxiway was constructed, aircraft would access the airfield at the westernmost location, which is not efficient from a taxi time perspective.
- Does the alternative site provide access to major surface transportation corridors (i.e., Interstates 71/75 and Interstate 275)?
  - Yes, North Bend Road has access to Interstate 275.
- Does the alternative site allow for expansion on adjacent land?
  - Yes, but through the purchase of private land.
- Does the alternative site allow for operation of the facility in 2021?
  - No, the need to construct a tunnel for a section of North Bend Road (a public roadway) to allow the construction of an access taxiway would add substantial complexity to the design, approval, and construction process, which would be an impediment to completion and operation of the cargo facility by 2021.

Conclusion: Alternative A could provide access to Interstate 275, a major surface transportation corridor. Additionally, the land area is prime for development as it is located on Airport-owned property and is adjacent to land that could be acquired for expansion. Conversely, the site lacks access to the DHL cargo facility and does not provide 500 acres of contiguous land. The site also provides limited airfield access as tunneling North Bend Road under a new taxiway would be required and would add complexity and time to construction. In conclusion, this alternative site would not meet criteria representing the purpose and need. Therefore, this alternative site was eliminated from further review.

3.1.2 ALTERNATIVE B (MIDFIELD SITE)

Alternative B would locate the proposed facility north of Runway 9/27, between Runway 18R/36L and Runway 18C/36C. This site is approximately 460 acres and divided on the north by Taxiway A.

- Does the alternative site provide minimum of 500 acres of contiguous land?
  - No, this site only has 460 acres.
- Does the alternative site provide direct access to the DHL cargo facility?
  - No, this site would require crossing two runways (18C/36C and 9/27) to access DHL.
- Does the alternative site provide direct airfield access?
  - Yes, this site offers access to Runways 18R/36L, 18C/36C, and 9/27.
- Does the alternative site provide access to major surface transportation corridors (i.e., Interstates 71/75 and Interstate 275)?
  - Yes, Interstate 275 is located directly north of the site and could be accessed via Loomis Road, which is currently two lanes or potentially a new Interstate 275 interchange.
- Does the alternative site allow for expansion on adjacent land?
  - No, the location has no adjacent land for expansion. There is a small parcel north of Taxiway A, but grade changes and the need to expand an existing tunnel make it difficult to access.
- Does the alternative site allow for operation of the facility in 2021?
  - Yes. However, if it is determined that roadway improvements and construction of a new interchange at Interstate 275 is necessary, this would add substantial complexity to the design, approval, and construction process, which would be an impediment to completion and operation of the cargo facility by 2021.

Conclusion: Alternative B would not provide adequate access to Interstate 275, a major surface transportation corridor, without widening roads and the potential need to construct a new interchange. Additionally, the land area is prime for development as it is located on Airport-owned property and provides direct airfield access. However, the site is not large enough to accommodate existing and potential expansion; it lacks direct access to the DHL cargo facility, and would require aircraft to cross two runways to access the DHL facility. Further, the potential need for a new interchange at Interstate 275 would add substantial complexity to the project, which would affect the ability to begin operating the facility in 2021. In conclusion, this alternative site would not meet the criteria representing the purpose and need. Therefore, this alternative site was eliminated from further review.

Air Cargo Facility Environmental Assessment

Alternative Sites

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3.1.3 ALTERNATIVE C (PROPOSED ACTION)

Alternative C (Proposed Action) is approximately 500 acres and is located north of Aero Parkway between Runway 18C/36C and Runway 18L/36R. The Proposed Action is described in Section 1.2 and shown in Exhibit 1-2.

- Does the alternative site provide minimum of 500 acres of contiguous land?
  - Yes, this site is approximately 500 acres.
- Does the alternative site provide direct access to the DHL cargo facility?
  - Yes, this site is located adjacent to DHL.
- Does the alternative site provide direct airfield access?
  - Yes, this site has access to Runway 18C/36C and short taxi times to Runways 18L/36R and 9/27.
- Does the alternative site provide access to major surface transportation corridors (i.e., Interstates 71/75 and Interstate 275)?
  - Yes, the site can access Interstate 71/75 via Aero Parkway, a 4-lane divided highway.
- Does the alternative site allow for expansion on adjacent land?
  - Yes, but through purchase of private land.
- Does the alternative site allow for operation of the facility in 2021?
  - Yes, there are no known impediments to completion by 2021.

Conclusion: Alternative C would provide access to Interstate 71/75 and 275, major surface transportation corridors. The site also provides approximately 500 acres of contiguous land, with the potential for expansion on adjacent land. The site also has direct access to the DHL cargo facility and direct airfield access. In conclusion, this alternative site would meet the purpose and need. Therefore, this alternative site was selected for further review.

Table 3-1 provides a summary of the alternatives analysis conducted as part of this EA process. The elements of each alternative are described in the table along with a determination if the alternative would be carried forward for further environmental analysis.

Table 3-1
DEVELOPMENT ALTERNATIVES ANALYSIS SUMMARY

Alternative	Meet the Screening Criteria?						Carried Forward for Detailed Environmental Review?
	500 acres of contiguous land	*Direct access to DHL facility*	*Direct airfield access*	*Access to major surface transportation corridors*	*Expansion on adjacent land*	*Operation of facility in 2021*	
A (West Site)	No	No	No	**Yes**	**Yes**	No	No
B (Midfield Site)	No	No	**Yes**	**Yes**	No	No	**Yes**
C (Proposed Action)	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

3.2 ALTERNATIVES CARRIED FORWARD FOR DETAILED ENVIRONMENTAL REVIEW

As a result of the evaluations previously described, the only development alternative carried forward for further evaluation is the Proposed Action (Alternative C). As discussed previously, the No Action alternative will also be carried forward as required by FAA Orders 1050.1F, 5050.4B, and NEPA. **Exhibit 3-2, *Alternative Sites Carried Forward for Detailed Environmental Review***, shows both the No Action and Proposed Action areas.

3.2.1 ALTERNATIVE C (PROPOSED ACTION)

Construct a primary package sort building, ground package sort building, and support buildings with total building footprint up to 3.8 million square feet

The Proposed Action includes the construction of a multiple buildings up to 3.8 million square feet of total building footprint. The facility would sort packages that would move from air-to-air, air-to-ground and ground-to-air. The project includes the construction of a primary sorting building and ancillary support buildings. The primary sorting building would be located on the south side of the airfield with access from Aero Parkway. The support buildings include space for equipment storage, equipment maintenance, and pilot services.

Construct approximately 255-acre concrete aircraft parking apron and apron taxilanes

The Proposed Action includes the construction of an approximately 255-acre aircraft parking apron and apron taxilanes which would provide circulation and parking for up to 77 cargo aircraft. Ground support equipment, unit load devices, staging areas, and fuel and de-icing pads would also be implemented.

Construct paved employee and visitor vehicle parking garage/lots (approximately 781,000 square feet/96,000 square yards)

The Proposed Action includes the construction of employee vehicle parking, truck courts, and vehicle circulation areas for additional trucks and cars moving to and from the air cargo facility. These areas would additionally include space for employee parking service areas, unit load devices, and trailer staging.

3.2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, no development not already approved by the FAA for NEPA purposes would occur and there would not be physical impacts to any environmental resources. Because there would be no development, this alternative would not address any of the purpose and need criteria. Therefore, it is not an alternative that meets the purpose and need. However, a No Action Alternative must be included in the evaluation of environmental impacts pursuant to CEQ Regulation 40 CFR 1502.14(d). The purpose of the No Action is to serve as a baseline against which impacts from the other alternatives are assessed for significance.

In order to define the No Action Alternative for this EA, it is important to understand if it is feasible for the Airport to meet the forecasted activity and, if so, with what inefficiencies. This is done by: (1) identifying facilities that could be used to meet the forecasted activity, (2) identifying operational measures that may be implemented due to the lack of new facilities, and (3) identify the effect of the inherently inefficient operating environment. These are described below:

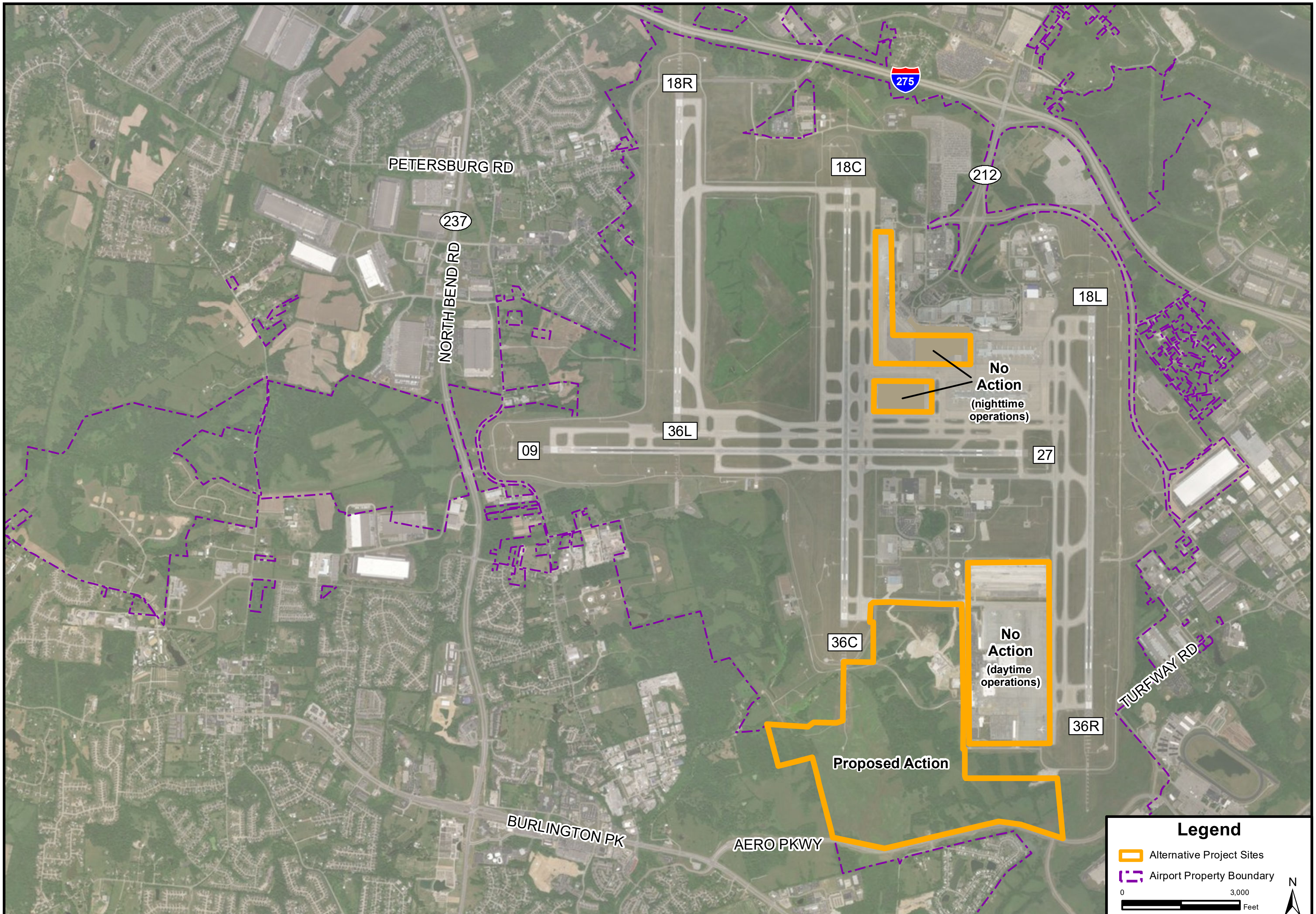
(1) Use of Facilities – Existing facilities and areas, located at various locations at CVG, could be used to accommodate the sorting needs of the air cargo service provider in the short-term but not fully in the long-term. In the short-term, using existing facilities would be highly inefficient and require the air cargo service provider to move equipment and packages across different locations on the airfield, potentially resulting in delays to delivery times of packages. For this EA it is assumed, in the No Action, the air cargo service provider would continue to utilize the existing DHL facilities (sort building and aircraft apron) during the daytime (7:00 a.m. – 9:59 p.m.), as it does today and that the existing DHL facilities would continue to provide adequate capacity. During the nighttime (10:00 p.m. – 6:59 a.m.), existing vacant cargo buildings and apron area, located on the north side of the terminal area, would need to be used to accommodate the sort operation and aircraft parking, assuming these buildings meet the air cargo service provider's sortation configuration and overall capacity requirements.

(2) Operational Measures – Additional operational measures would be needed to accommodate the nighttime operations. This would include use of additional tugs, more hand sorting (which would require more employees), longer truck idling times, longer taxi times, and busses transferring employees from existing parking facilities to the sort facilities.

(3) Inefficiencies in the System – A split operation across several locations on the airport means duplication of certain functions, less than ideal parking for trucks and employees, more truck idling and longer truck trips, and more aircraft idling times. It also does not allow the air cargo service provider to develop a tailored, purpose-built, state of the art facility that provides necessary throughput capabilities.

While the description above may be theoretically feasible, it is not reasonable that an cargo service provider would <u>*plan*</u> to operate in this manner. However, the purpose of this exercise is to understand if the air cargo service provider could operate without constructing new facilities. Based on the discussion above, it is determined the forecasted activity by the air cargo service provider in 2021 could be accommodated at CVG under the No Action condition, but there would be significant inefficiencies associated with the operation. Some of those inefficiencies may have a negative effect on environmental conditions.

Selection of the No Action alternative would inhibit the KCAB's obligation and commitment to provide its airport users with sufficient infrastructure and maintain a high level of service. This alternative would not accommodate the air cargo facility's expected demand by failing to provide land area available for development. However, as discussed above, the No Action alternative is required by the CEQ to be evaluated in an EA. As such, this alternative will be carried forward in the EA, assuming the air cargo service provider would operate under these conditions, and used as the baseline against which the Proposed Action will be evaluated.



Air Cargo Facility Environmental Assessment

Alternative Sites Carried Forward for Detailed Environmental Review

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Chapter Four

CHAPTER FOUR
AFFECTED ENVIRONMENT

Federal Aviation Administration (FAA) Order 5050.4B states the affected environment section of an Environmental Assessment (EA) should succinctly describe only those environmental resources the Proposed Action and its reasonable alternatives, are likely to affect. The amount of information on potentially affected resources should be based on the expected impact and be commensurate with the impact's importance. FAA Order 1050.1F and the 1050.1F Desk Reference provide information on identifying resources for evaluation in the EA.

The following describes the area around Cincinnati/Northern Kentucky International Airport (CVG or Airport). This is followed by discussions of the resources that may potentially be impacted, which include: air quality; biological resources; climate, hazardous materials, historic, architectural, archeological, and cultural resources, land use, socioeconomic conditions, natural resources and energy supply, noise and compatible land use, visual effects, and water resources. In accordance with FAA Order 5050.4B, the other resource categories are not discussed in this chapter due to lack of presence of the resource in the project. These resource categories are coastal resources, farmland, and wild and scenic rivers. Chapter Five, *Environmental Consequences*, includes a discussion about all of the resource categories, whether there are impacts of the category or not.

4.1 PROPOSED ACTION SETTING

CVG is an international airport located on approximately 7,753 acres of land within Boone County, Kentucky. The Proposed Action is located on the southern portion of the Airport, north of Aero Parkway between Runway 18C/36C and Runway 18L/36R. The Proposed Action would occur on property currently owned by the Kenton County Airport Board (KCAB) and two private parcels totaling approximately 200 acres. Exhibit 1-2, *Proposed Action*, shows the location of the Proposed Action site. Site features include a combination of grassed areas and undeveloped wooded areas. The private parcels currently have vacant structures located on the property.

For the purposes of this EA, two study areas have been defined. The General Study Area (GSA) depicts the area surrounding the Airport. A further refined Detailed Study Area (DSA) depicts the areas that may be physically disturbed with the development of the Proposed Action. Both study areas are shown on **Exhibit 4-1, *Study Areas*.**

The GSA covers approximately 60,000 acres and is defined as the area where both direct and indirect impacts may result from the development of the Proposed Action. The GSA boundary lines were squared off to follow roadways and other identifiable features where available.

The DSA covers approximately 800 acres and is defined as the areas where direct impacts may result from the Proposed Action. The DSA boundaries were developed using the description of the Proposed Action.

4.2 RESOURCES POTENTIALLY AFFECTED

4.2.1 AIR QUALITY

Regulatory Setting

An airport air quality assessment requires consideration under both the Clean Air Act of 1970, as Amended (CAA), and the National Environmental Policy Act of 1969, as Amended (NEPA). These two federal laws require distinct analyses and may be separately applicable to an airport project.

The CAA establishes standards and programs to evaluate, achieve, and maintain acceptable air quality in the United States. In accordance with CAA requirements, the United States Environmental Protection Agency (EPA) established the National Ambient Air Quality Standards (NAAQS), for six common air pollutants (known as "criteria air pollutants") that are potentially harmful to human health and welfare.[1]

The EPA considers the presence of the following six criteria pollutants to be indicators of air quality:

- Carbon monoxide (CO);
- Nitrogen dioxide (NO_2);
- Ground-level Ozone (O_3);
- Sulfur dioxide (SO_2);
- Particulate matter (PM_{10} and $PM_{2.5}$);[2] and,
- Lead (Pb);[3]

Since 1975, lead emissions have been in decline due in part to the introduction of catalyst-equipped vehicles and the decline in production of leaded gasoline. In general, an analysis of lead is limited to projects that emit significant quantities of the pollutant (*e.g.*, lead smelters) and is generally not applied to transportation projects. For lead, a major source, as defined by EPA for a Nonattainment New Source Review permitting program would emit over 100 tons per year.

The NAAQS are summarized in **Table 4-1**. For each of the criteria pollutants, the EPA established primary standards intended to protect public health, and secondary standards to protect other aspects of public welfare, such as preventing materials damage, preventing crop and vegetation damage, and assuring good visibility. Areas of the country where air pollution levels consistently exceed these standards may be designated nonattainment by the EPA.

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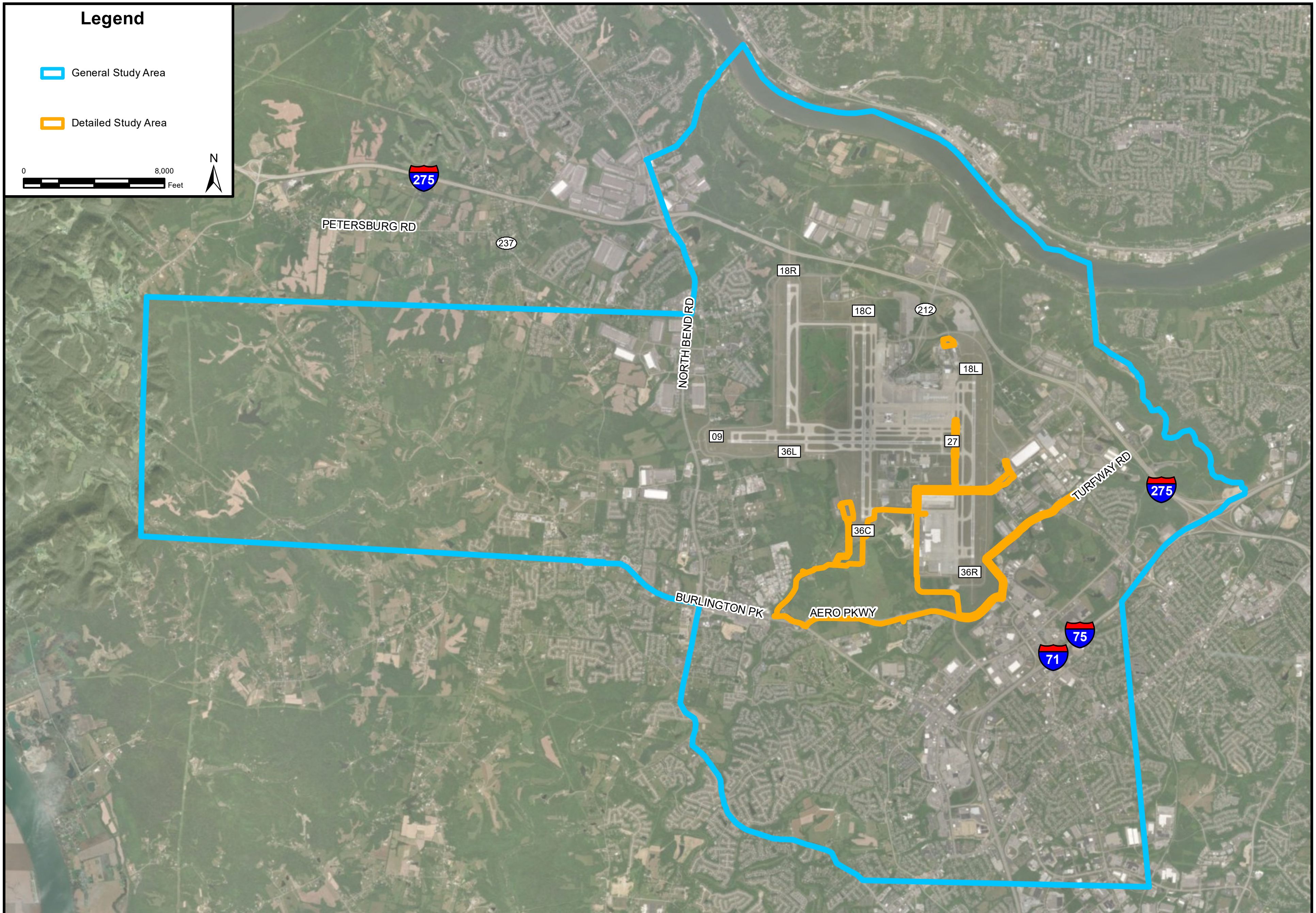
1 EPA, 40 C.F.R. § 50, National Primary and Secondary Ambient Air Quality Standards (NAAQS).
2 PM_{10} and $PM_{2.5}$ are airborne inhalable particles that are less than ten micrometers (coarse particles) and less than 2.5 micrometers (fine particles) in diameter, respectively.
3 Airborne lead in urban areas is primarily emitted by vehicles using leaded fuels.



Air Cargo Facility Environmental Assessment

Study Areas

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4-1

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Table 4-1
NATIONAL AMBIENT AIR QUALITY STANDARDS

POLLUTANT		PRIMARY / SECONDARY	AVERAGING TIME	LEVEL	FORM
Carbon Monoxide (CO)		Primary	8 hour	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		Primary and Secondary	Rolling 3-month average	0.15 μg/m3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)		Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary and Secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O_3)		Primary and Secondary	8 hour	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particulate Matter	$PM_{2.5}$	Primary	1 year	12.0 μg/m^3	Annual mean, averaged over 3 years
		Secondary	1 year	15.0 μg/m^3	Annual mean, averaged over 3 years
		Primary and Secondary	24 hour	35 μg/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24 hour	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		Primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3 hour	0.5 ppm	Not to be exceeded more than once per year

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 μg/m^3 as a calendar quarter average) also remain in effect.
(2) The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.
(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.
(4) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet one year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 C.F.R. § 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Notes: ppm is parts per million; ppb is parts per billion, and μg/m^3 is micrograms per cubic meter.

Source: EPA, 40 C.F.R. § 50, National Primary and Secondary Ambient Air Quality Standards (NAAQS) accessed August 2018.

A nonattainment area is a homogeneous geographical area[4] (usually referred to as an air quality control region) that is in violation of one or more NAAQS and has been designated as nonattainment by the EPA. Some regulatory provisions, for instance the CAA General Conformity regulations, apply only to areas designated as nonattainment or maintenance.

A maintenance area describes the air quality designation of an area previously designated nonattainment by the EPA and subsequently re-designated attainment after emissions are reduced. Such an area remains designated as maintenance for a period up to 20 years at which time the state can apply for re-designation to attainment, provided that the NAAQS were sufficiently maintained throughout the maintenance period.

Affected Environment

The Airport is located within Boone County, Kentucky, which is included in the Metropolitan Cincinnati Interstate Air Quality Region. The EPA previously determined that Boone County's levels of the eight-hour concentration of ozone exceeded the federal standards defining healthful air quality. On July 5, 2017, the EPA determined the area had attained the 2008 eight-hour standard for ozone. However, in 2018, the area was designated as marginal non-attainment for the 2015 eight-hour standard for ozone.

4.2.2 BIOLOGICAL RESOURCES

Regulatory Setting

The United States Congress passed the Endangered Species Act of 1973, as Amended (ESA) 16 U.S.C. §1531 *et seq*., in 1973 to conserve those species that are endangered or threatened with extinction (federally-listed species). Under ESA, Section 7, the FAA is required to consult with the United States Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) to ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.

Affected Environment

The affected environment or action area for biological resources is defined per 50 C.F.R. § 402.02 as "*all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action*."

Biological surveys and habitat assessments were completed in August 21, October 29 and 30, 2015, September 21, 22, and 23, 2016, February 2017, March 14 and 15, 2017, September 7, 2017, and January 22 and 23, 2018 for the DSA. The purpose of these surveys was to determine the presence or absence of federal or state-listed species and if potential habitat for both federal and state-listed species existed in the proposed development area at CVG. The following ground cover/vegetation types are located on the DSA: old field, urban/industrial turf, Upland mixed deciduous forest, post-agricultural disturbed forest, hayfield, hickory woodland, beech forest, palustrine emergent wetland, palustrine forested wetland, palustrine scrub/shrub wetland, and upland scrub/shrub.

[4] A homogeneous geographical area, with regard to air quality, is an area, not necessarily bounded by state lines, where the air quality characteristics have been shown to be similar over the whole area. This may include several counties, encompassing more than one state, or may be a very small area within a single county.

4.2.2.1 Threatened and Endangered Species

According to the USFWS, the following federal listed species of plants and animals, shown in **Table 4-2,** may be found in Boone County, Kentucky.

Table 4-2
FEDERAL THREATENED AND ENDANGERED SPECIES

TAXONOMIC GROUP	COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS
Mammal	Gray bat	*Myotis grisescens*	*Endangered*
Mammal	Indiana bat	*Myotis sodalis*	*Endangered*
Mammal	Northern long-eared bat	*Myotis septentrionalis*	*Threatened*
Mussels	Clubshell	*Pleurobema clava*	*Endangered*
Mussels	Fanshell	*Cyprogenia stegaria*	*Endangered*
Mussels	Northern Riffleshell	*Epioblasma torulosa rangiana*	*Endangered*
Mussels	Orangefoot pimpleback	*Plethobasus cooperianus*	*Endangered*
Mussels	Purple cat's paw	*Epioblasma obliquata*	*Endangered*
Mussels	Rabbitsfoots	Quadrula cylindrica cylindrica	*Threatened*
Mussels	Ring pink	*Obovaria retusa*	*Endangered*
Mussels	Rough pigtoe	*Pleurobema plenum*	*Endangered*
Mussels	Sheepnose	*Plethobasus cyphyus*	*Endangered*
Mussels	Spectaclecase mussel	*Cumberlandia monodonta*	*Endangered*
Plants	Running buffalo clover	*Trifolium stoloniferum*	*Endangered*

Source: USFWS Information for Planning and Conservation (IPaC) website, https://ecos.fws.gov/ipac/location/LS34QCWHZZDTZCOJ4LG4CW3T3E/resources, Accessed May 17, 2018

4.2.2.2 State Designated Threatened, Endangered, or Special Status Species

In addition to the USFWS information, the Kentucky Department of Fish & Wildlife Resources and the Kentucky State Nature Preserves Commission (KSNPC) were contacted to obtain information on threatened and endangered species. The list of species monitored by the KSNPC that may be found within Boone County is provided in **Appendix C, *Section 7 Consultation***.

4.2.2.3 Survey Findings

There are no known records of federally-protected or state-protected plant or animal species in the DSA. The habitat surveys found potentially suitable habitat for three federal threatened and endangered species: the Indiana bat, the northern long eared bat, and running buffalo clover. Approximately 244 acres of potential summer habitat for the two bat species is located within the DSA. In accordance with Section 7 of the ESA, a Biological Assessment was prepared to analyze the potential impacts of the Proposed Action on the Indiana bat and northern long-eared bat. Running buffalo clover surveys were conducted during the flowering period within the project areas identified as potential habitat during the habitat surveys. No running buffalo clover was identified during the surveys. Suitable habitat was not present for any of the other federal species in the DSA. See Appendix C for additional information on the Biological Assessment and the field surveys.

4.2.3 CLIMATE

Per FAA Order 1050.1F, the discussion of potential climate impacts should be documented in a separate section of the NEPA document, distinct from air quality.[5] Where the proposed action or alternative(s) would result in an increase in greenhouse gases (GHG) emissions, the emissions should be assessed either qualitatively or quantitatively.

GHGs are gases that trap heat in the earth's atmosphere. Both naturally occurring and man-made GHGs primarily include water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Sources that require fuel or power at an airport are the primary sources that would generate GHGs. Aircraft are probably the most often cited air pollutant source, but they produce the same types of emissions as ground access vehicles.

Research has shown there is a direct correlation between fuel combustion and GHG emissions. In terms of U.S. contributions, the General Accounting Office (GAO) reports that "domestic aviation contributes about three percent of total carbon dioxide emissions, according to EPA data," compared with other industrial sources including the remainder of the transportation sector (20 percent) and power generation (41 percent).[6] The International Civil Aviation Organization (ICAO) estimates that GHG emissions from aircraft account for roughly three percent of all anthropogenic GHG emissions globally.[7] Climate change due to GHG emissions is a global phenomenon, so the affected environment is the global climate.[8]

4.2.4 DEPARTMENT OF TRANSPORTATION ACT, SECTION 4(F)

Regulatory Setting

Section 4(f) of the United States Department of Transportation (USDOT) Act of 1966 (49 U.S.C. § 303) protects publicly owned parks, recreational areas, wildlife and waterfowl refuges of national, state, or local significance, and public and private historic sites of national, state, or local significance. Section 4(f) provides that the Secretary of Transportation may approve a transportation program or project requiring the use of publicly owned land of a public park, recreation area, or wildlife or waterfowl refuge of national, state, or local significance, or land of an historic site of national, state, or local significance, only if there is no feasible and prudent alternative to using that land and the program or project includes all possible planning to minimize harm resulting from the use. Section 4(f) applies only to transportation modal agencies within the USDOT. If the FAA is engaged with a non-USDOT agency on the NEPA review of a proposed project involving Section 4(f), the FAA must take the lead on Section 4(f) compliance.

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5 FAA, April 2015, Order 1050.1F Paragraph 4-1. Climate is considered a separate section from Air Quality.

6 *Aviation and Climate Change.* GAO Report to Congressional Committees, (2009).

7 Alan Melrose, "European ATM and Climate Adaptation: A Scoping Study," in *ICAO Environmental Report.* (2010).

8 As explained by the EPA, "greenhouse gases, once emitted, become well mixed in the atmosphere, meaning U.S. emissions can affect not only the U.S. population and environment but other regions of the world as well; likewise, emissions in other countries can affect the United States." Climate Change Division, Office of Atmospheric Programs, EPA, *Technical Support Document for Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act* 2-3 (2009).

Section 6(f) of the Land and Water Conservation Fund Act of 1965 (LWCFA), 16 U.S.C. § 4601-8(f), prohibits the conversion of property acquired or developed with LWCFA grants for uses other than public outdoor recreation without the approval of the United States Department of Interior's (USDOI) National Park Service (NPS). The USDOI has delegated most review, consultation and assessment of Section 6(f) impacts and conversions to specified state recreation offices. When acquisition is required, Section 6(f) directs the USDOI to assure that replacement lands of at least equal fair market value and of reasonably equivalent usefulness and location are provided as a condition of such conversions. Consequently, where conversions of Section 6(f) lands are proposed for airport projects, replacement lands are required.

Affected Environment

A review of records maintained by the National Park Service (NPS), the Kentucky Heritage Council (KHC), Boone County, and the Northern Kentucky Area Planning Commission (NKAPC) was conducted to identify known Section 4(f) resources in the GSA. Potential Section 4(f) properties within and around the GSA are shown in **Exhibit 4-2, *Potential Section 4(f) Resources*** and listed in **Table 4-3**. Potential historic sites are discussed in Section 4.2.6. No LWCF lands are located within the GSA.[9] Therefore, LWCF Section 6(f) lands are not discussed further in this EA.

Table 4-3
POTENTIAL SECTION 4(f) RESOURCES

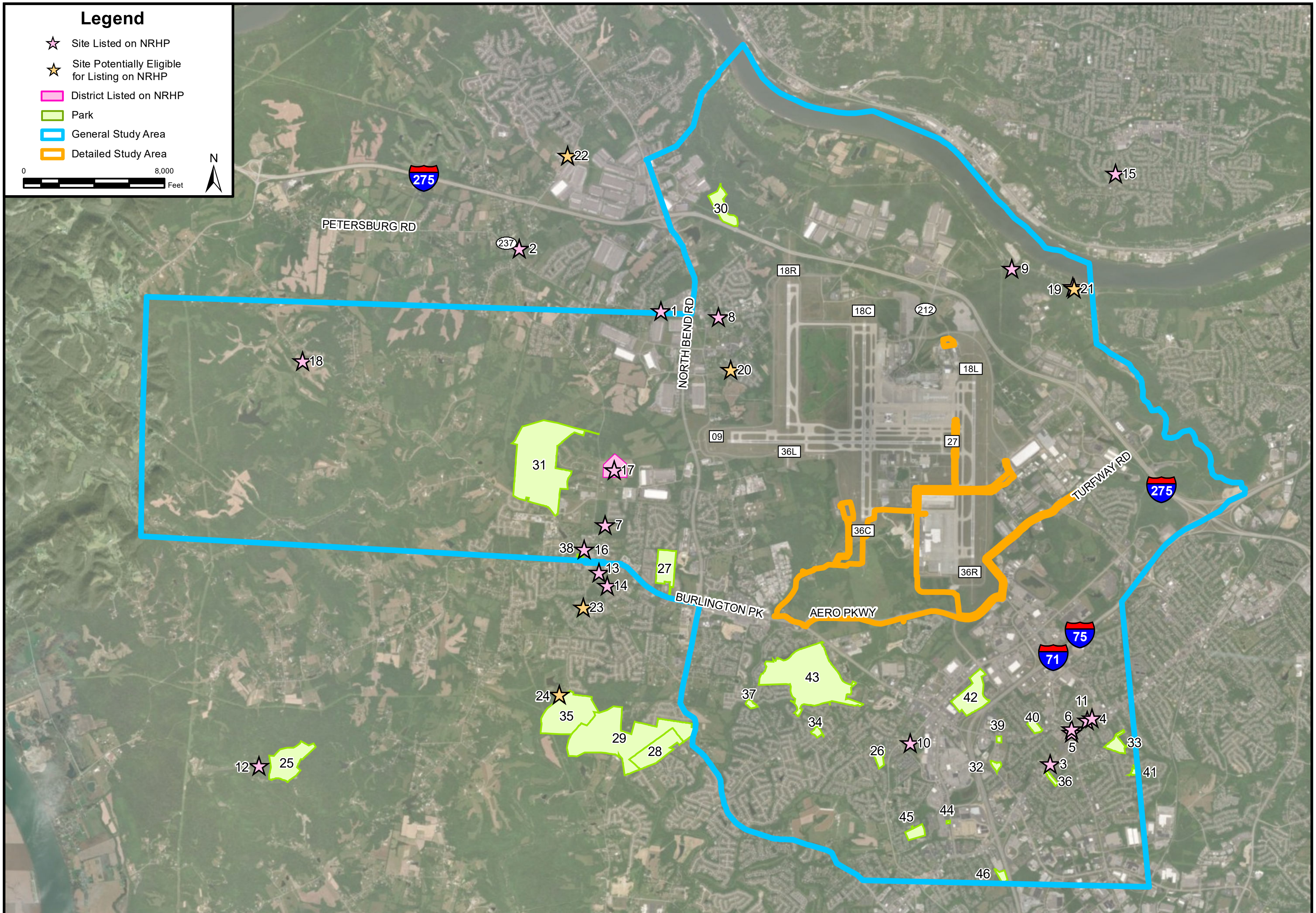
MAP ID	NAME	RESOURCE TYPE
1	A.J. Aylor House	Historic Structure
2	Allie Corn House	Historic Structure
3	Clinton Blankenbeker House	Historic Structure
4	Dr. Gladys Rouse Office and House	Historic Structure
5	Florence Fire Station	Historic Structure
6	Florence Hotel	Historic Structure
7	Frank S. Milburn Machine Shop	Historic Structure
8	Hebron Deposit Bank	Historic Structure
9	Henry and Agnes Rolsen House	Historic Structure
10	Hopeful Lutheran Church	Historic Structure
11	John Delehunty House	Historic Structure
12	Roberts, Thomas Zane, House and Workshop	Historic Structure
13	W.F. and Florence McKim House	Historic Structure
14	W.T. Delph House	Historic Structure
15	Williams, W. L., House	Historic Structure
16	Burlington Historic District	Historic District
17	Ephraim Uitz House	Historic District
18	Gaines, Benjamin R., Farm	Historic District
19	Anderson Ferry House	Historic Structure
20	Joel Garnett House	Historic Structure

[9] Land and Water Conservation Fund Coalition, 2017, Map of LWCF Funding Through Federal Land Management Agencies and State & Local Assistance Program - Resources. Available on-line: https://www.lwcfcoalition.com/tools/. Accessed June 2017.

Table 4-3, *Continued*
POTENTIAL SECTION 4(f) RESOURCES

MAP ID	NAME	RESOURCE TYPE
21	Kottmeyer House	Historic Structure
22	Marietta Graves House	Historic Structure
23	Robert Chambers House	Historic Structure
24	Sperti Farm	Historic Structure
25	Boone Cliffs	Park / Recreation
26	Boone County Pee Wee Football	Park / Recreation
27	Boone Woods Park	Park / Recreation
28	Camp Ernst Lake	Park / Recreation
29	Camp Ernst YMCA	Park / Recreation
30	Carder Dolwick Nature Preserve	Park / Recreation
31	England Idlewild Park	Park / Recreation
32	Florence Family Aquatic Center	Park / Recreation
33	Florence Nature Park	Park / Recreation
34	Fox Run Park	Park / Recreation
35	Gunpowder Creek Nature Park	Park / Recreation
36	Niblack Memorial Park	Park / Recreation
37	Oakbrook Park	Park / Recreation
38	Pete’s Park	Park / Recreation
39	Skate Park	Park / Recreation
40	Stringtown Park	Park / Recreation
41	Walnut Creek Park	Park / Recreation
42	World of Golf	Park / Recreation
43	Boone Links Golf Course	Park / Recreation
44	Florence Community Plaza	Park / Recreation
45	Lincoln Woods Park	Park / Recreation
46	Florence Lions Park	Park / Recreation

Source: U.S. National Park Service, National Register of Historic Places, Kentucky Heritage Council, Boone County, Landrum & Brown analysis, 2017.



Air Cargo Facility Environmental Assessment

Potential Section 4(f) Resources

EXHIBIT:
4-2

SOURCES: U.S. National Park Service, National Register of Historic Places, Boone County Planning Commission

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4.2.5 HAZARDOUS MATERIALS, SOLID WASTE, AND POLLUTION PREVENTION

Regulatory Setting

Primary laws passed governing the handling and disposal of hazardous materials, solid waste and pollution prevention include: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), Pollution Prevention Act (PPA), Toxic Substances Control Act (TSCA), and the Oil Pollution Act (OPA).

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): The CERCLA of 1980, 42 U.S.C. §§ 9601 – 9675, was amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and the Community Environmental Response Facilitation Act (CERFA) of 1992. The purpose of CERCLA is to conduct an increasingly complex series of evaluations of federally-listed suspected hazardous waste sites to determine if those sites pose sufficient threats to human health and the environment to become eligible for federally-funded investigation and clean up under Superfund.

Resource Conservation and Recovery Act (RCRA): The RCRA of 1987, 42 U.S.C. §§ 6901 – 6992k, is intended to provide "cradle to grave" management of hazardous and solid wastes and regulation of underground storage tanks (USTs) containing chemical and petroleum products. The RCRA allows the EPA to set standards for entities producing, storing, handling, transporting, and disposing of hazardous waste. The RCRA was amended with the Hazardous and Solid Waste Amendments of 1984 (HSWA) that addressed corrective actions and permitting of hazardous waste issues.

Pollution Prevention Act (PPA): The PPA of 1990, 42 U.S.C. §§ 13101 – 13109, established that it is the national policy of the United States that, whenever feasible: (1) pollution should be prevented or reduced at the source; (2) pollution that cannot be prevented should be recycled in an environmentally safe manner; (3) pollution that cannot be prevented or recycled should be treated in an environmentally-safe manner; and (4) disposal or other release into the environment should be employed only as a last resort, and should be conducted in an environmentally-safe manner.

Toxic Substances Control Act (TSCA): The TSCA of 1976, 42 U.S.C. §§ 2601 – 2697, states that it is the policy of the United States that: (1) adequate data should be developed with respect to the effect of chemical substances and mixtures on health and the environment, and that the development of such data should be the responsibility of those who manufacture and those who process such chemical substances and mixtures; (2) adequate authority should exist to regulate chemical substances and mixtures that create an unreasonable risk of injury to health or the environment, and to take action with respect to chemical substances and mixtures which are imminent hazards; and (3) authority over chemical substances and mixtures should be exercised in such a manner as not to impede unduly or create unnecessary economic barriers to technological innovation while fulfilling the primary purpose of the TSCA to assure that such innovation and commerce in such chemical substances and mixtures do not create an unreasonable risk of injury to health or the environment.

Oil Pollution Act (OPA): The OPA of 1990, 33 U.S.C. §§ 2701 - 2762 was established to improve the nation's ability to prevent and respond to oil spills by establishing provisions that expand the federal government's ability, and provide the money and resources necessary to respond to oil spills. The OPA provided new requirements for contingency planning by both government and industry. The Oil Pollution Prevention Regulation (40 C.F.R. Part 112) was amended to incorporate requirements of the OPA, and now forms the basis of the EPA's Oil Spill Prevention, Control, and Countermeasure (SPCC) program. The SPCC program seeks to prevent oil spills from certain aboveground storage tanks (ASTs) and USTs.

Affected Environment

Hazardous Materials

Phase I Environmental Site Assessments (ESAs) were completed to evaluate potential hazardous substances contamination on the DSA. The Phase I ESAs are provided in **Appendix D, *Hazardous Materials***. The Phase I ESAs did not reveal evidence of a recognized environmental condition (REC) or Conditional RECs (CRECs) in the DSA. While there are records of potential ground contaminating events in the DSA, there is no potential for encountering hazardous substances and/or groundwater during construction activities as these are considered historical recognized environmental conditions (HRECs) and it has been determined no further action is required..

Furthermore, there are no properties listed on the National Priority List (NPL) or Resource Conservation and Recovery Act (RCRA) solid waste management units within the DSA.

Solid Waste

The solid waste at CVG is managed by the Northern Kentucky Solid Waste Management Area (NKSWMA), which serves approximately 261,000 people in Boone, Kenton, and Campbell Counties.[10] NKSWMA utilized three landfills for waste disposal in 2016: Bavarian (Boone County, Kentucky), Epperson (Grant County, Kentucky), Rumpke (Pendleton County, Kentucky). In addition to landfills, a variety of recycling, composting, and buy-back programs were utilized to handle solid waste.

According to the KCAB, approximately 7,708 tons of solid waste was generated by the airport and its tenants in 2017. The three largest generators of solid waste were the Airport, Delta Air Lines, and DHL. All 7,708 tons of waste were collected and transported by Rumpke Waste Collection and Disposal Systems to landfills in Colerain Township, Ohio and Pendleton County, Kentucky.

10 *Northern Kentucky Solid Waste Management Area Plan – 5 Year Update 2018-2022*, 2016.

4.2.6 HISTORIC, ARCHITECTURAL, ARCHEOLOGICAL, AND CULTURAL RESOURCES

Regulatory Setting

The National Historic Preservation Act of 1966 (NHPA) (54 U.S.C. § 300101 *et seq*.) Section 106, *Protection of Historic Properties* requires federal agencies to take into account the effects of their undertakings on properties that are listed on or determined eligible for inclusion in the National Register of Historic Places (NRHP), and requires federal agencies to consult with the State Historic Preservation Office (SHPO), Tribal Historic Preservation Officers (THPO), and other parties to develop and evaluate alternatives or modifications to the undertaking that could avoid, minimize, or mitigate adverse effects on historic properties. The independent federal agency overseeing federal historic preservation and tribal programs, the Advisory Council on Historic Preservation (ACHP), is afforded a reasonable opportunity to comment on such undertakings subject to Section 106. The ACHP typically reserves its comments either for complex consultations in which it has had previous involvement or for consultations wherein a federal agency seeks ACHP comment on unresolved consultation issues. Section 106 of NHPA is the principal statute concerning such resources. It requires consideration of direct and indirect impacts from federal actions on historic, architectural, archeological, and other cultural resources.

This project also falls under the purview of the Kentucky Heritage Council (KHC),which serves as the SHPO and is responsible for the identification, protection and preservation of prehistoric resources and historic buildings, sites and cultural resources throughout Kentucky.

Affected Environment

The Area of Potential Effects (APE) is "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties" (36 C.F.R. § 800.16(d)). For purposes of Section 106, the term "historic properties" can include architectural, archeological, or cultural resources. The determination of the APE considers the character of a project area and the potential for resources to be found.

The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36 C.F.R. § 800.16(d)). The APE must include all direct and reasonably foreseeable indirect effects. Although the NHPA regulations do not define the term "indirect effect," the criteria of adverse effects cover reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative (36 C.F.R. § 800.5(a)(1)).

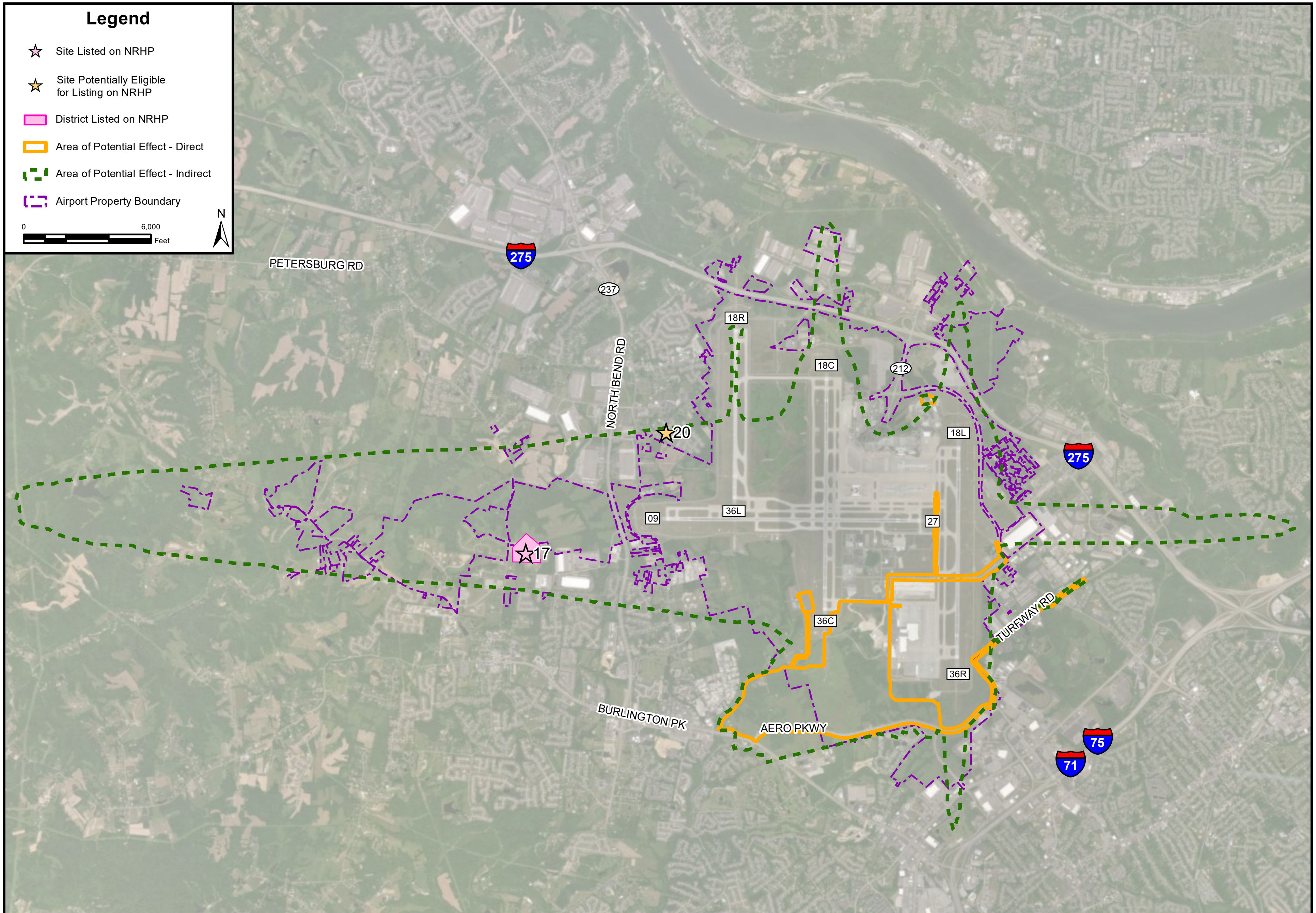
For this undertaking, impacts to historic resources associated with visual impacts or changes in setting, could cause direct and indirect effects. As a result of this effort the FAA defined two APEs - a Direct APE and an Indirect APE as shown on **Exhibit 4-3, *Direct and Indirect Areas of Potential Effect***. The Indirect APE covers approximately 1,300 acres and is defined as the area where both direct and indirect impacts may result from the development of the Proposed Action. The Direct APE covers approximately 900 acres and is defined as the area where direct impacts may result from the Proposed Action. The Direct APE boundary was developed using the area of physical disturbance. The KHC concurred with FAA delineation of the APE via email on May 21, 2018 (see **Appendix E, *Section 106 Consultation***).

Architectural, Phase I, and Phase II archeological surveys were conducted for the proposed undertaking in compliance with Section 106 of the NHPA and KHC guidelines. The purpose of the investigation was to identify any historic properties located within the Direct APE that are listed or eligible for listing in the NRHP. Historic properties may include buildings or structures, sites, objects, and even districts of importance in prehistory or history. The cultural resources investigation consisted of a records search and literature review, as well as an archeological pedestrian survey of the Direct APE. The background research included a review of the Kentucky Office of State Archaeology (KYOSA), the KHC, historical aerials from Boone County Online GIS website, and historic United States Geological Survey (USGS) maps.

Qualified archeologists conducted pedestrian surveys dating back to 1983. As described in the FAA Order 1050.1F Desk Reference, the steps taken to identify archeological sites must be identified.[11] The pedestrian survey was conducted in accordance to KHC pedestrian survey standards which allow a person to achieve 100 percent coverage of a corridor 20 meters (66 feet) wide in a single pass. In addition, surveys were conducted for aboveground resources within the Direct APE.

The surveys identified 49 sites within the direct and indirect APE, of which 37 were archaeological resources and 12 were aboveground resources. Through consultation with KHC, 33 of the archaeological sites were determined not eligible and four were determined eligible for listing in the National Register of Historic Places (NRHP). Two aboveground resources were previously identified, Ephraim Uitz House (listed on the NRHP) and the Joel Garnett House (eligible). The remaining ten aboveground resources were determined not eligible for the NRHP. **Table 4-4** provides the evaluated sites and the NRHP eligibility determination.

[11] FAA, 2015, *1050.1F Desk Reference*.



Air Cargo Facility Environmental Assessment

Direct and Indirect Areas of Potential Effect

EXHIBIT: **4-3**

SOURCES:U.S. National Park Service, National Register of Historic Places, Boone County Planning Commission

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Table 4-4
EVALUATED SITES WITHIN THE DIRECT AND INDIRECT APE

	APE	ASM SITE NUMBER	DESCRIPTION	NRHP STATUS RECOMMENDATION
Archaeological Resources				
1	Direct APE	15Be305	Prehistoric open habitations without mounds	Not eligible
2	Direct APE	15Be307	Prehistoric open habitations without mounds	Not eligible
3	Direct APE	15Be315	Middle Archaic open habitat without mounds	Not eligible
4	Direct APE	15Be320	Prehistoric open habitations without mounds	Not eligible
5	Direct APE	15Be327	Historic Farm/Residence	Not eligible
6	Direct APE	15Be328	Historic Farm/Residence	Not eligible
7	Direct APE	15Be330	Historic Farm/Residence	Not eligible
8	Direct APE	15Be331	Historic Farm/Residence	Not eligible
9	Direct APE	15Be334	Prehistoric open habitations without mounds	Not eligible
10	Direct APE	15Be338	Prehistoric open habitations without mounds	Not eligible
11	Direct APE	15Be339	Prehistoric open habitations without mounds	Not eligible
12	Direct APE	15Be340	Prehistoric open habitations without mounds	Not eligible
13	Direct APE	15Be549	Prehistoric open habitations without mounds	Not eligible
14	Direct APE	15Be550	Historic Farm/Residence	Not eligible
15	Direct APE	15Be682	Historic Cemetery	Not eligible
16	Direct APE	15Be685	Unaffiliated Prehistoric Lithic Scatter	Not eligible
17	Direct APE	15Be686	Unaffiliated Prehistoric Lithic	Not eligible
18	Direct APE	15Be687	Unaffiliated Prehistoric Lithic Scatter	Not eligible
19	Direct APE	15Be688	Historic Residence/Farmstead	Eligible
20	Direct APE	15Be689	Historic Residence/Farmstead	Not eligible
21	Direct APE	15Be690	Unaffiliated Prehistoric Lithic Scatter	Not eligible
22	Direct APE	15Be691	Historic Residence/Farmstead	Not eligible
23	Direct APE	15Be692	Historic Cemetery	Not eligible
24	Direct APE	15Be693	Unaffiliated Prehistoric Lithic Scatter	Not eligible
25	Direct APE	15Be694	Historic Residence/Farmstead	Eligible

Table 4-4, *Continued*
EVALUATED SITES WITHIN THE DIRECT AND INDIRECT APE

	APE	ASM SITE NUMBER	DESCRIPTION	NRHP STATUS RECOMMENDATION
26	Direct APE	15Be695	Unaffiliated Prehistoric Lithic Scatter	Not eligible
27	Direct APE	15Be696	Unaffiliated Prehistoric Lithic Scatter	Not eligible
28	Direct APE	15Be697	Historic Residence/Farm	Eligible
29	Direct APE	15Be698	Unaffiliated Prehistoric Lithic Scatter	Not eligible
30	Direct APE	15Be699	Unaffiliated Prehistoric Lithic Scatter	Not eligible
31	Direct APE	15Be700	Unaffiliated Prehistoric Lithic Scatter with Historic Component	Not eligible
32	Direct APE	15Be701	Unaffiliated Prehistoric Lithic Scatter with Historic Component	Not eligible
33	Direct APE	15Be702	Unaffiliated Prehistoric Lithic Scatter	Not eligible
34	Direct APE	15Be703	Historic Cemetery	Not eligible
35	Direct APE	15Be715	Historic Cemetery	Not eligible
36	Direct APE	15Be716	Historic Residence/Farmstead-Associated with BE176	Not eligible
37	Direct APE	15Be717	Historic Residence/Farmstead	Eligible*
Aboveground Resources				
38	Direct APE	Site # not assigned	Shed/outhouse (Structure)	Not eligible
39	Direct APE	Be176	Historic Residence/Farmstead-Associated with 15BE716 (Structure)	Not eligible
40	Direct APE	Be1661	Tobacco Barn (Structure)	Not eligible
41	Direct APE	Be1663	Stripping Shed (Structure)	Not eligible
42	Direct APE	Be1664	Vittitoe House (Structure)	Not eligible
43	Indirect APE	Be1667	Mayerhofer House	Not eligible
44	Indirect APE	Be1668	George Irwin House	Not eligible
45	Indirect APE	Be1669	Johnson House	Not eligible
46	Indirect APE	Be1670	Kenner House	Not eligible
47	Indirect APE	Be1671	5679 Limaburg Creek Road	Not eligible
48	Indirect APE	Be125	Ephraim Uitz House	Listed on NRHP
49	Indirect APE	Be376	Joel Garnett House	Eligible

* Phase II archeological work on this site could not be completed due to safety concerns regarding asbestos contamination on the site. Therefore, the site was determined eligible for the NRHP.

Source: Environment & Archaeology, LLC

4.2.7 LAND USE

Regulatory Setting

Special guidance relevant to land use is given in the NEPA implementing regulations, which require consideration of "[p]ossible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned." The impacts on land use may include indirect impacts such as the disruption of communities, relocation, induced socioeconomic impacts, and impacts to land uses protected under USDOT Act Section 4(f). The regulations recognize that certain inconsistencies may exist between the proposed federal action and any approved state or local plan or law. Where an inconsistency exists, the NEPA document should describe the extent to which the agency would reconcile its action with the plan or law. (See 40 C.F.R. § 1506.2(d).)

Affected Environment

The DSA is located on the southern edge of the Airport in a predominantly commercial area. The land uses immediately adjacent to the DSA are a mix of commercial and residential uses and undeveloped Airport property. There is a residential area located south of the DSA on the south side of Aero Parkway and west of the DSA on the west side of Limaburg-Creek Road. The DSA has frontage on Aero Parkway, which provides automobile access. **Exhibit 4-4, *Existing Land Use***, shows the location of the DSA and the surrounding land uses.

The on-Airport portion of the DSA is located within an area that is zoned as "Airport" district and is part of the Houston-Donaldson Study Corridor Overlay District (HDO). The Airport zoning designation allows airport development and commercial, office and industrial uses. The HDO is an overlay zoning district that applies additional conditions related to design and signage while maintaining the provisions of the underlying Airport zoning district.

The off-Airport portion of the DSA is currently zoned C-4 – Commercial, I-1 – Industrial, and A-2 – Agricultural Estate. According to the Boone County Comprehensive Plan, the C-4 designation is land designed for "locally oriented commercial services, either retail, recreational or office uses, in areas located near or adjacent to interstate highways and arterial roads. These areas are either currently or expected to experience rapid growth due to the population projections and recommended land uses in the Boone County Comprehensive Plan and in other land use studies." The I-1 designation is land designed for "different types of small to large scale light manufacturing, warehouse, distribution and related service uses, which require direct accessibility to a regional transportation system." The A-2 designation is land designated to "provide low density residential development and on a limited basis agricultural uses or agricultural related uses in the context of a rural environment."

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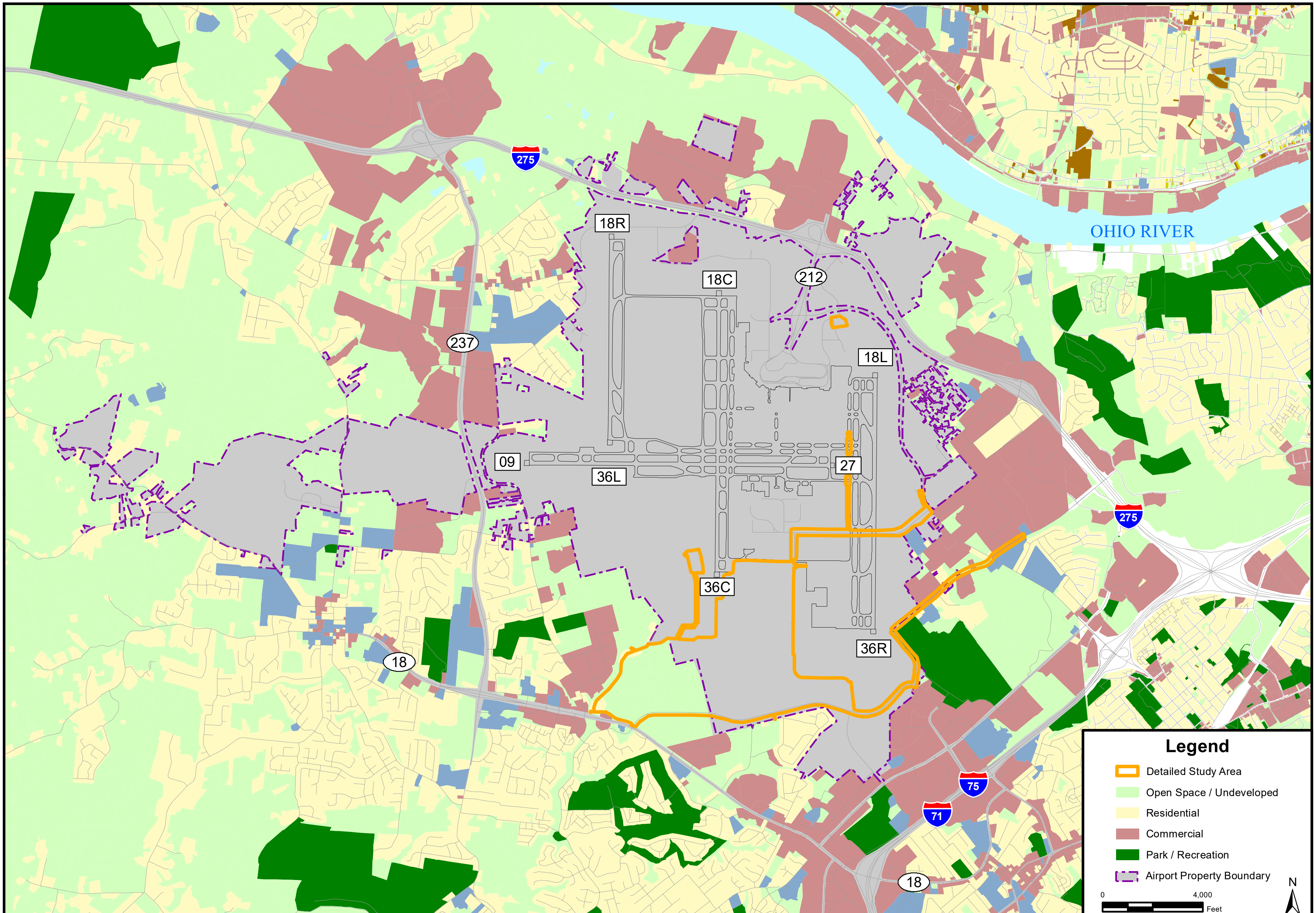

Air Cargo Facility
Environmental Assessment

Existing Land Use

EXHIBIT:
4-4

SOURCE: Boone County Planning Commission GIS Services Division, 2017. @ http://www.boonecountygis.com

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4.2.8 NATURAL RESOURCES AND ENERGY SUPPLY

Regulatory Setting

As an impact category, natural resources and energy supply provides an evaluation of a project's consumption of natural resources and use of energy supplies. As set forth in 40 C.F.R. §§1502.14 and 1502.16(e)-(f), CEQ Regulations require that, when evaluating the environmental consequences of a proposed action and its alternatives, a federal agency's environmental consequences analysis must include, among other things, energy requirements and the conservation potential of various alternatives and mitigation measures, and natural or depletable resource requirements and the conservation potential of various alternatives and mitigation measures. The following section describes the existing conditions for natural resources and energy supply at CVG.

Affected Environment

Duke Energy supplies the Airport's electricity and natural gas, Boone County Water District and the Northern Kentucky Water District supply the Airport's water utilities, Sanitation District 1 and 2 support the Airport's stormwater and sewage utilities, Cincinnati Bell provides the Airport's internet service, and Delta Fuel Storage Tanks supplies the Airport's aircraft fuel.[12] Based on information provided by KCAB staff, in 2016 the Airport's electric usage was approximately 63,500,000-kilowatt hours, water usage was approximately 17,300,000 cubic feet, and natural gas usage was approximately 142,000 million British thermal units.

4.2.9 NOISE AND NOISE-COMPATIBLE LAND USE

4.2.9.1 Noise

Regulatory Setting

For aviation noise analyses, the FAA has determined that the cumulative noise energy exposure of individuals resulting from aviation activities must be established in terms of Yearly Day-Night Average Sound Level (DNL), the FAA's primary noise metric. To evaluate aircraft noise, the FAA has a required computer model, the Aviation Environmental Design Tool (AEDT) that simulates aircraft activity at an airport. AEDT replaced the Integrated Noise Model, and the Emissions and Dispersion Modeling System as the required tool for environmental modeling of FAA actions to determine if significant noise impacts would result. AEDT 2d is the latest version.[13]

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[12] Cincinnati/Northern Kentucky International Airport – 2035 Master Plan Update, *Chapter 4 - Airport Inventory*.

[13] FAA, 2017, Aviation Environmental Design Tool, Version 2d. Available on-line at: https://aedt.faa.gov/2d_information.aspx Accessed 2017.

The FAA uses the 14 C.F.R. Part 150, *Airport Noise Compatibility Planning*, land use compatibility guidelines to determine compatibility with most land uses. These guidelines are consistent with land use compatibility guidelines developed by other federal agencies such as the EPA and the United States Department of Housing and Urban Development.[14,15] A DNL of 65 decibels (dB) is the noise level at which noise-sensitive land uses (residences, churches, schools, libraries, and nursing homes) become significantly impacted. Below 65 DNL, all land uses are determined to be compatible with airport noise. Special consideration is given to noise sensitive areas within Section 4(f) properties (including, noise sensitive areas within national parks, national wildlife and waterfowl refuges and historic sites, including traditional cultural properties) where the land use compatibility guidelines in 14 C.F.R. Part 150 are not relevant to the value, significance, and enjoyment of the area in question.

Affected Environment

The 65 DNL, 70 DNL, and 75 DNL Existing noise exposure contours are shown on **Exhibit 4-5, *Existing Noise Exposure Contours***. The Existing Noise Exposure contours were based on data from January 2017 through December 2017, as it was the latest data available at the time the noise contours were prepared. **Table 4-5** summarizes the area within each noise contour level for the existing noise exposure contour. A DNL noise contour does not represent the noise levels present on any specific day, but represents the energy-average of all 365 days of operation during the year. Noise contour patterns extend from an airport along each extended runway centerline, reflective of the flight tracks used by all aircraft. The relative distance of a contour from an airport along each route is a function of the frequency of use of each runway end for total arrivals and departures, as well as its use at night, and the type of aircraft assigned to it.

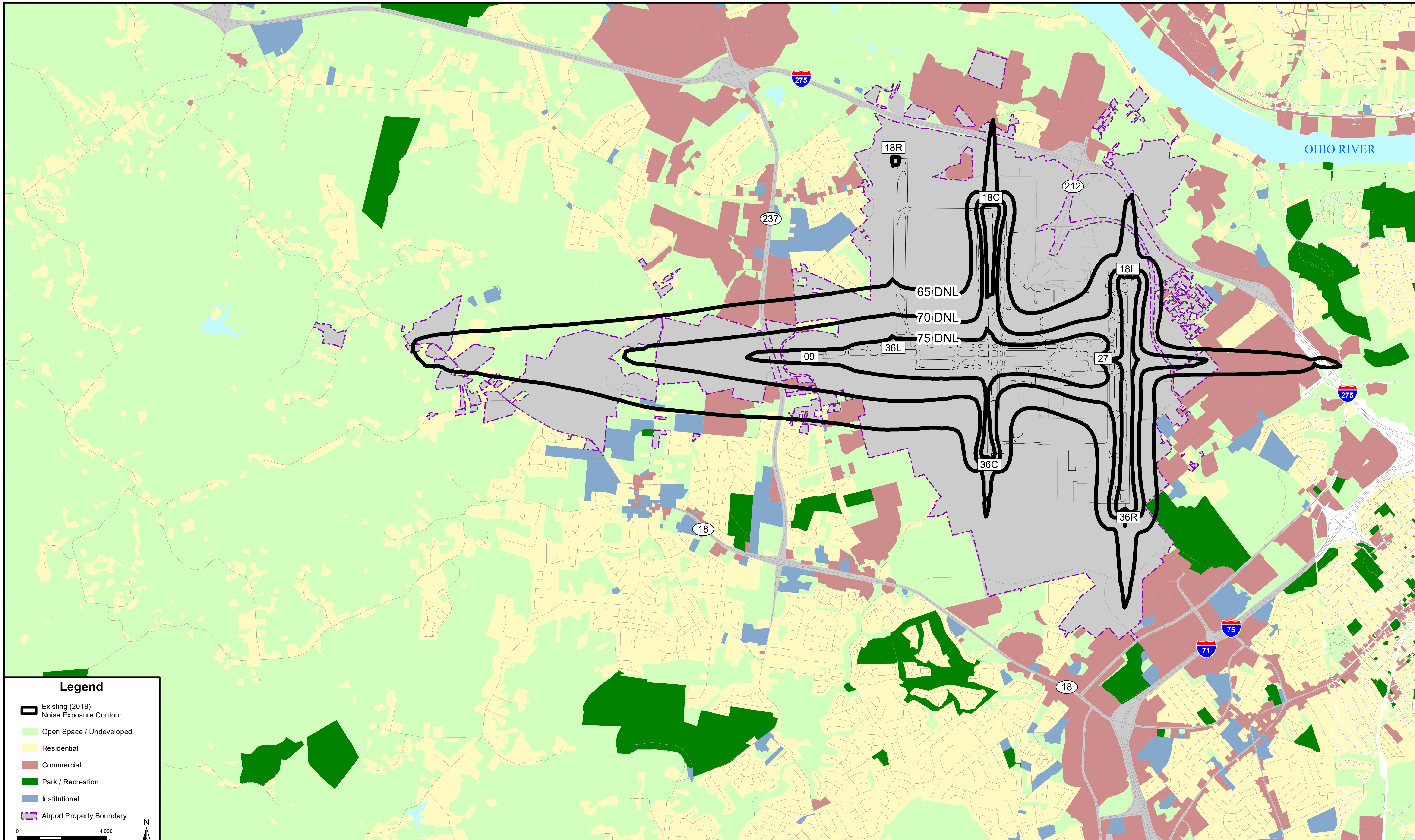
Table 4-5
AREAS WITHIN EXISTING NOISE EXPOSURE CONTOURS
(IN SQUARE MILES)

CONTOUR RANGE	EXISTING
65-70 DNL	4.0
70-75 DNL	1.8
75 + DNL	1.1
65 + DNL	7.0

Source: Landrum & Brown, 2018.

The shape of the noise contours north and south of the Airport reflect the predominant daytime use of Runways 18C/36C and 18L/36R and the dominant south/west flow of the Airport. During the daytime, the primary west/south flow of the Airport consists generally of arrivals from the north to Runways 18L, 18C, and 27, and departures to the south and west from Runways 18L, 18C, and 27. As a result, the noise contour is spiked to the north (indicating predominantly arrival operations) and more rounded and larger to the south (indicating predominantly departure operations). During the nighttime, Runway 27 is the preferred departure runway, creating the larger contour to the west of the Airport.

[14] Federal Interagency Committee on Urban Noise (FICUN), 1980, *Guidelines for Considering Noise in Land Use Planning and Control*.
[15] Federal Interagency Committee on Noise (FICON), 1992, *Federal Agency Review of Selected Airport Noise Analysis Issues*, August.



Air Cargo Facility Environmental Assessment

Existing Noise Exposure Contours

EXHIBIT:
4-5

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4.2.9.2 Noise-Compatible Land Use

Regulatory Setting

The FAA has created guidelines regarding the compatibility of land uses with various aircraft noise levels measured using the DNL metric. These guidelines are defined in Appendix A to 14 C.F.R. Part 150. The land use compatibility table is reproduced in **Table 4-6**. These guidelines show the compatibility parameters for residential, public (schools, churches, nursing homes, hospitals, and libraries), commercial, institutional, and recreational land uses. All land uses exposed to noise levels below the DNL 65 dB noise contour are generally considered compatible with airport operations.

Table 4-6
LAND USE COMPATIBILITY GUIDELINES – 14 C.F.R. PART 150

	YEARLY DAY-NIGHT AVERAGE SOUND LEVEL (DNL) IN DECIBELS					
LAND USE	**BELOW 65**	**65-70**	**70-75**	**75-80**	**80-85**	**OVER 85**
RESIDENTIAL						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
PUBLIC USE						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
COMMERCIAL USE						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
MANUFACTURING AND PRODUCTION						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
RECREATIONAL						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Table 4-6, *Continued*
LAND USE COMPATIBILITY GUIDELINES - 14 C.F.R. PART 150

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
(2) Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
(4) Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal level is low.
(5) Land use compatible provided special sound reinforcement systems are installed.
(6) Residential buildings require an NLR of 25.
(7) Residential buildings require an NLR of 30.
(8) Residential buildings not permitted.

Notes:
1. The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.
2. SLUCM=Standard Land Use Coding Manual.
3. Y (Yes)=Land Use and related structures compatible without restrictions.
4. N (No)=Land Use and related structures are not compatible and should be prohibited.
5. NLR=Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
6. 25, 30, or 35=Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.

Source: 14 C.F.R. § 150 *Airport Noise Compatibility Planning*, Appendix A, Table 1.

Affected Environment

There are no public schools, churches, nursing homes, hospitals, or libraries within any of the contours. Summaries of the residential population and housing units affected by noise levels exceeding 65 DNL for the Existing Noise Exposure Contours are provided in **Table 4-7**. For more information on the noise exposure contours see **Appendix F, *Noise*.**

Table 4-7
EXISTING INCOMPATIBILITIES

EXISTING CONDITIONS	65-70 DNL	70-75 DNL	75+DNL	TOTAL
RESIDENCES				
Mitigated[1]	**15**	**0**	**0**	**15**
Unmitigated	**7**	**0**	**0**	**7**
Previously Offered but Refused	5	0	0	5
Never Offered Mitigation[2]	2	0	0	2
Total	**22**	**0**	**0**	**22**
ESTIMATED POPULATION				
Mitigated[1]	**42**	**0**	**0**	**42**
Unmitigated	**21**	**0**	**0**	**21**
Previously Offered but Refused	15	0	0	**15**
Never Offered Mitigation[2]	6	0	0	**6**
Total	**63**	**0**	**0**	**63**
NOISE-SENSITIVE FACILITIES (NSF)				
Schools	0	0	0	**0**
Churches	0	0	0	**0**
Nursing Homes	0	0	0	**0**
Hospitals	0	0	0	**0**
Libraries	0	0	0	**0**

1 Residences were mitigated through previous Part 150 Studies conducted by KCAB
2 Residence was either built after Part 150 mitigation program, never in the 65 DNL of an official Noise Exposure Map, or an ineligible property.

Notes: Population numbers are estimates based on the 2010 U.S. Census average household size per number of housing units.

Source: Landrum & Brown, 2018.

4.2.10 SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S HEALTH AND SAFETY RISKS

4.2.10.1 Socioeconomics

Socioeconomics is an umbrella term used to describe aspects of a project that are either social or economic in nature. A socioeconomic analysis evaluates how elements of the human environment such as population, employment, housing, and public services might be affected by the Proposed Action and alternatives.

Regulatory Setting

Section 1508.14 of the CEQ Regulations requires all federal agencies to conduct a socioeconomic analysis in the event that economic or social and natural environmental effects are interrelated as a result of the proposed action and alternative(s). This would include an evaluation of how elements of the human environment such as population, employment, housing, and public services might be affected by the proposed action and alternative(s).

The Uniform Relocation Assistance and Real Property Acquisitions Policy Act of 1970, 42 U.S.C. § 61 *et seq*., and implementing regulations found at 49 C.F.R. Part 24, provides standards if acquisition of real property or displacement of people would occur as a result of implementing the proposed action.

Affected Environment

Economic Activity and Income

CVG functions as the largest airport in the Greater Cincinnati and Northern Kentucky area and is the eighth largest cargo airport in the U.S. by tonnage. The economic activity that CVG generates is a major contributor to the region's economy, contributing nearly $4.4 billion in annual total economic impact to the region.[16]

Employment

In addition to serving the Metropolitan Statistic Area (MSA) as a hub for passenger air transportation and air cargo shipping, CVG contributes to the regional economy through its operations and the operations of supporting industries. Employers who maintain staff on-site have nearly 13,500 workers, including airlines, tenants, other businesses and the KCAB.[17] Additionally, more than 31,100 jobs in the region are directly or indirectly related to the Airport and its services. Those workers earn $1.3 billion in wages and salaries. CVG's state and local tax contribution is approximately $25 million.

[16] https://www.cvgairport.com/docs/default-source/stats/cvg-fact-sheet.pdf?sfvrsn=4, accessed February 8, 2018.
[17] Ibid.

Population and Housing

The GSA contains 33 census block groups that surround the Airport—32 in Boone County and one in Kenton County. Demographic data of the population within the GSA is shown in **Table 4-8**.

Table 4-8
GENERAL STUDY AREA DEMOGRAPHIC DATA

CATEGORY	VALUE
Population & Housing	
Total Population	67,700
Total Housing Units	24,913
Age Groups	
4 years old and under	6.9%
5 – 17 years old	16.2%
18 – 64 years old	63.5%
65 years old and older	13.4%
Race	
White alone	91.5%
Black or African American alone	3.4%
American Indian and Alaska Native alone	0.4%
Asian alone	1.2%
Some other race alone	0.9%
Two or more races	2.0%
Ethnicity	
Hispanic or Latino	4.6%
Not Hispanic or Latino	95.4%
Poverty*	
Individuals living below poverty level	8.4%
Families living below poverty level	6.1%

* The HHS poverty guideline level in 2016 for a family/household of one was $11,880 and for a household/family of four was $24,300.[18]

Source: American Community Survey 2012-2016 5-Year Estimate[19]; Landrum & Brown analysis, 2018.

[18] 2014 Poverty Guidelines, U.S. Department of Health and human Services. Available on-line: https://aspe.hhs.gov/2014-poverty-guidelines. Accessed on August 28, 2017.

[19] American Community Survey 2010-2014 5-Year Estimate, U.S. Census Bureau. Available on-line: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml. Accessed August 2017.

The average household size, median household income, median family income, and per capita for each census tract block group within the GSA is shown in **Table 4-9**.

Table 4-9
GENERAL STUDY AREA DEMOGRAPHIC DATA BY CENSUS BLOCK GROUP

CENSUS TRACT	BLOCK GROUP	AVERAGE HOUSEHOLD SIZE	MEDIAN HOUSEHOLD INCOME	MEDIAN FAMILY INCOME*	PER CAPITA
642.00	1	2.85	$58,750	$63,359	$25,354
701.00	1	2.01	$31,864	$42,241	$21,862
701.00	2	3.19	$37,083	$63,173	$19,197
701.00	3	2.76	$50,313	$42,340	$20,594
701.00	4	2.28	$32,679	$26,146	$17,920
701.00	5	2.30	$40,476	$53,984	$21,885
702.00	1	1.67	$42,159	$53,828	$57,665
702.00	2	2.46	$56,172	$96,731	$28,473
702.00	3	2.93	$46,838	$62,672	$17,572
702.00	4	2.34	$51,271	$32,708	$22,103
702.00	5	1.91	$32,807	$50,966	$21,100
703.01	1	1.64	$42,098	$52,721	$23,543
703.05	1	2.40	$54,238	$67,461	$28,125
703.05	2	2.17	$71,548	$71,466	$42,184
703.05	3	1.92	$51,750	$66,458	$28,928
703.08	3	2.35	$73,703	$74,899	$32,728
703.11	1	2.51	$36,033	$42,619	$15,968
703.11	2	2.73	$48,587	$51,979	$22,393
703.12	1	3.03	$95,032	$29,612	$27,168
703.12	2	2.17	$45,563	$67,143	$24,190
703.13	1	2.78	$79,688	$85,568	$31,413
703.13	2	2.80	$86,641	$83,000	$33,701
703.14	1	3.07	$72,642	$76,250	$26,804
703.14	2	2.58	$67,083	$73,902	$30,088
704.01	2	2.71	$91,792	$99,024	$38,522
704.02	1	3.14	$82,692	$73,359	$27,295
704.02	2	2.41	$91,029	$89,934	$39,764
704.02	3	3.11	$74,922	$70,223	$26,176
704.02	4	3.27	$72,009	$85,833	$26,304
705.02	2	2.85	$55,119	$66,094	$25,108
705.03	1	2.14	$47,093	$56,523	$28,900
705.03	2	2.46	$51,392	$68,984	$27,335
705.04	2	2.94	$78,347	$85,238	$29,555

* American Community Survey 2010–2014 5-Year Estimate, most recent data available.

Source: American Community Survey 2012-2016 5-Year Estimate; Landrum & Brown analysis, 2018.

Public Services and Social Conditions

Residents of communities in the GSA have a wide range of public services available. Public services include such facilities as educational institutions, medical services, and emergency response services.

- Educational Institutions: Boone County is encompassed by two school districts, including the Boone County Unified School District and the Walton-Verona Independent School District. In the GSA, there are seven elementary schools, three middle schools, and three high schools within Boone County.[20,21]
- Medical Services: Boone County has one hospital, St. Elizabeth – Florence, which is located in the GSA. Kenton County has one hospital, St. Elizabeth – Covington, which is located approximately 11 miles east of the Airport.
- Emergency Response Services: Boone County is comprised of seven fire protection districts, including the fire protection districts of Belleview-McVille, Burlington, Florence, Point Pleasant, Union, and Walton. Between the seven fire protection districts, there are a total of 14 fire stations, including one located on Airport property.[22] Additionally, there are eight police departments within Boone County, including one located on Airport property. Furthermore, there are a total of 23 fire stations and 14 police departments within Kenton County.[23]

4.2.10.2 Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. *Fair treatment* means that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or policies. *Meaningful Involvement* means that:

- People have an opportunity to participate in decisions about activities that may affect their environment and/or health;
- The public's contribution can influence the regulatory agency's decision;
- Their concerns will be considered in the decision making process; and,
- The decision makers seek out and facilitate the involvement of those potentially affected.

20 About Boone County Schools, Boone County Schools. Available on-line: http://www.boone.k12.ky.us/administrativeDepartment.aspx?aid=18. Accessed on August, 2017.
21 Directory, Walton-Verona Independent Schools. Available on-line: http://www.wv.kyschools.us/cms/One.aspx?portalId=324341&pageId=760781. Accessed on August, 2017.
22 Boone County GIS. Available on-line: http://www.boonecountygis.com/. Accessed on August, 2017.
23 Kenton County GIS. Available on-line: https://linkgis.org/mapviewer/index.html?slayer=0&exprnum=1&esearch=&submit=Open+the+Map Accessed May 17, 2017.

Regulatory Setting

Title VI of the Civil Rights Act of 1964 as amended, 42 U.S.C. §§ 2000d – 2000d-7, states that, "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance." Title VI expressly prohibits any discrimination in federally funded programs and projects, including those sponsored by the FAA.

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, requires all federal agencies to address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

USDOT Order 5610.2(a) defines a minority population as any readily identifiable group of minority persons living in geographic proximity to a proposed USDOT program, policy or activity including, if circumstances warrant, geographically dispersed or transient persons (such as migrant workers or Native Americans) who will be similarly affected by the proposed program, policy, or activity.

Requirements for meaningful public involvement by minority and low-income populations are addressed in Paragraph 2-5.2.b of FAA Order 1050.1F. As stated in the Order, the FAA must provide for meaningful public involvement by minority and low-income populations. In accordance with USDOT Order 5610.2(a), this public involvement must provide an opportunity for minority and low income populations to provide input on the analysis, including demographic analysis that identifies and addresses potential impacts on these populations that may be disproportionately high and adverse. The public involvement process can also provide information on subsistence patterns of consumption of fish, vegetation, or wildlife. This information should be disclosed to potentially affected populations for proposed actions and alternative(s) that are likely to have a substantial effect and for Comprehensive Environmental Response, Compensation, and Liability Act sites.

Affected Environment

The Census Bureau's American Community Survey (ACS) 2012-2016 5-Year Estimate was used to identify environmental justice populations within the project's GSA. The environmental justice populations include minority and/or low-income populations. Minority population refers to any readily identifiable group of minority persons (Black, Hispanic or Latino, Asian American, American Indian, Alaskan Native, Native Hawaiian, other Pacific Islander, or other non-White populations). Low income is defined as a person whose median household income is at or below the Department of Health and Human Services poverty guidelines.

The AEDT Version 2d used the GSA to identify census block groups composed of 50 percent or more minority populations (composed primarily of Hispanic or Latino population and American Indian populations) and/or 50 percent or more low income populations. **Table 4-10** lists the percent low-income and percent minority for the census block groups in the GSA.

None of the census block groups exceeded the 50 percent threshold for poverty level. Additionally, none of the census block groups exceeded the 50 percent threshold for minority populations. Therefore, this analysis did not identify environmental justice populations located within the GSA.

Table 4-10
GENERAL STUDY AREA DEMOGRAPHIC DATA BY CENSUS BLOCK GROUP

CENSUS TRACT	BLOCK GROUP	PERCENT OF POPULATION LIVING BELOW POVERTY LEVEL	PERCENT MINORITY POPULATION	ENVIRONMENTAL JUSTICE POPULATION PRESENT?
642.00	1	11.9	11.7	No
701.00	1	5.3	19.7	No
701.00	2	26.3	5.1	No
701.00	3	4.9	5.8	No
701.00	4	15.8	22.8	No
701.00	5	11.1	10.6	No
702.00	1	13.6	9.1	No
702.00	2	6.3	25.0	No
702.00	3	12.8	25.9	No
702.00	4	7.8	7.8	No
702.00	5	34.0	22.9	No
703.01	1	16.4	16.3	No
703.05	1	8.9	20.1	No
703.05	2	3.7	2.2	No
703.05	3	8.5	0.0	No
703.08	3	4.5	9.1	No
703.11	1	37.6	1.8	No
703.11	2	17.2	17.1	No
703.12	1	5.0	1.3	No
703.12	2	8.5	24.5	No
703.13	1	1.4	8.7	No
703.13	2	2.1	5.4	No
703.14	1	6.0	12.1	No
703.14	2	3.5	12.7	No
704.01	2	1.7	7.5	No
704.02	1	0.0	18.3	No
704.02	2	0.5	2.1	No
704.02	3	8.4	13.4	No
704.02	4	1.4	0.0	No
705.02	2	8.2	2.3	No
705.03	1	3.4	17.3	No
705.03	2	7.3	3.2	No
705.04	2	11.1	14.3	No

Source: American Community Survey 2012-2016 5-Year Estimate; AEDT 2d; Landrum & Brown analysis, 2018.

4.2.10.3 Children's Environmental Health and Safety Risks

Regulatory Setting

Pursuant to EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, federal agencies are directed to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. Environmental health risks and safety risks include risks to health or to safety that are attributable to products or substances that a child is likely to come in contact with or ingest, such as air, food, drinking water, recreational waters, soil, or products they might use or be exposed to.

Affected Environment

Schools and day care centers are locations where the potential for a child to be exposed to environmental health risks is increased because a higher concentration of children are located in one place during the day. Currently the following schools and day care centers are within the GSA:

- Burlington Elementary School
- Immaculate Heart of Mary School
- Stephens Elementary School
- Conner Middle School
- Goodridge Elementary School
- Boone County Area Vocational School
- Conner High School
- A.M. Yealey Elementary School
- Ockerman Elementary School
- Ockerman Middle School
- St. Paul School
- Heritage Assembly School
- R.A. Jones Middle School
- Collins Elementary School
- Florence Elementary School
- Boone County High School
- Mary Queen of Heaven School
- St. Henry's High School
- Penguin Playschool
- Discover Zone Child Care
- Rainbow Child Care Center
- Y-Kids Child Care
- Crossroads Preschool
- Christ United Methodist Kids Day Out

However, as stated in Section 4.2.9, *Noise and Noise-Compatible Land Use*, there are no public schools, within any of the noise contours.

4.2.11 VISUAL EFFECTS

Regulatory Setting

FAA Order 1050.1F states that the Visual Effects environmental impacts category deals with the extent to which the proposed action would have the potential to either 1) produce light emissions that create annoyance or interfere with normal activities; or 2) affect the nature of the visual resources or visual character of the area, including the importance, uniqueness and aesthetic value of the affected visual resources, including by contrasting with, or detracting from, the visual resources and/or the visual character of the existing environment or blocking or obstructing the views of visual resources, including whether those resources would still be viewable from other locations.[24] Although there are no federal special purpose laws or requirements specific to light emissions and visual effects, there are special purpose laws and requirements that may be relevant. In addition to NEPA, laws protecting resources that may be affected by visual effects include sensitive wildlife species, Section 106 of the NHPA, Section 4(f) of the USDOT Act, and Section 6(f) of the LWCFA.

Affected Environment

Light Emissions

CVG is currently illuminated by various types of lighting on the airfield and landside facilities. Lighting that emanates from the airfield includes runway, apron, and navigational lighting such as, hold position lights, stop-bar lights, and runway and taxiway signage. Airfield lighting is located along taxiways and ramps for guidance during periods of low visibility, and to assist aircraft movement on the airfield. Aircraft lighting, such as landing lights, position and navigation lights, beacon lights, and vehicle lighting are other types of light sources on the airfield. Lights for landside facilities include buildings, roadways, and parking facilities. CVG is located in an urbanized area which is comprised of other development that is also lighted and contributes to the overall light emissions in the area.

Visual Resources / Visual Character

As previously discussed, the DSA is located on the southern edge of the Airport in a predominantly commercial area. The land uses immediately adjacent to the DSA are a mix of commercial uses and undeveloped Airport property. There is a residential area located south of the DSA on the south side of Aero Parkway and west of the DSA on the west side of Limaburg-Creek Road. The DSA features include a combination of grassed areas, streams, and undeveloped wooded areas.

[24] FAA, 2015, Order 1050.1F, *Environmental Impacts: Policies and Procedures*, Exhibit 4-1, page 4-10.

4.2.12 WATER RESOURCES

Regulatory Setting

Water resources are surface waters and groundwater that are vital to society; they are important in providing drinking water and in supporting recreation, transportation and commerce, industry, agriculture, and aquatic ecosystems. Surface water, groundwater, floodplains, and wetlands do not function as separate and isolated components of the watershed, but rather as a single, integrated natural system.

Federal Clean Water Act: The 1972 Federal Water Pollution Control Act, 33 U.S.C. § 1251 *et seq*., also known as the Clean Water Act (CWA), is intended to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.

The CWA establishes the basic structure for regulating the discharge of pollutants into waters of the U.S., including jurisdictional surface waters, through Section 404 permit and Section 401 certification processes as well as the Section 402 permit process. Section 401 of the CWA (33 U.S.C. § 1341) requires any federal license or permit applicant to obtain a water quality certification if any proposed project activity may result in a discharge of pollutants into waters of the United States This certification assures that the discharge would comply with the applicable effluent limitations and water quality standards. Section 301 of the CWA (33 U.S.C. § 1311) prohibits discharges to waters of the United States except with a permit. As a condition of the permit, application of the best practicable control technology currently available is required.

Section 402 establishes a framework for regulating stormwater discharges under the National Pollutant Discharge Elimination System (NPDES) to ensure water quality standards are attained. All discharges to waters of the Commonwealth require a permit through the Kentucky Pollutant Discharge Elimination System (KPDES). If the proposed action or alternative(s) has the potential to discharge pollutants into waters of the United States through a point source, a KPDES permit will likely need to be obtained.

Safe Drinking Water Act (SDWA): The SDWA, 42 U.S.C. §§ 300(f) – 300j-26, was established to protect the health of the public by ensuring that a safe drinking water supply exists. The Sole Source Aquifer Program, authorized by Section 1424(e) of the SDWA, requires the EPA to review any federally financially-assisted projects that have the potential to contaminate a sole source aquifer or its recharge area. The Kentucky Energy and Environment Cabinet, Division of Water works to ensure public health protection through primacy of SDWA and the provision of potable water. Potable water is defined as finished water, after treatment, that is safe and satisfactory for drinking and cooking. Public water and water distribution systems in Kentucky are regulated by the Kentucky Energy and Environment Cabinet, Division of Water (DOW).

If the potential exists for contamination of an aquifer designated by the EPA as a sole or principal drinking water resource within the project area, the FAA is required to consult with the EPA regional office, tribal, state, or local officials as required by Section 1424(e) of the SDWA.

Fish and Wildlife Coordination Act of 1980: If a proposed action would impound, divert, drain, control, or otherwise modify the waters of any stream or other body of water, the Fish and Wildlife Coordination Act, 16 U.S.C. §§ 661 – 667d, is applicable, unless the project is for the impoundment of water covering an area of less than ten acres. The Fish and Wildlife Coordination Act requires the FAA to consult with the USFWS and the applicable state agency to identify means to prevent loss or damage to wildlife resources resulting from a proposed action. Separate from, but related to this Act is the Magnuson-Stevens Fishery Conservation and Management Act, which governs United States marine fisheries management. The act mandates the identification of Essential Fish Habitat for managed species, as well as measures to conserve and enhance the habitat necessary for fish to carry out their life cycles.

EO 11990, Protection of Wetlands and DOT Order 5660.1A, Preservation of the Nation's Wetlands: EO 11990 states federal actions must "... avoid to the extent possible the long and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." EO 11990 states that agencies shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands. Agencies are also responsible for preserving and enhancing the natural and beneficial values of wetlands.

USDOT has implemented EO 11990 through policies and procedures documented in DOT Order 5660.1A, Preservation of the Nation's Wetlands. USDOT Order 5660.1A requires that transportation facilities and projects should be planned, constructed, and operated to assure the protection, preservation, and enhancement of the nation's wetlands to the fullest extent practicable, and establishes procedures for implementation of the policy.

EO 11988, Floodplain Management and DOT Order 5650.2, Floodplain Management and Protection: EO 11988 directs federal agencies to take actions to reduce the risk of flood loss, minimize flood impacts on human safety, health and welfare, and restore and preserve floodplain natural and beneficial values. To do this, the Order bans approving activities in a floodplain unless:

(1) No practicable alternative exists; and

(2) Measures to minimize adverse impacts to the floodplain's natural and beneficial values are included.

USDOT Order 5650.2 contains policies and procedures for carrying out EO 11988. Based on USDOT Order 5650.2, if an action includes development within a floodplain, the analysis shall indicate if the encroachment would be a "significant encroachment," that is, whether it would cause one or more of the following impacts:

(1) The action would have a considerable probability of loss of human life;

(2) The action would likely have substantial encroachment- associated costs or extent, including interrupting aircraft service or loss of a vital transportation facility (e.g., flooding of a runway or taxiway; important navigational aid out of service due to flooding, etc.); or

(3) The action would cause notable adverse impacts on natural and beneficial floodplain values.

Moreover, the National Flood Insurance Act requires any community participating in the National Flood Insurance Program (NFIP), a voluntary floodplain management program, follow the community's Federal Emergency Management Agency (FEMA) approved floodplain management regulations. FEMA coordinates with the Kentucky Energy and Environment Cabinet, Division of Water (DOW) on the designation of floodplain boundaries within the

Commonwealth of Kentucky. DOW delegates the responsibility of adopting floodplain regulations to the Boone County, which regulates development within the floodway and, through an administrative process, concurs with the latest FEMA map revisions. Chapter 151 of the Kentucky Revised Statutes is the state statute that addresses the development of floodplain areas.

Affected Environment

The Airport lies within the Ohio River Drainage Basin. Surface drainage flows from the Airport by numerous conveyances, such as ditches, creeks, and streams, and eventually enters the Ohio River or one of its impoundments. The majority of the developed Airport is located at a topographical high point, split between outfalls of two watersheds. Runoff from the northern portion of the Airport discharges from a detention basin into Elijah Creek, while the southern portion of the Airport discharges from the Southwest Detention Facility to Gunpowder Creek.

4.2.12.1 Wetlands and Streams

Wetland and stream delineations occurred in August and October 2015, September 2016, and February and March 2017. Linear footage of streams within the DSA consisted of 12,698 feet of ephemeral streams, 44,249 feet of intermittent streams, and 7,296 feet of perennial streams. The delineated wetlands amounted to 11.24 acres of palustrine emergent wetland, 0.08 acres of scrub-shrub wetlands, 0.51 acres of palustrine forested wetland, 0.27 acre of open water/wetland areas, and 1.48 acres of ponds. **Table 4-11** present a summary of the wetlands and streams located within the DSA. The wetlands and streams are shown on **Exhibit 4-6, *Wetlands and Streams***. More detailed information regarding the wetlands and streams is located in **Appendix G, *Water Resources*.**

Table 4-11
STREAMS AND WETLANDS LOCATED WITHIN THE DETAILED STUDY AREA

STREAMS		
	Linear Feet	**Acreage**
Ephemeral	12,698	0.68
Intermittent	43,849	4.74
Intermittent - Culverted	400	0.08
Perennial	4,869	1.95
Perennial - Culverted	2,427	0.58
Total	**64,243**	**8.03**
WETLANDS		
	Linear Feet	**Acreage**
Palustrine Emergent Wetland (PEM)	NA	11.24
Palustrine Scrub-Shrub Wetland (PSS)	NA	0.08
Palustrine Forested Wetland (PFO)	NA	0.51
Palustrine Unconsolidated Bottom Wetland (PUB)	NA	0.27
Pond	NA	1.48
Total	**NA**	**13.58**

Notes: PEM = Palustrine Emergent Wetland, PSS = Palustrine Scrub-Shrub Wetland, PFO = Palustrine Forested Wetland, PUB = Palustrine Unconsolidated Bottom Wetland

Source: Wetland and Stream Delineation Report Kenton County Airport Board CVG Air Cargo Hub Development Project ACOE Louisville District ID No. LRL-2018-00268 Boone County, Kentucky

Air Cargo Facility Environmental Assessment

Wetlands and Streams

EXHIBIT: **4-6**

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4.2.12.2 Floodplains

The 100-year flood has been adopted by FEMA as the base flood for floodplain management purposes. Floodplains are valued for their natural flood and erosion control, enhancement of biological productivity, and socioeconomic benefits and functions. The Flood Insurance Rate Maps (FIRM) prepared by FEMA were used to establish the boundary of the 100-year floodplain in the area to be either directly or indirectly affected by the Proposed Action. The DSA is depicted on FEMA Flood Insurance Rate Map (FIRM) Panel 120 of 325, Map Number: 21015C0120C as reproduced in **Exhibit 4-7, *Floodplains***. The southeast corner of the DSA contains 11 acres of high flood risk subject to inundation by the one percent annual-chance flood event.

4.2.12.3 Surface Waters

The main sources of hydrology to the DSA are precipitation, surface runoff from adjacent properties, and various streams (see Exhibit 4-6). In general, surface water is collected and migrated across the DSA in an east to west direction.

The two primary sources of drinking water in Kenton County are the Ohio River and the Licking River. Water is pumped from the rivers to one of three treatment plants where the water is cleaned, tested, and pumped into the distribution system. The Ohio River is located to the north and west of CVG and several tributaries flow from CVG property into the Ohio River. Topography within the DSA is gently sloping, and located within the Gunpowder Creek watershed (HUC 05090203). The DOW defines Gunpowder Creek as a warm-water aquatic habitat. The streams are not identified as a Special Resource Water. In Kentucky, stormwater discharges are regulated by the Kentucky Pollutant Discharge Elimination System (KPDES) as administered by the DOW. CVG currently holds an individual KPDES Permit (Permit No. KY0083864) for industrial activity.

4.2.12.4 Groundwater

The geology of the DSA is predominantly limestone which yields 100 to 500 gallons of water per day from wells in valleys or on broad ridges, but almost no water from drilled wells on narrow ridges or hilltops.[25] There are no public or private drinking water wells or wells used for agricultural purposes within a half-mile radius of the DSA.[26]

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[25] Kentucky Geological Survey; Groundwater Resources of Boone County, Kentucky; 2004

[26] Kentucky Geological Survey; Water Well Records Search Results, Kentucky Groundwater Data Repository; Online at: http://kgs.uky.edu/kgsweb/datasearching/water/waterwellsearch.asp; Accessed: February 22, 2017

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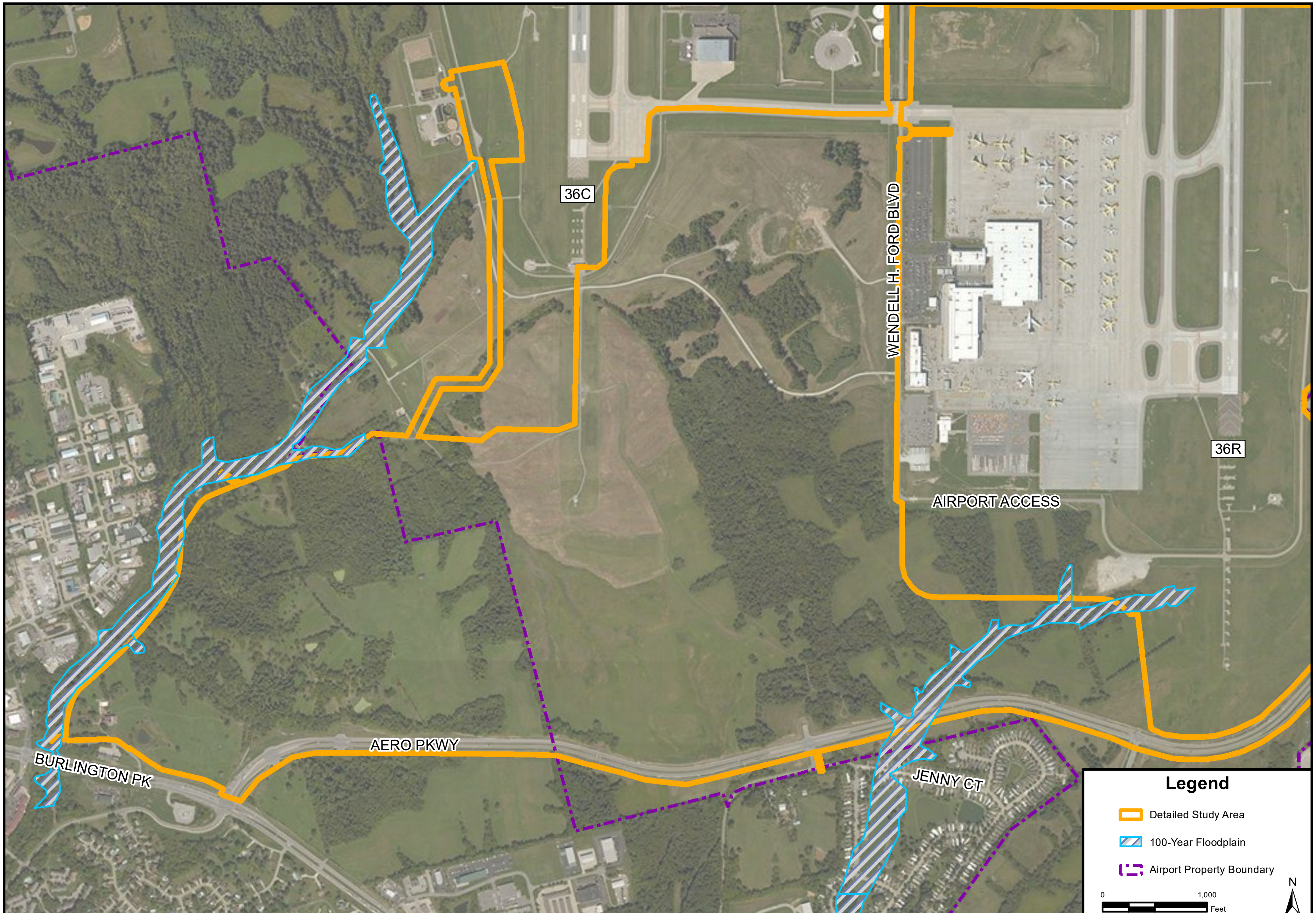

Air Cargo Facility Environmental Assessment

Floodplains

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Chapter Five

CHAPTER FIVE
ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

This chapter presents the assessment of potential environmental impacts resulting from implementation of the Proposed Action and the No Action. The analysis presented in this chapter includes considerations of direct, indirect, and cumulative impacts and their significance and possible conflicts with the objectives of federal, regional, state, tribal, and local land use plans, policies, and controls for the area concerned. This chapter also presents a discussion of mitigation measures, where applicable, to avoid and minimize potential adverse environmental impacts of the Proposed Action.

5.1 ANALYSIS YEARS

The following analysis discloses the impacts for the construction of the entire air cargo facility in 2021 to disclose maximum environmental impacts due to this project. The year 2021 is used as a basis for analysis because 2021 is the projected implementation year of the Proposed Action. In addition, 2026 is used as a basis for analysis, for air quality, climate, and noise and noise-compatible land use, because it represents a condition five years beyond the opening year where the facility would experience an increase in operations.

5.2 ENVIRONMENTAL RESOURCES NOT AFFECTED

As discussed in Chapter Four, the following environmental resources are not present within the project area and would not be affected by the Proposed Action or No Action:

- Coastal resources: There are no coastal zones in the state of Kentucky.
- Farmlands: The Proposed Action does not include the conversion of any important farmlands to non-agricultural use.
- Wild and scenic rivers: A review of the Wild and Scenic Rivers System list[1] indicated that there are no designated State or National Scenic Rivers within Boone County. The nearest Wild and Scenic River to the Cincinnati/Northern Kentucky International Airport (CVG or Airport) is the Little Miami River located northeast in Ohio, approximately 20 miles from the Airport.

5.3 ENVIRONMENTAL RESOURCES POTENTIALLY AFFECTED

The remaining portion of this chapter is focused on those environmental resources that may potentially be affected by the Proposed Action or No Action. These resources are evaluated in detail in this chapter of the EA. Construction impacts are analyzed within each applicable environmental resource category. This chapter of the EA is organized to address the following topics:

- Section 5.4: Air Quality
- Section 5.5: Biological Resources

[1] *Department of the Interior, 2018, National Wild and Scenic Rivers System. Available on-line at: https://www.rivers.gov/kentucky.php Accessed June 2018.*

- Section 5.6: Climate
- Section 5.7: Department of Transportation (DOT) Act: Section 4(f) Resources
- Section 5.8: Hazardous Materials, Solid Waste, and Pollution Prevention
- Section 5.9: Historical, Architectural, Archeological, and Cultural Resources
- Section 5.10: Land Use
- Section 5.11: Natural Resources and Energy Supply
- Section 5.12: Noise and Noise-Compatible Land Use
- Section 5.13: Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks
- Section 5.14: Visual Effects
- Section 5.15: Water Resources
- Section 5.16: Cumulative Impacts

5.4 AIR QUALITY

This section presents the analysis of potential for significant adverse air quality impacts resulting from the No Action and the Proposed Action. The analysis of significant adverse air quality impacts was prepared using the latest version of the Aviation Environmental Design Tool (AEDT), Version 2d to develop emissions inventories.

As discussed in Section 4.2.1, Affected Environment, Boone County operates under a maintenance plan for ozone. Therefore, General Conformity regulations apply. The General Conformity Rule under the Clean Air Act of 1970 (CAA) establishes minimum values, referred to as the *de minimis* thresholds, for the criteria and precursor pollutants[2] for the purpose of:

- Identifying federal actions with project-related emissions that are clearly negligible (*de minimis*);
- Avoiding unreasonable administrative burdens on the sponsoring agency, and;
- Focusing efforts on key actions that would have potential for significant air quality impacts.

The *de minimis* rates vary depending on the severity of the nonattainment area and further depend on whether the general federal action is located inside an ozone transport region.[3] EPA defines *de minimis* as emissions that are so low as to be considered insignificant and negligible. An evaluation relative to the General Conformity Rule (the Rule), published under 40 Code of Federal Regulations (C.F.R.) Part 93,[4] is required only for general federal actions that would cause emissions of the criteria or precursor pollutants, and are:

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2 Precursor pollutants are pollutants that are involved in the chemical reactions that form the resultant pollutant. Ozone precursor pollutants are NO_x and VOC, whereas $PM_{2.5}$ precursor pollutants include NO_x, VOC, SO_2, and ammonia (NH_3).

3 The ozone transport region is a single transport region for ozone (within the meaning of Section 176A(a) of the CAA), comprised of the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the Consolidated Metropolitan Statistical Area that includes the District of Columbia, as given at Section 184 of the CAA.

4 EPA, 40 C.F.R. Part 93, Subpart B, *Determining Conformity of General Federal Actions to State or Federal Implementation Plans*, July 1, 2006.

- Federally-funded or federally-approved;
- Not a highway or transit project[5];
- Not identified as an exempt project[6] under the CAA;
- Not a project identified on the approving federal agency's Presumed to Conform list;[7] and,
- Located within a nonattainment or maintenance area.

When the action requires evaluation under the General Conformity regulations, the net total direct and indirect emissions due to the federal action may not equal or exceed the relevant *de minimis* thresholds unless:

- An analytical demonstration is provided that shows the emissions would not exceed the National Ambient Air Quality Standards (NAAQS); or
- Net emissions are accounted for in the State Implementation Plan (SIP) planning emissions budget; or
- Net emissions are otherwise accounted for by applying a solution prescribed under 40 C.F.R. § 93.158.

The federal *de minimis* thresholds established under the CAA are provided in **Table 5-1**. Conformity to the *de minimis* thresholds is relevant only with regard to those pollutants and the precursor pollutants for which the area is nonattainment or maintenance. Notably, there are no *de minimis* thresholds to which a federal agency would compare ozone emissions. This is because ozone is not directly emitted from a source. Rather, ozone is formed through photochemical reactions involving emissions of the precursor pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOC), in the presence of abundant sunlight and heat. Therefore, emissions of ozone on a project level are evaluated based on the rate of emissions of the ozone precursor pollutants, NO_x and VOC. The Airport is located within Boone County, Kentucky, which has been designated as marginal nonattainment for ozone. As a result, conformity to the *de minimis* threshold is relevant only with regard to the ozone precursor pollutants therefore only NO_x and VOC emissions are presented and evaluated for the No Action and Proposed Action. **Appendix B, *Air Quality*** presents all of the pollutantsemissions for both the No Action and Proposed Action.

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5 Highway and transit projects are defined under Title 23 United States Code and the Federal Transit Act.

6 The Proposed Project is not listed as an action exempt from a conformity determination pursuant to 40 C.F.R. § 93.153(c). An exempt project is one that the EPA has determined would clearly have no impact on air quality at the facility, and any net increase in emissions would be so small as to be considered negligible.

7 The provisions of the CAA allow a federal agency to submit a list of actions demonstrated to have low emissions that would have no potential to cause an exceedance of the NAAQS and are presumed to conform to the CAA conformity regulations. This list would be referred to as the "Presumed to Conform" list. The FAA Presumed to Conform list was published in the Federal Register on February 12, 2007 (72 FR 6641-6656) and includes airport projects that would not require evaluation under the General Conformity regulations.

If the General Conformity evaluation for this air quality assessment were to show that any of the applicable thresholds were equaled or exceeded due to the Proposed Action, more detailed analysis to demonstrate confor mity would be required. This is referred to as a General Conformity Determination.[8] Conversely, if the General Conformity evaluation were to show that none of the relevant thresholds were equaled or exceeded, the Proposed Action would be presumed to conform to the applicable SIPs and no further analysis would be required under the CAA. Appendix B presents the inputs and methodology used to prepare the inventory for this EA.

Table 5-1
DE MINIMIS THRESHOLDS

CRITERIA AND PRECURSOR POLLUTANTS	TYPE AND SEVERITY OF NONATTAINMENT AREA	TONS PER YEAR THRESHOLD
Ozone (VOC or NO_x)[1]	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other areas outside an ozone transport region	100
Ozone (NO_x)[1]	Marginal and moderate nonattainment inside an ozone transport regions (OTR)[2]	100
	Maintenance	100
Ozone (VOC)[1]	Marginal and moderate nonattainment inside an ozone transport region[2]	50
	Maintenance within an ozone transport region[2]	50
	Maintenance outside an ozone transport region[2]	100
Carbon monoxide (CO)	All nonattainment & maintenance	100
Sulfur dioxide (SO_2)	All nonattainment & maintenance	100
Nitrogen dioxide (NO_2)	All nonattainment & maintenance	100
Coarse particulate matter (PM_{10})	Serious nonattainment	70
	Moderate nonattainment and maintenance	100
Fine particulate matter ($PM_{2.5}$) (VOC, NO_x, NH_3, and SO_x)[3]	All nonattainment and maintenance	100
Lead (Pb)	All nonattainment and maintenance	25

1 The rate of increase of ozone emi ssions is not evaluated for a project-level environmental review because the formation of ozone occurs on a regi onal level and is the result of the photochemical reaction of NO_x and VOC in the presence of abundant sunlight and heat. Therefore, EPA considers the increasing rates of NO_x and VOC emissions to refl ect the likelihood of ozone formation on a project level.

2 An OTR is a single transport region for ozone, comprised of the states of Co nnecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the Consolidated Metropolitan Statistical Area that includes the District of Columbia.

3 For the purposes of General Conformity applicability, VOC's and NH_3 emissions are only considered $PM_{2.5}$ precursors in nonattainment areas where ei ther a State or EPA has made a fi nding that the pollutants significantly contribute to the $PM_{2.5}$ problem in the area. In addition, NO_X emissions are always considered a $PM_{2.5}$ precursor unless the State and EPA make a finding that NO_X emissions from sources in the State do not significantly contribute to $PM_{2.5}$ in the area. Refer to 74 FR 17003, April 5, 2006.

Sources: 40 C.F.R. § 93.153(b)(1) & (2).

8 40 C.F.R. § 93.153.

5.4.1 NO ACTION

5.4.1.1 Future (2021) No Action

The operational emissions inventory for the Future (2021) No Action is shown in **Table 5-2**.

Table 5-2
OPERATIONAL EMISSIONS INVENTORY – FUTURE (2021) NO ACTION

SOURCE	ANNUAL EMISSIONS (SHORT TONS PER YEAR)	
	VOC	NO_x
Aircraft Takeoffs and Landings	8.2	200.7
APUs	0.2	5.3
Aircraft Taxiing	17.2	13.5
GSE	30.1	100.1
Stationary Sources	0.4	7.1
Ground Access Vehicles (GAVs)	3.3	10.3
2021 No Action - Operational Total	***59.4***	***337.0***

Note: Operational activities were modeled under the assumpti on that the devel opment was operational during 365 days in 2021 to accoun t for the maxi mum annual operational emissions.
Because conformity to the *de minimis* threshold for Boone County is relevant only with regard to the ozone precursor pollutants, only NO_x and VOC emissions are presented and evaluated in this report.

Source: Landrum & Brown analysis, 2018

5.4.1.2 Future (2026) No Action

The operational emissions inventory for the Future (2026) No Action is shown in **Table 5-3**.

Table 5-3
OPERATIONAL EMISSIONS INVENTORY – FUTURE (2026) NO ACTION

SOURCE	ANNUAL EMISSIONS (SHORT TONS PER YEAR)	
	VOC	NO_x
Aircraft Takeoffs and Landings	14.8	354.3
APUs	0.3	10.0
Aircraft Taxiing	21.6	22.3
GSE	54.3	122.4
Stationary Sources	0.4	7.1
GAVs	4.9	15.1
2026 No Action - Operational Total	***96.3***	***531.1***

Note: Operational activities were modeled under the assumpti on that the devel opment was operational during 365 days in 2021 to accoun t for the maxi mum annual operational emissions.
Because conformity to the *de minimis* threshold for Boone County is relevant only with regard to the ozone precursor pollutants, only NO_x and VOC emissions are presented and evaluated in this report.

Source: Landrum & Brown analysis, 2018

5.4.2 PROPOSED ACTION

5.4.2.1 Future (2021) Proposed Action

The operational emissions inventory for the Future (2021) Proposed Action is shown in **Table 5-4**.

Table 5-4
OPERATIONAL EMISSIONS INVENTORY – FUTURE (2021) PROPOSED ACTION

SOURCE	ANNUAL EMISSIONS (SHORT TONS PER YEAR)	
	VOC	NO_x
Aircraft Takeoffs and Landings	8.2	200.7
APUs	0.2	5.3
Aircraft Taxiing	15.2	12.2
GSE	24.1	80.1
Stationary Sources	1.8	32.5
GAVs	3.7	8.8
2021 Proposed Action - Operational Total	***53.2***	***339.6***

Note: Operational activities were modeled under the assumpti on that the devel opment was operational during 365 days in 2026 to accoun t for the maxi mum annual operational emissions.
Because conformity to the *de minimis* threshold for Boone County is relevant only with regard to the ozone precursor pollutants, only NO_x and VOC emissions are presented and evaluated in this report.

Source: Landrum & Brown analysis, 2018

5.4.2.2 Future (2026) Proposed Action

The operational emissions inventory for the Future (2026) Proposed Action is shown in **Table 5-5**.

Table 5-5
OPERATIONAL EMISSIONS INVENTORY – FUTURE (2026) PROPOSED ACTION

SOURCE	ANNUAL EMISSIONS (SHORT TONS PER YEAR)	
	VOC	NO_x
Aircraft Takeoffs and Landings	16.7	404.2
APUs	0.4	11.3
Aircraft Taxiing	24.7	26.0
GSE	48.9	110.1
Stationary Sources	1.8	32.5
GAVs	6.0	13.2
2026 Proposed Action - Operational Total	***98.5***	***597.2***

Note: Operational activities were modeled under the assumpti on that the devel opment was operational during 365 days in 2026 to accoun t for the maxi mum annual operational emissions.
Because conformity to the *de minimis* threshold for Boone County is relevant only with regard to the ozone precursor pollutants, only NO_x and VOC emissions are presented and evaluated in this report.

Source: Landrum & Brown analysis, 2018

5.4.3 TOTAL EMISSIONS

The emissions inventories prepared for the Proposed Action were compared to the emissions inventories prepared for the No Action of the same future year to disclose the potential increase in emissions caused by the Proposed Action. The comparison of the emission inventories, which included an inventory of construction and operational emissions, was used for the evaluation of General Conformity as required under the CAA (including the 1990 Amendments). Because conformity to the *de minimis* threshold is relevant only with regard to the ozone precursor pollutants, only NO_x and VOC emissions are presented and evaluated in this report. **Table 5-6** evaluates the annual net impact of emissions that would be caused by the implementation Proposed Action. The annual net impact of emissions was calculated by subtracting the emissions of the No Action from those of the Proposed Action. As shown in Table 5-6 shows that neither of the relevant federal thresholds were equaled or exceeded for the Future (2021) Proposed Action or the Future (2026) Proposed Action.

In 2019 and 2020, there is an increase in net emissions due to construction activities associated with the Proposed Action. In 2021, there is an increase in net emissions of NOx and VOCs due to construction activities and usage of stationary sources associated with the Proposed Action. In 2026, there is an increase in net emissions of NO_x and VOCs due to increased aircraft activity and taxiing levels associated with the Proposed Action.

The air quality assessment demonstrates that the Proposed Action would not cause an increase in air emissions above the applicable *de minimis* thresholds. Therefore, the Proposed Action conforms to the SIP and the CAA and would not create any new violation of the NAAQS, delay the attainment of any NAAQS, nor increase the frequency or severity of any existing violations of the NAAQS. As such, no adverse impact on local or regional air quality is expected by construction of the Proposed Action. No further analysis or reporting is required under the CAA or National Environmental Policy Act (NEPA).

Table 5-6
TOTAL ANNUAL EMISSIONS

SOURCE	ANNUAL EMISSIONS (SHORT TONS)	
	VOC	NO_x
Federal de minimis Threshold	***100***	***100***
2019		
Construction - Proposed Action	23.7	28.8
2019 Proposed Action Subtotal	*23.7*	*28.8*
2019 Proposed Action Net Emissions	***23.7***	***28.8***
2020		
Construction - Proposed Action	57.7	62.0
2020 Proposed Action Subtotal	*57.7*	*62.0*
2020 Proposed Action Net Emissions	***57.7***	***62.0***
2021		
Aircraft Takeoffs and Landings - No Action	8.2	200.7
APUs – No Action	0.2	5.3
Aircraft Taxiing - No Action	17.2	13.5
GSE – No Action	30.1	100.1
Stationary Sources – No Action	0.4	7.1
GAVs - No Action	3.3	10.3
2021 No Action Subtotal	*59.4*	*337.0*
Aircraft Takeoffs and Landings - Proposed Action	8.2	200.7
APUs – Proposed Action	0.2	5.3
Aircraft Taxiing - Proposed Action	15.2	12.2
GSE – Proposed Action	24.1	80.1
Stationary Sources - Proposed Action	1.8	32.5
GAVs - Proposed Action	3.7	8.8
Construction - Proposed Action	9.7	13.3
2021 Proposed Action Subtotal	*62.9*	*352.9*
2021 Proposed Action Net Emissions	***3.4***	***15.8***
2026		
Aircraft Takeoffs and Landings - No Action	14.8	354.3
APUs – No Action	0.3	10.0
Aircraft Taxiing - No Action	21.6	22.3
GSE - No Action	54.3	122.4
Stationary Sources – No Action	0.4	7.1
GAVs - No Action	4.9	15.1
2026 No Action Subtotal	*96.3*	*531.1*
Aircraft Takeoffs and Landings - Proposed Action	16.7	404.2
APU - Proposed Action	0.4	11.3
Aircraft Taxiing - Proposed Action	24.7	26.0
GSE - Proposed Action	48.9	110.1
Stationary Sources - Proposed Action	1.8	32.5
GAVs - Proposed Action	6.0	13.2
2026 Proposed Action Subtotal	*98.5*	*597.2*
2026 Proposed Action Net Emissions	***2.1***	***66.1***

Note: Numbers may not sum due to rounding.
The net impact of emissions was calculated by subtracting the emissions of the No Action from those of the Proposed Action.

Source: Landrum & Brown analysis, 2018

5.4.4 MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES

The Proposed Action does not exceed the applicable thresholds of significance for any pollutants; therefore, no mitigation measures are required. However, the following minimization measures and best management practices are being provided to further minimize air quality impacts from the Proposed Action.

While the Proposed Action would not exceed the applicable threshold of significant for particulate matter, construction of the Proposed Action would result in a short-term increase of particulate matter (airborne fugitive dust) emissions from vehicle movement and soil excavation in and around the construction site. KCAB would ensure that measures would be taken to reduce fugitive dust emissions by adhering to guidelines included in FAA Advisory Circular (AC), *Standards for Specifying Construction of Airports*.[9] In addition, KCAB would follow 401 KAR 63:010 and 401 KAR 63:005 standards for construction of the Proposed Action.

Methods of controlling dust and other airborne particles will be implemented to the maximum possible extent and may include, but would not be limited to, the following:

- Exposing the minimum area of erodible earth;
- Applying temporary mulch with or without seeding;
- Using water sprinkler trucks;
- Using covered haul trucks;
- Reduce idling time on equipment;
- Using dust palliatives or penetration asphalt on haul roads; and,
- Using plastic sheet coverings.

In addition, when possible, the utilizing alternatively fueled equipment and reducing the idling time on equipment will be employed to minimize potential air quality impacts.

[9] FAA AC, 2014, *Standards for Specifying Construction of Airports*, Item P-156, *Temporary Air and Water Pollution, Soil Erosion, and Siltation Control*, AC 150/5370-10G.

5.5 BIOLOGICAL RESOURCES

This section presents the analysis of potential impacts to Endangered Species Act (ESA)-listed species as a result of the No Action and the Proposed Action.

5.5.1 NO ACTION

The No Action includes no physical development on the Airport. Therefore, the implementation of the No Action would have no effect on any federal or state threatened or endangered species, no effect on any biotic or critical habitat supporting a federal or state endangered or threatened species, and would not result in the development, conversion, or removal of any existing habitat.

5.5.2 PROPOSED ACTION

Federally Listed (ESA) Species

Section 7(a)(2) of the ESA requires federal agencies to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any federally-listed endangered or threatened species or result in the destruction or adverse modification of critical habitat.

Gray Bat

Gray bats inhabit caves year-round. In the winter, the gray bat hibernates in deep vertical caves. In the summer, they roost in caves scattered along rivers. No karst topography[10] occurs within the Detailed Study Area (DSA) and no caves were identified within or adjacent to the DSA during the habitat surveys on February 16, 2017, September 5 through 8, 2017, and May 22 through 25, 2018. The DSA does not contain the required habitat for the gray bat. Therefore, the FAA has determined the Proposed Action would have ***no effect*** on the gray bat.

Mussels

There are seven mussel species with the potential to be located within the DSA: Clubshell (*Pleurobema clava)*, Fanshell (*Cyprogenia stegaria)*, Orangefoot pimpleback (*Plethobasus cooperianus)*, Pink Mucket (*Lampsilis orbiculata)*, Ring pink (*Obovaria retusa)*, Rough pigtoe (*Pleurobema plenum)*, and Sheepnose (*Plethobasus cyphyus)*. However, the habitat requirements for the seven mussel species are not found within the DSA. Therefore, the FAA has determined the Proposed Action would have ***no effect*** on the seven mussel species.

Running Buffalo Clover

Based on habitat assessments, suitable habitat for running buffalo clover (RBC) was present within the DSA. As a result, RBC presence-absence surveys were completed during the flowering period of May 22 through May 25, 2018. No RBC was identified during the species-specific surveys. Therefore, the FAA has determined the Proposed Action would have ***no effect*** on the RBC species.

[10] A terrain, generally underlain by limestone or dolomite, in which the topography is chiefly formed by the dissolving of rock and which may be characterized by sinkholes, sinking streams, closed depressions, subterranean drainage, and caves.

Indiana bat

The DSA contains potential habitat for the endangered Indiana bat. No known hibernacula, swarming, or summer habitat is present in Boone County. It is anticipated indirect and direct impacts to the Indiana bat would occur with the Proposed Action. Indirect impacts include forested habitat removal, noise and vibration, night lighting, collision, and water quality. Direct impacts would occur due to forested habitat removal. Approximately 244 acres of forested habitat is present within the DSA, all of which would be removed prior to the construction of the air cargo facility. The removal of forested habitat in the DSA would likely have a negative impact on the Indiana bat commuting, roosting, and foraging habitat. Therefore, the FAA has determined the Proposed Action ***may affect, is likely to adversely affect*** the Indiana bat. Mitigation measures are identified in Section 5.5.3 for the Indiana bat.

Northern long-eared bat

Northern long-eared bat habitat closely resembles Indiana bat habitat; however, the northern long-eared bat appears to be more flexible in roost tree selection. As a result, the impacts to the northern long-eared bat are the same as those for the Indiana bat previously described. It is anticipated indirect and direct impacts to the Indiana bat would occur with the Proposed Action. Indirect impacts include forested habitat removal, noise and vibration, night lighting, collision, and water quality. Direct impacts would occur due to forested habitat removal. Approximately 244 acres of forested habitat is present within the DSA, all of which would be removed prior to the construction of the air cargo facility. The removal of forested habitat in the DSA would likely have a negative impact on the northern long-eared commuting, roosting, and foraging habitat. Therefore, the FAA has determined the Proposed Action ***may affect, is likely to adversely affect*** the northern long-eared bat. Mitigation measures are identified in Section 5.5.3 for the northern long-eared bat.

Migratory Bird Treaty Act Species

Potential habitat for Migratory Bird Treaty Act Species is present within the DSA. However, due to the mobile nature of the species and the surrounding suitable habitat for these species, no impacts are expected on the migratory bird species from the construction of the Proposed Action. Therefore, the Proposed Action would not reduce the viability of the Migratory Bird Species population. In addition, the DSA does not contain supportive nesting or breeding habitat for the bald eagle with respect to the Bald and Golden Eagle Protection Act.

Determination of Effects

A Biological Assessment (BA) was prepared to be used by the FAA in its consultation with the United States Fish and Wildlife Service (USFWS). The analysis included an evaluation of the DSA for potential impacts to ESA-listed threatened and endangered species and associated critical habitat under the jurisdiction of the USFWS. Based on the analysis, the FAA has made the following findings.

- The Proposed Action "*May affect, is likely to adversely affect*" the Indiana bat.
- The Proposed Action *"May affect, is likely to adversely affect"* the northern long-eared bat.

FAA's finding was submitted to the USFWS on July 17, 2018 and received by the USFWS on July 23, 2018. The USFWS responded with a Biological Opinion dated November 28, 2018. The BO concluded the Proposed Action is *not* likely to jeopardize species and is *not* likely to destroy or adversely modify critical habitat. (See **Appendix C, *Section 7 Consultation*** for the Section 7 consultation).

5.5.3 MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES

The DSA is located outside of known forest-dwelling bat habitat; however, the USFWS Kentucky Field Office (KFO) designates the area as Potential Habitat. Rather than choosing to conduct presence or probable absence surveys for the Indiana bat and northern long-eared bat, presence of these species will be assumed in the DSA and assumed impacts will be offset by a voluntary contribution to the Imperiled Bat Conservation fund (IBCF) as detailed in the Biological Assessment. Total tree removal for the Proposed Action would be 244 acres. Payment into the IBCF will be made prior to tree clearing per the mitigation multipliers by habitat type and season in the Revised Conservation Strategy for Forest-Dwelling Bats.

The clearing, grading, and site preparation for the project is expected to last approximately 18 months. Efforts will be made to avoid removing trees in June and July. This contribution to the IBCF is expected to promote the survival and recovery of Indiana and northern long-eared bats.

5.6 CLIMATE

Although there are no federal standards for aviation-related GHG emissions, it is well-established that GHG emissions can affect climate.[11] The Council on Environmental Quality (CEQ) has indicated that climate should be considered in NEPA analyses. The following provides an estimate of GHG emissions. This report used the carbon dioxide equivalent (CO_2E) method to show relative impacts on climate change of different chemical species. The resulting CO_2E is provided for information only because no federal NEPA standard for the significance of GHG emissions from individual projects on the environment has been established. **Table 5-7** provides the CO_2E emissions inventory for the construction and operational activities for both the No Action and Proposed Action.

5.6.1 MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES

The FAA has not identified specific factors to consider in making a significance determination for GHG emissions; therefore, no mitigation measures are required to mitigate the potential increase in GHGs attributed to the Proposed Action. However, for NEPA reviews of proposed FAA actions that would result in increased emissions of GHGs, consideration should be given to whether there are areas within the scope of a project where such emissions could be reduced. GHG emissions reduction can come from measures such as changes to more fuel efficient equipment, delay reductions, use of renewable fuels, and operational changes.

[11] See *Massachusetts* v. *E.P.A.*, 549 U.S. 497, 508-10, 521-23 (2007).

Table 5-7
TOTAL ANNUAL GHG EMISSIONS

SOURCE	ANNUAL EMISSIONS (METRIC TONS) CO_2E
2019	
Construction - Proposed Action	17,216.6
2019 Proposed Action Net Emissions	***17,216***
2020	
Construction - Proposed Action	40,988.5
2020 Proposed Action Net Emissions	***40,988.5***
2021	
Aircraft Takeoffs and Landings - No Action	27,144.4
Aircraft Taxiing - No Action	8,796.2
GAVs - No Action	2,493.0
2021 No Action Subtotal	*38,433.7*
Aircraft Takeoffs and Landings - No Action	27,144.4
Aircraft Taxiing - Proposed Action	8,526.6
GAVs - Proposed Action	2,238.4
Construction - Proposed Action	9,356.9
2021 Proposed Action Subtotal	*47,266.3*
2021 Proposed Action Net Emissions	***8,832.6***
2026	
Aircraft Takeoffs and Landings - No Action	44,423.4
Aircraft Taxiing - No Action	13,746.8
GAVs - No Action	5,062.9
2026 No Action Subtotal	*63,233.0*
Aircraft Takeoffs and Landings - Proposed Action	50,508.1
Aircraft Taxiing - Proposed Action	16,817.6
GAVs - Proposed Action	4,882.2
2026 Proposed Action Subtotal	*72,207.9*
2026 Proposed Action Net Emissions	***8,974.8***

CO_2E: Carbon Dioxide equivalent

Notes: GHG emissions for stationary sources, GSE, and APUs are not reported because AEDT does not have the capability of calculating GHG emissions for these emission sources.
Numbers may not sum due to rounding.
The net impact of emissions was calculated by subtracting the emissions of the No Action from those of the Proposed Action.

Source: Landrum & Brown analysis, 2018

5.7 DEPARTMENT OF TRANSPORTATION (DOT) ACT: SECTION 4(F) RESOURCES

This section presents the analysis of potential impacts to the U.S. Department of Transportation (USDOT) Act, Section 4(f) resources as a result of the No Action and the Proposed Action. Section 4(f) of the USDOT Act of 1966 (49 United States Code (U.S.C.) § 303) protects significant publicly owned parks, recreational areas, wildlife and waterfowl refuges, and public and private historic sites. Section 4(f) provides that the Secretary of Transportation (Secretary) may approve a transportation project requiring the use of publicly owned land of a public park, recreation area, or land of an historic site of national, state, or local significance, only if there is no feasible and prudent alternative to using that land and the project includes all possible planning to minimize harm resulting from the use.

Section 6(f) of the National Park Service (NPS) Land and Water Conservation Fund (LWCF) Act contains provisions for the protection of federal investments in land and water resources. The LWCF Act discourages the conversion of parks or recreational facilities to other uses. As stated in Section 4.2.4 of this Draft EA, there are no LWCF lands within the General Study Area (GSA) for this EA, thus there are no LWCF lands that would be affected by the Proposed Action.

Two types of impacts to a Section 4(f) resource, physical or constructive use, can occur from a Proposed Action.[12] As described in FAA Order 5050.4B, a determination is made by the FAA if the Proposed Action or a reasonable alternative would eliminate or severely degrade the intended use of the Section 4(f) resource. That is, would the Proposed Action or alternative physically or constructively use (i.e., substantially impair the use) that resource? The responsible FAA official should determine if mitigation is satisfactory to the agency having jurisdiction over the protected resource. If mitigation is unsatisfactory, more detailed, impact analysis is likely needed.

A physical use would occur if the Proposed Action or alternative(s) would involve an actual physical taking of Section 4(f) property through purchase of land or a permanent easement, physical occupation of a portion or all of the property, or alteration of structures or facilities on the property.

With respect to a physical use of historic sites, the Secretary may make a finding of *de minimis* only if—

A. the Secretary has determined, in accordance with the consultation process required under Section 106 of the National Historic Preservation Act (16 U.S.C. 470f), that—
   - o the transportation program or project will have no adverse effect on the historic site; or
   - o there will be no historic properties affected by the transportation program or project;

B. the finding of the Secretary has received written concurrence from the applicable State historic preservation officer or tribal historic preservation officer (and from the Advisory Council on Historic Preservation if the Council is participating in the consultation process); and

C. the finding of the Secretary has been developed in consultation with parties consulting as part of the Section 106 process.

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[12] FAA, 2006, Order 5050.4B, National Environmental Policy Act Implementing Instructions for Airport Actions, Table 7-1, page 7.1-2.

With respect to physical use of parks, recreation areas, or wildlife or waterfowl refuges, the Secretary may make a finding of *de minimis* only if—

A. the Secretary has determined, after public notice and opportunity for public review and comment, that the transportation program or project will not adversely affect the activities, features, and attributes of the park, recreation area, or wildlife or waterfowl refuge eligible for protection under this section; and

B. the finding of the Secretary has received concurrence from the officials with jurisdiction over the park, recreation area, or wildlife or waterfowl refuge.[13]

The concept of constructive use is that a project that does not physically use land in a park, for example, may still, by means of noise, air pollution, water pollution, or other impacts, dissipate its aesthetic value, harm its wildlife, restrict its access, and take it in every practical sense. Constructive use occurs when the impacts of a project on a Section 4(f) property are so severe that the activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired. A *de minimis* impact determination is not appropriate for constructive use of a Section 4(f) property because constructive use is defined as substantial impairment, and substantial impairment cannot be considered a *de minimis* impact. The analysis in this EA uses the DNL from Section 5.12 to determine if a constructive use of the property would occur from the Proposed Action.

5.7.1 NO ACTION

Physical Use

As no physical changes to the Airport would occur under the No Action, implementation of the Future (2021) No Action or Future (2026) No Action would not result in a physical use of Section 4(f) resources.

Constructive Use

The noise exposure of the potential Section 4(f) resources under the Future (2021) No Action and Future (2026) No Action are provided in **Table 5-8**. As shown, there are four potential Section 4(f) resources within the 65+ DNL contours for the Future (2021) No Action and Future (2026) No Action.

Table 5-8
SUMMARY OF NOISE EXPOSURE AT POTENTIAL SECTION 4(F) RESOURCES – NO ACTION

MAP ID	POTENTIAL SECTION 4(F) RESOURCE	FUTURE (2021) NO ACTION	FUTURE (2026) NO ACTION
17	Ephraim Uitz House	65-70 DNL & 70-75 DNL	65-70 DNL & 70-75 DNL
20	Joel Garnett House	<65 DNL	65-70 DNL
31	England Idlewild Park	65-70 DNL & 70-75 DNL	65-70 DNL & 70-75 DNL
42	World of Golf	<65 DNL	65-70 DNL

Source: Landrum & Brown analysis, 2018.

13 USDOT Act of 1966 (49 U.S.C. § 303).

Ephraim Uitz House[14] **–** The Ephraim Uitz House is a National Register of Historic Places (NRHP) listed property located in Burlington, KY owned by Melvin E. Elslager. The property is significant under Criteria C[15] because it is a good example of distinct architectural style (a double cell plan type and Federal style). The property is also significant under Criterion A[16] because it is a good example of what a traditional farm would look and function like in the period of significance (1842 – 1940). The property is currently in use as a residence and working farm.

Joel Garnett House[17] **–** The Joel Garnett House is an NRHP eligible property located on Conner Road near Hebron, Kentucky. It is recommended for listing on the NRHP under Criteria C because it is a good example of distinct architectural style (hall-parlor). The property is currently in use as a residence and working farm.

England Idlewild Park[18] **–** England Idlewild Park is approximately 290 acres and consists of wooded areas, open areas, and wetlands. The park offers three fishing ponds that are regularly stocked with bluegill and catfish, three large shelters, 24-Hole Championship Disc Golf Course, baseball and softball fields, basketball courts, soccer fields, a dog park, unpaved mountain bike trails, paved hiking trails with fitness stations, picnic tables, a playground, and England Idlewild Bike Park. The park is owned by KCAB and managed by Boone Country Parks and Recreation.

World of Golf[19] **–** World of Golf is located in Florence, KY and has an 18-hole golf course, miniature golf, practice range, indoor range, golf simulator and Divots Grill. It is owned by the City of Florence and operated by Landrum Golf Management.

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14 https://npgallery.nps.gov/pdfhost/docs/NRHP/Text/88003276.pdf, Accessed, July 5, 2018

15 This criterion applies to properties significant for their physical design or construction, including such elements as architecture, landscape architecture, engineering, and artwork.

16 To be considered for listing under Criterion A, a property must be associated with one or more events important in the defined historic context and it must retain historic integrity.

17 https://www.bcpl.org/cbc/doku.php/joel_garnett_house, https://www.boonecountyky.org/document_center/PlanningCommission/ArchitecturalSurvey.pdf, Accessed July 5, 2018

18 https://www.boonecountyky.org/departments/parks/england_idlewild_park_and_dog_park.aspx, Accessed, July 5, 2018

19 https://cincinnatiusa.com/things-to-do/attractions/world-golf, Accessed, July 5, 2018

5.7.2 PROPOSED ACTION

Physical Use

Four archeological sites were determined to be eligible for listing on the NRHP under Criteria D (see Section 5.8, Historical Architectural, Archeological, and Cultural Resources) and would be directly impacted by the Proposed Action. However, based on guidance provided in the FAA Order 1050.1F Desk Reference, Section 4(f) does not apply because these NRHP sites are important chiefly for data recovery and notimportant for preservation in place. Therefore, implementation of the Future (2021) Proposed Action or the Future (2026) Proposed Action would not result in the physical use of any Section 4(f) resource to other purposes.

Constructive Use

The noise exposure of the potential Section 4(f) resources under the Future (2021) Proposed Action and Future (2026) Proposed Action is provided in **Table 5-9**. The World of Golf would shift from being entirely outside the 65 DNL under the Future (2021) No Action to partially within the 65-70 DNL under the Future (2026) No Action. The other three resources would continue to be within the same contour band under both the Future (2021) No Action and Future (2021) Proposed Action. Similarly, each of these resources continue to be within the same contour band under both the Future (2026) No Action and Future (2026) Proposed Action. These noise levels would not substantially impair the properties because the activities, features, and attributes that qualify the properties for protection under Section 4(f) would not be affected by the implementation of the Proposed Action. In addition, the Future (2021) Proposed Action and the Future (2026) Proposed Action would not cause significant air pollutant emissions, water pollutants, or other environmental impacts that could affect the properties. Therefore, the Proposed Action would not result in a constructive use of the properties.

Table 5-9
SUMMARY OF NOISE EXPOSURE AT POTENTIAL SECTION 4(F) RESOURCES – COMPARISON OF NO ACTION AND PROPOSED ACTION

MAP ID	POTENTIAL SECTION 4(F) RESOURCE	2021 NO ACTION	2021 PROPOSED PROJECT	2026 NO ACTION	2026 PROPOSED PROJECT
17	Ephraim Uitz House	65-70 DNL & 70-75 DNL	65-70 DNL & 70-75 DNL	65-70 DNL & 70-75 DNL	65-70 DNL & 70-75 DNL
20	Joel Garnett House	<65 DNL	<65 DNL	65-70 DNL	65-70 DNL
31	England Idlewild Park	65-70 DNL & 70-75 DNL	65-70 DNL & 70-75 DNL	65-70 DNL & 70-75 DNL	65-70 DNL & 70-75 DNL
42	World of Golf	<65 DNL	<65 DNL	65-70 DNL	65-70 DNL

Source: Landrum & Brown analysis, 2018.

5.7.3 MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES

The Proposed Action does not exceed the applicable thresholds of significance. No Section 4(f) protected resources would experience a physical or constructive use resulting from implementation of the Proposed Action for the future years 2021 or 2026. Therefore, no mitigation measures are required.

5.8 HAZARDOUS MATERIALS, SOLID WASTE, AND POLLUTION PREVENTION

This section assesses the potential exposure to hazardous materials, describes the potential for solid waste, and presents pollution prevention measures that would occur as a result of the No Action and Proposed Action.

5.8.1 NO ACTION

Hazardous Materials/Waste

There would be no change to hazardous materials/waste described in Section 4.2.5 for the No Action. In addition, no sites involving fuel storage, handling, or dispensing of fuels would be affected by the No Action.

Solid Waste

The No Action assumes the proposed air cargo facility would not be constructed and therefore would not result in construction debris. It is assumed the air cargo service provider would operate at existing facilities and therefore an increase in operation would occur under the No Action. Therefore, the volume of solid waste generated at the Airport would also increase. Approximately 91,000 tons of solid waste would be generated in the No Action in 2021 and approximately 152,500 tons in 2026.

5.8.2 PROPOSED ACTION

Hazardous Materials

The DSA has remained largely undeveloped. Surveys found asbestos containing materials within the areas previously used for residences. No other recognized environmental conditions (REC) or Controlled REC (CREC) were observed in the DSA. During construction, contractor staging areas would be located at various locations in the DSA. The staging areas would likely include portable above ground storage tanks for fuel storage. The construction contractor(s) would be required to implement pollution prevention, spill prevention, and response plans documenting the measures that would be taken to prevent accidental releases to the environment and, should they occur, the actions that would be undertaken to minimize the environmental impact. In addition, the contractor would be required to implement site-specific pollution prevention plans (i.e., Spill Prevention Control and Countermeasures Plan) that reduce the potential for substantial impacts associated with regulated materials. Should construction activities discover underground storage tanks, waste materials, or other sources of environmental contamination, regulatory authorities would be notified and the necessary site remediation completed. All hazardous substances and wastes used or generated by the contractors, the Airport, or the tenants would be stored, labeled, and disposed of in accordance with federal and state laws.

The use of fuel, deicing fluids, and other regulated substances necessary for routine operations at the Airport would increase due to the increase in operations at the Airport and development of the air cargo facility. The storage, use, transportation, and disposal of hazardous materials and other regulated substances is governed by federal, state, and local regulations. These regulations, combined with existing technologies and work practices developed to properly manage these substances, substantially reduce the risks of causing environmental contamination from the construction and operation of the Proposed Project. Therefore, the Proposed Action is not likely to result in significant impacts from hazardous materials or environmental contamination.

Solid Waste

Solid wastes associated with construction of the Proposed Action are expected to be comprised of waste materials typical of earthwork and paving projects. The volume of solid waste is expected to be minor during construction as most of the earthwork would involve moving dirt from one area to another area within theDSA to achieve the proper grade. Recycling of paper and plastic products could substantially reduce the amount of the construction-related solid wastes. Construction waste not diverted, recycled, or re-used would be transported to and disposed of in local permitted construction/demolition facilities or in accordance with applicable state and local requirements. Therefore, no significant construction-related solid waste impacts would occur.

The number of aircraft operations at the Airport are forecasted to increase with the Proposed Action in 2026. The forecast increase in aircraft operations would similarly increase the volume of solid waste generated at the Airport. In addition, operation of the air cargo facility would generate municipal solid wastes requiring offsite disposal. The estimated volume of solid waste generated from the air cargo facility in 2021 is approximately 91,000 tons. The estimated volume of solid waste generated from the air cargo facility in 2026 is approximately 171,600 tons. This volume of solidwaste can be accommodated at the existing landfill facilities without substantially compromising capacity. According to information provided by Bavarian Trucking in 2017, the remaining capacity at the landfill is approximately 7.6 million tons. The Rumpke Landfill, in Pendleton County, 2017 Solid Waste 5-Year Plan indicates the remaining capacity at the landfill is 6 million tons.[20] Therefore, the Proposed Project, in conjunction with area recycling activities, would not significantly impact the capacity of the solid waste systems.

5.8.3 MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES

Although significant solid waste impacts would not occur with the Proposed Action, measures to minimize the solid waste stream, such as source reduction and recycling strategies, would be developed and implemented by the air cargo service provider through the development of a Recycling and Waste Management Program. This minimization measure consists of the KCAB, the air cargo service provider, on-Airport businesses, and waste handlers working together to develop and implement source reduction strategies to achieve reductions in solid waste disposal volumes generated at CVG. The specifics of this cooperative effort and the costs associated with it will be developed during the development of lease agreements between the KCAB and the air cargo service provider.

[20] Pendleton County, KY 2017 Comprehensive Plan Update, November 27, 2017

5.9 HISTORICAL, ARCHITECTURAL, ARCHEOLOGICAL, AND CULTURAL RESOURCES

This section presents the analysis of potential impacts to Historical, Architectural, Archeological, and Cultural Resources as a result of the No Action and the Proposed Action. The FAA conducted the required consultation with the Kentucky Heritage Council (KHC) under the National Historic Preservation Act of 1966, as amended (NHPA). FAA initiated consultation on July 12, 2018, with the KHC and consulting parties to provide ongoing opportunities for informal and formal review of the project's potential effect on historic resources. The Area of Potential Effect (APE) for direct and indirect impacts is described in Section 4.2.6, Historical, Architectural, Archeological, and Cultural Resources, and shown on Exhibit 4-3. The KHC concurred with FAA's delineation of the APE via email on July 20, 2018 and December 12, 2018. (See **Appendix E, *Section 106 Consultation***).

5.9.1 NO ACTION

No physical development would occur for the No Action. Therefore, no impacts to historical, architectural, archeological, or cultural resources would occur.

5.9.2 PROPOSED ACTION

This section describes the potential impacts, including direct and indirect effects, upon historical, architectural, archeological, and cultural resources due to the Proposed Action. Exhibit 4-3, in Chapter Four of this EA, depicts the Direct and Indirect APE.

Direct Effects

Architectural, Phase I, and Phase II archeological surveys were conducted for the proposed undertaking in compliance with Section 106 of the NHPA and guidelines set forth by the KHC and are discussed in Section 4.2.6, *Historical, Architectural, Archeological, and Cultural Resources*. The purpose of the surveys was to identify any historic properties located within the Direct APE that are listed or eligible for listing in the NRHP. 36 C.F.R. § 800.16(l)(1) defines the term Historic property as *"any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria."*[21]

In total, there are 33 archeological sites, four cemeteries, and five structures within the Direct APE that would be removed as part of the Proposed Action. The FAA has determined that 29 of the archeological sites, the four cemeteries, and the five structures are not eligible for inclusion in the NRHP. Three archeological sites (15Be688, 15Be694, and 15Be697) were determined eligible for inclusion in the NRHP. Archeological site (15Be717) was determined to have unsafe conditions to complete the Phase II archeological survey on the site. As a result, this site has been determined to be eligible for the NRHP. Therefore, FAA determined the proposed undertaking would have an Adverse Effect on Historic Properties. The Section 106 Consultation is provided in Appendix E.

[21] 36 C.F.R. § 800.16(l)(1) Definition – Historic Property.

Indirect Effects

FAA also designated an Indirect Effects APE that includes areas around CVG that experience airport noise from aircraft over flights and would experience potential impacts to the view of historic properties. FAA has determined there are two historic properties within the Indirect Effects APE, the Ephraim Uitz House and the Joel Garnett House. The Ephraim Uitz House was previously recommended as historically significant and listing in the NRHP under Criteria A (Association with Events) and Criteria C (Embodiment of Distinctive Architectural Characteristics). The Joel Garnett House was previously recommended as eligible for the NRHP under Criteria C.

In the Future (2021) No Action and Future (2026) No Action noise exposure contours, the Ephraim Uitz House would be exposed to noise levels of 65-70 DNL and the farmstead property would be partially within the 70-75 DNL. Under the Future (2021) Proposed Action and Future (2026) Proposed Action, the Ephraim Uitz House would continue to be exposed to 65-70 DNL and the farmstead property would continue to be partially within the 70-75 DNL. These noise levels would not significantly change the property's setting or diminish the integrity of the property's significant features because it would maintain its existing architecture and setting and maintain the association with past events. In addition, the Future (2021) Proposed Action and Future (2026) Proposed Action would not cause significant air pollutant emissions or water pollutants that could affect these structures (See Section 5.4 *Air Quality* and Section 5.15 *Water Resources* for additional information). Therefore, the proposed undertaking would have no adverse effect on the Ephraim Uitz House and farmstead.

In the Future (2021) No Action noise exposure contours, the Joel Garnett House would be exposed to noise levels less than 65 DNL. Under the Future (2021) Proposed Action, the Joel Garnett House would continue to be exposed to noise levels less than 65 DNL. In the Future (2026) No Action noise exposure contours, the Joel Garnett House would be exposed to noise levels of 65-70 DNL. Under the Future (2026) Proposed Action, the Joel Garnett House would continue to be exposed to noise levels of 65-70 DNL. These noise levels would not significantly change the property's setting or diminish the integrity of the property's significant features because it would maintain its existing architecture. In addition, the Future (2021) Proposed Action and Future (2026) Proposed Action would not cause significant air pollutant emissions or water pollutants that could affect these structures (See Section 5.4 *Air Quality* and Section 5.15 *Water Resources* for additional information). Therefore, the proposed undertaking would have no adverse effect on the Joel Garnett House.

5.9.3 MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES

A Memorandum of Agreement (MOA) was prepared between the FAA, KCAB, and the KHC sites 15Be688, 15Be694, 15Be697, and 15Be717. The air cargo service provider was also a signatory on the MOA. A Mitigation Plan was developed for sites 15Be688, 15Be694 and 15Be697 by the FAA, KCAB, and in consultation with the KHC, specifying the Data Recovery Plan, which is sometimes called Phase III. Phase III data recovery takes place when there will be an adverse effect to a site listed in or eligible for listing in the National Register and mitigation by excavation of all or portions of the site becomes necessary. The data recovery plan is included as an attachment to the MOA. The FAA, KCAB, and the air cargo service provider are responsible for carrying out the data recovery plan. The data recovery plan defines how fieldwork is to be conducted, as well as the structure and content of the mitigation report. The MOA also includes alternate mitigation for site 15Be717 due to the Phase II archeological work on this site not able to be completed due to safety concerns regarding asbestos contamination on the site.

Unanticipated Discovery Plan

If previously undocumented buried cultural resources are identified by contractors during construction activities, all work in the immediate vicinity of the discovery would stop until the find can be confirmed by a professional archeologist and evaluated for its significance. The air cargo service provider will notify KCAB staff of the find and it will be KCAB's responsibility to notify the FAA, KHC, and tribal officer if undocumented resources are found. If human remains are uncovered, per Kentucky Revised Statutes 72.020, the local coroner and law enforcement agency must be notified.

5.10 LAND USE

This section presents the analysis of potential land use incompatibility of the No Action and the Proposed Action, including potential conflicts with surrounding land uses and zoning with the comprehensive plans of the surrounding communities.

The FAA has not established a significance threshold for land use. The determination that significant impacts exist in the land use impact category is normally dependent on the significance of other impacts. Potential impacts on noise compatible land use are discussed in Section 5.12, Noise and Noise Compatible Land Use. Potential impacts related to potential for disruptions to communities or relocation of residences or businesses is discussed in Section 5.13, Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks. Regarding consistency with state and/or local plans, an inconsistency with surrounding land uses and zoning by itself does not automatically result in a significant impact.

5.10.1 NO ACTION

No physical development would occur under the No Action. Therefore, no impacts to land use would occur.

5.10.2 PROPOSED ACTION

The DSA is located on the southern edge of the Airport in a predominantly commercial area. Currently, the DSA is both on-Airport property and off-Airport property. At the time of the preparation of this document, the air cargo service provider is the owner of the off-Airport property. Negotiations are underway to transfer all of the off-Airport land to the KCAB. Once the ownership of the off-Airport land is transferred to the KCAB, the development would be considered compatible land use. The land would be zoned as "Airport" district and would be part of the Houston-Donaldson Study Corridor Overlay District.[22] The development proposed for the on-Airport property is considered a compatible land use.

In addition, the Proposed Action would not create a new wildlife attractant or create an obstruction to navigation airspace per 14 CFR Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace.* Therefore, no impacts to land use would occur with implementation of the Proposed Action.

5.10.3 MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES

The Proposed Project would not result in significant land use impacts. Therefore, there is no mitigation required or proposed.

22 Boone County Zoning Regulations, Boone County Planning Commission, December 4, 2013.

5.11 NATURAL RESOURCES AND ENERGY SUPPLY

This section presents the analysis of potential impacts to natural resources and energy supplies as a result of the No Action and the Proposed Action. The supply of natural resources may be impacted by a construction project because the use of dirt, rock, or gravel could diminish or deplete the supply of those and other natural resources. In addition, the operation of an airport requires energy in the form of electricity, natural gas, aviation fuel, diesel fuel, and gasoline. There are two primary sources of energy consumption at an airport – stationary facilities and aircraft operations. Stationary facilities use utility energy (electricity and natural gas) to provide lighting, cooling, heat, and hot water to buildings, the airfield, and parking areas. Aircraft operations and GSE consume fuel energy including jet fuel (Jet A), low-lead aviation gasoline (AvGas), unleaded gasoline, and diesel fuel to operate the aircraft and power GSE.

5.11.1 NO ACTION

Natural Resources

Resources such as sand, gravel, stone, concrete, asphalt water, wood, metals, plastic, and other resources are used for airport construction and maintenance. No new facilities would be constructed that would consume natural resources or other construction materials for the No Action. It is expected that small amounts of these materials would be used for general maintenance activities.

Electricity

There would be no increase in demand for electricity for the No Action. No facilities or lighting would be constructed in the No Action. Existing electricity resources would continue to power the existing facilities and accommodate the forecast demand for aircraft operations.

Natural Gas

There would be no increase in demand for natural gas for the No Action. No new facilities would be constructed that would require natural gas due to the No Action. Natural gas resources would continue to power the existing facilities and accommodate the forecast demand for aircraft operations.

Fuel Consumption

Aviation fuel demand at the Airport is a function of the number of operations at CVG and how they operate. This includes the length of time the aircraft are operating while on the ground and during takeoff and climb out, and the fuel required for the aircraft to reach the flight destination. Aircraft fuel, typically Jet-A or AvGas is provided to airport users by various suppliers that obtain and sell fuel through existing contracts and on an as-needed basis. No new facilities would be constructed that would increase the demand for fuel for the No Action. Current forecasts project growth in aircraft operations at CVG and additional aircraft movements would likely increase fuel consumption. In addition to aircraft fuel, diesel fuel and gasoline are also used to power GSE and other service vehicles at CVG. The fuel requirement for GSE is roughly related to the number of aircraft operations that are serviced, which affects the number of GSE units and the amount of time in which they operate. Aircraft operations are projected to increase for the No Action, which would result in an increase in fuel usage for GSE.

5.11.2 PROPOSED ACTION

The Proposed Action would include the construction of new facilities. Operation of these proposed facilities would require the use of electricity, natural gas, and water. Electricity is used to power and light the buildings and to light the parking areas. Natural gas is used for gas-fired water heaters, kitchen equipment, and other gas-fired appliances. The Proposed Action would increase the amount of electricity, natural and natural gas consumed at CVG. Energy conservation features would be incorporated into the design of the proposed projects where feasible.

The objective of the assessment is to determine whether the Proposed Action would have the potential to exceed the local energy supply as compared to the No Action. The FAA has not established a significance threshold for natural resources and energy supply; however, per FAA Order 1050.1F, the analysis should consider situations in which the proposed action or alternative(s) would have the potential to cause demand to exceed available or future supplies of these resources. The analysis includes a discussion of the future demands for energy and natural resources, including changes in demand for utility services, fuel consumption, and consumable materials for operation and construction activities. The assessment also determined whether there would be a requirement for the use of rare natural resources that could potentially deplete the supply of natural resources in the area.

Electricity

The Proposed Action would include the construction of new facilities. Operation of these proposed facilities would require the use of electricity to power and light the buildings and to light the parking areas. The Proposed Action would increase the amount of electricity consumed at CVG. Estimates of electricity usage were provided by the air cargo service provider and based on the proposed facilities to be constructed. The estimates did not include the use of LED lighting in order to present the maximum potential demand for electricity. It is estimated that proposed facility would require approximately 55,000-kilowatt hours (kWh) per year. The electric utility, Duke Energy Kentucky, was contacted to determine if the utility has the capacity to meet the estimated increase in demand. Duke Energy Kentucky confirmed they have sufficient capacity to supply the potential increase in electricity demand from the Proposed Action.[23] Therefore, while implementing the Proposed Action would potentially increase the demand for electricity, the potential demand would not exceed the existing and future supplies.

[23] Meeting with Duke Energy, May 2, 2018

Natural Gas

As a result of implementing the Proposed Action, additional natural gas would be needed to provide for the proposed facilities. During construction, it is not anticipated there would be any additional need for natural gas. The estimated increase in natural gas demand due to the Proposed Action is 410 million British thermal units (BTU).[24] While implementing the Proposed Action would potentially increase the demand for natural gas, the potential demand would not exceed the available current and future supplies due to existing and future natural gas capacity. The natural gas utility, Duke Energy Kentucky, was contacted to determine if the utility has the capacity to meet the estimated increase in demand. Duke Energy Kentucky stated they have sufficient capacity to supply the potential increase in natural gas demand due to implementing the Proposed Action.[25] However, a new gas line would need to be installed along Aero Parkway. The potential impacts of this new gas line are included as an element of the Proposed Action and included in the DSA. Physical impacts are assessed in Section 5.5, Biological Resources; Section 5.8, Historic, Architectural, Archeological, and Cultural Resources; and Section 5.15, Water Resources of this EA.

Fuel Consumption

No change in the number of aircraft operations would occur in the Future (2021) Proposed Action when compared to the No Action as it is assumed aircraft operations would be accommodated with existing facilities. In the Future (2026) Proposed Action, additional aircraft operations would be accommodated by the proposed air cargo facility, resulting in an increase in fuel consumption. However, due to availability of fuel in the region, any increase in demand is expected to be minimal and would not exceed the existing supplies. During construction, it is anticipated there would be increased demand for diesel fuel for construction vehicles. **Table 5-10** presents the fuel consumption for the Proposed Action compared to the No Action Alterative for each future year.

Table 5-10
FUEL CONSUMPTION

	Future (2021) No Action	Future (2021) Proposed Action	Future (2026) No Action	Future (2026) Proposed Action
Fuel Usage (gallons/day)	48,083	48,083	59,437	61,582

Source: AEDT version 2d, Landrum & Brown analysis, 2018.

[24] One BTU of heat is equal to 1/180 of the heat required to raise the temperature of one pound of water from 32 degrees Fahrenheit to 212 degrees Fahrenheit at a constant pressure of one atmosphere.
[25] Meeting with Duke Energy, May 2, 2018

Natural Resources

There would be no increased demand for natural resources due to the Proposed Action as compared to the No Action for operational purposes. However, as a result of implementing the Proposed Action, proposed construction activities would require natural resources such as steel, gravel, sand, aggregate, concrete, asphalt, water, and other construction materials. These materials are not in short supply in the Greater Cincinnati and Northern Kentucky area and consumption of these materials is not expected to deplete or cause a shortage of existing supplies.

5.11.3 MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES

Demand for energy or natural resources identified due to the Proposed Action would not exceed current or future supplies. The Proposed Action does not exceed the applicable thresholds of significance; therefore, no mitigation measures are required.

5.12 NOISE AND NOISE-COMPATIBLE LAND USE

This section presents the analysis of aircraft noise exposure to surrounding communities as a result of the No Action and the Proposed Action. Additional information on the background and characteristics of noise are provided in **Appendix F, *Noise***. The impact of airport-related noise levels upon the surrounding area is presented in terms of the number and type of noise-sensitive land uses located within the noise contours for the Proposed Action and the No Action for both 2021 and 2026. This is in accordance with FAA Order 1050.1F guidance, which specifies that an operational impact analysis should be prepared for the year of anticipated project implementation and five years after implementation.[26]

The analysis of noise exposure around CVG was prepared using the latest version of the AEDT, Version 2d. Inputs to the AEDT include number of aircraft operations during the time period evaluated, the types of aircraft flown, time of day aircraft operations occur, runway definition, how frequently each runway is used for arriving and departing aircraft, the routes of flight used when arriving to and departing from the runways, the proportional use of those flight routes, and the length of the trips. The AEDT calculates noise exposure for the area around the airport and outputs contours of equal noise exposure using the Day-Night Average Sound Level (DNL) metric. For this EA, equal noise contours for the levels of DNL 65, 70, and 75 dB were calculated and represent average-annual day conditions.

[26] FAA, 2015, 1050.1F Desk Reference, *Environmental Impacts: Policies and Procedures*, 11. Noise and Noise-Compatible Land Use, 11.3 Environmental Consequences.

5.12.1 NO ACTION

5.12.1.1 Future (2021) No Action

Exhibit 5-1, *Future (2021) No Action Noise Exposure Contours* reflects the Future (2021) No Action average-annual noise contours at CVG. The 65+ DNL of the Future (2021) No Action Noise Exposure Contour encompasses approximately 11.2 square miles. The Future (2021) No Action Noise Exposure Contour is larger than the Existing Noise Exposure Contour due to the forecasted increase in aircraft operations, which includes general growth in aviation demand and the expected increase in cargo operations that would occur with or without the Proposed Action.

The Future (2021) No Action Noise Exposure Contour retains a similar shape as the Existing Noise Exposure contour because runway use patterns and flight tracks are expected to remain similar.

There are no public schools, churches, nursing homes, hospitals, or libraries within any of the contours. Summaries of the residential population and housing units affected by noise levels exceeding 65 DNL for the Future (2021) No Action Noise Exposure Contours are provided in **Table 5-11**.

Table 5-11
FUTURE (2021) NO ACTION INCOMPATIBILITIES

FUTURE (2021) NO ACTION	65-70 DNL	70-75 DNL	75+DNL	TOTAL
RESIDENCES				
Mitigated[1]	**174**	**2**	**0**	**176**
Unmitigated	**85**	**4**	**0**	**89**
Previously Offered but Refused	31	2	0	33
Never Offered Mitigation[2]	54	2	0	56
Total	**259**	**6**	**0**	**265**
ESTIMATED POPULATION				
Mitigated[1]	**466**	**6**	**0**	**472**
Unmitigated	**236**	**12**	**0**	**248**
Previously Offered but Refused	84	6	0	91
Never Offered Mitigation[2]	151	6	0	157
Total	**702**	**18**	**0**	**720**
NOISE-SENSITIVE FACILITIES (NSF)				
Schools	0	0	0	**0**
Churches	0	0	0	**0**
Nursing Homes	0	0	0	**0**
Hospitals	0	0	0	**0**
Libraries	0	0	0	**0**

1 Residences were mitigated through previous Part 150 Studies conducted by KCAB.
2 Residence was either built after Part 150 mitigation program, never in the 65 DNL of an official Noise Exposure Map, or an ineligible property.

Notes: Population numbers are estimates based on the 2010 U.S. Census average household size per number of housing units.

Source: Landrum & Brown, 2018.

5.12.1.2 Future (2026) No Action

The Future (2026) No Action Noise Exposure Contour, showing 65, 70, and 75 DNL levels, is presented on **Exhibit 5-2, *Future (2026) No Action Noise Exposure Contours***. The 65+ DNL of the Future (2026) No Action Noise Exposure Contour encompasses approximately 13.3 square miles. The Future (2026) No Action Noise Exposure Contour retains a similar shape as the Future (2021) No Action Noise Exposur e Contour, but is larger due to the forecasted increase in aircraft operations. There are no public schools, churches, nursing homes, hospitals, or libraries within any of the contours. Summaries of the residential population and housing units affected by noise levels exceeding 65 DNL for the Future (2026) Noise Exposure Contours are provided in **Table 5-12**.

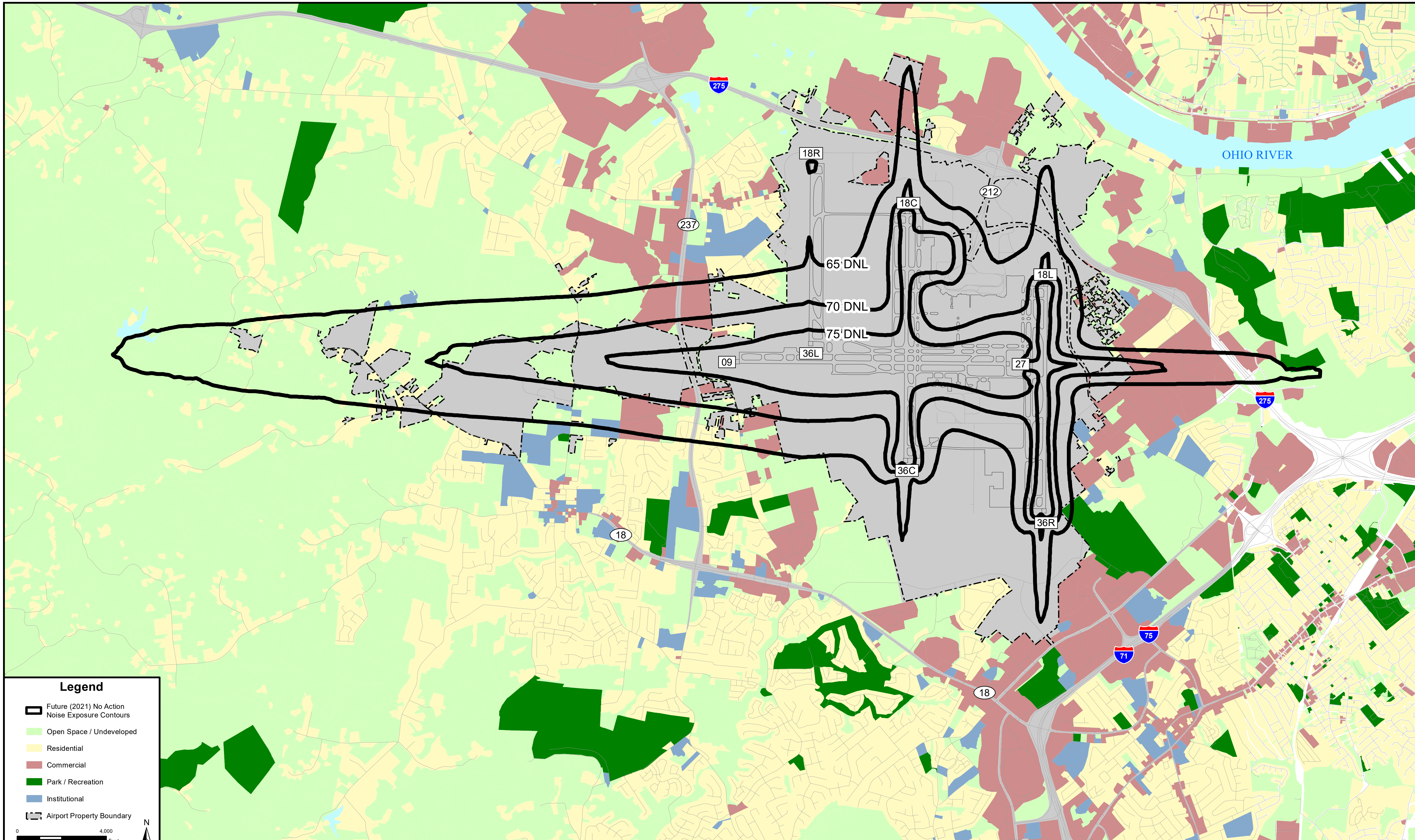
Table 5-12
FUTURE (2026) NO ACTION INCOMPATIBILITIES

FUTURE (2026) NO ACTION	65-70 DNL	70-75 DNL	75+DNL	TOTAL
RESIDENCES				
Mitigated[1]	**233**	**4**	**0**	**237**
Unmitigated	**172**	**4**	**0**	**176**
Previously Offered but Refused	43	2	0	45
Never Offered Mitigation[2]	129	2	0	131
Total	**405**	**8**	**0**	**413**
ESTIMATED POPULATION				
Mitigated[1]	**621**	**11**	**0**	**632**
Unmitigated	**411**	**12**	**0**	**423**
Previously Offered but Refused	115	6	0	122
Never Offered Mitigation[2]	296	6	0	301
Total	**1,032**	**23**	**0**	**1,055**
NOISE-SENSITIVE FACILITIES (NSF)				
Schools	0	0	0	**0**
Churches	0	0	0	**0**
Nursing Homes	0	0	0	**0**
Hospitals	0	0	0	**0**
Libraries	0	0	0	**0**

1 Residences were mitigated through previous Part 150 Studies conducted by KCAB.
2 Residence was either built after Part 150 mitigation program, never in the 65 DNL of an official Noise Exposure Map, or an ineligible property.

Notes: Population numbers are estimates based on the 2010 U.S. Census average household size per number of housing units.

Source: Landrum & Brown, 2018.



Air Cargo Facility Environmental Assessment

Future (2021) No Action Noise Exposure Contours

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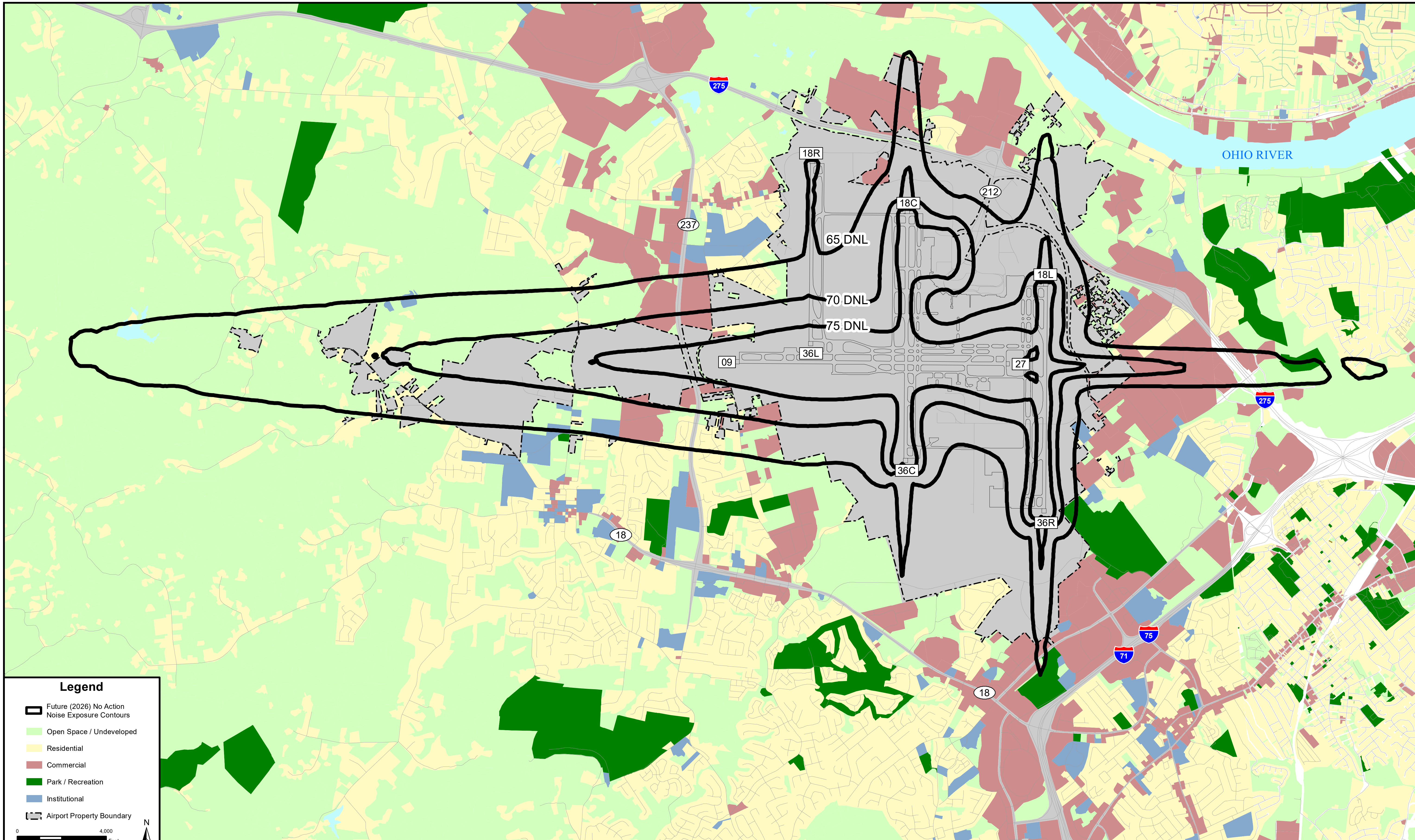

Air Cargo Facility Environmental Assessment

Future (2026) No Action Noise Exposure Contours

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5.12.2 PROPOSED ACTION

5.12.2.1 Future (2021) Proposed Action

The Future (2021) Proposed Action Noise Exposure Contour, showing 65, 70, and 75 DNL levels, is presented on **Exhibit 5-3, *Future (2021) Proposed Action Noise Exposure Contours***. The 65+ DNL of the Future (2021) Proposed Action Noise Exposure Contour encompasses approximately 11.2 square miles. Summaries of the residential population and housing units affected by noise levels exceeding 65 DNL for the Future (2021) Proposed Action Noise Exposure Contours are provided in **Table 5-13.**

Table 5-13
FUTURE (2021) PROPOSED ACTION INCOMPATIBILITIES

FUTURE (2021) PROPOSED ACTION	65-70 DNL	70-75 DNL	75+DNL	TOTAL
RESIDENCES				
Mitigated[1]	**174**	**2**	**0**	**176**
Unmitigated	**85**	**4**	**0**	**89**
Previously Offered but Refused	31	2	0	33
Never Offered Mitigation[2]	54	2	0	56
Total	**259**	**6**	**0**	**265**
ESTIMATED POPULATION				
Mitigated[1]	**466**	**6**	**0**	**472**
Unmitigated	**236**	**12**	**0**	**248**
Previously Offered but Refused	84	6	0	91
Never Offered Mitigation[2]	151	6	0	157
Total	**702**	**18**	**0**	**720**
NOISE-SENSITIVE FACILITIES (NSF)				
Schools	0	0	0	**0**
Churches	0	0	0	**0**
Nursing Homes	0	0	0	**0**
Hospitals	0	0	0	**0**
Libraries	0	0	0	**0**

1 Residences were mitigated through previous Part 150 Studies conducted by KCAB.
2 Residence was either built after Part 150 mitigation program, never in the 65 DNL of an official Noise Exposure Map, or an ineligible property.

Notes: Population numbers are estimates based on the 2010 U.S. Census average household size per number of housing units.

Source: Landrum & Brown, 2018.

The Future (2021) Proposed Action Noise Exposure Contour is similar in shape and size to the Future (2021) No Action Noise Contour. There would be no change to the number of arrivals and departure, nor would there be any change to runway use or flight tracks. Under the Future (2021) No Action, run-ups would occur on the north airfield to the east of Runway 18C. Under the Future (2021) Proposed Action, run-ups would occur at the proposed cargo facility on the south airfield. Therefore, the size of the Future (2021) Proposed Action noise contour increases within the south airfield between Runway 36C and Runway 36R and decreases within the north airfield east of Runway 18C.

A noise impact would be considered to be significant if there were an increase of 1.5 decibel (dB) or more over noise-sensitive facilities within the 65 DNL contour when comparing the No Action and Proposed Action of the same corresponding year.[27] The Future (2021) Proposed Action, compared to the Future (2021) No Action, and the area of 1.5 DNL increase within the 65 DNL is shown on **Exhibit 5-4, *Future (2021) No Action Noise Exposure Contours Compared to Future (2021) Proposed Action Noise Exposure Contours***. The 1.5 dB increase area remains over compatible Airport-owned land. Therefore, no significant noise impacts would occur with the Proposed Action. As shown in **Table 5-14**, there are no new residences or Noise Sensitive Facilities (NSF) exposed to 65 DNL.

Table 5-14
NEW RESIDENCES AND NOISE-SENSITIVE FACILITIES EXPOSED TO 65 DNL IN THE FUTURE (2021) PROPOSED ACTION NOISE EXPOSURE CONTOUR

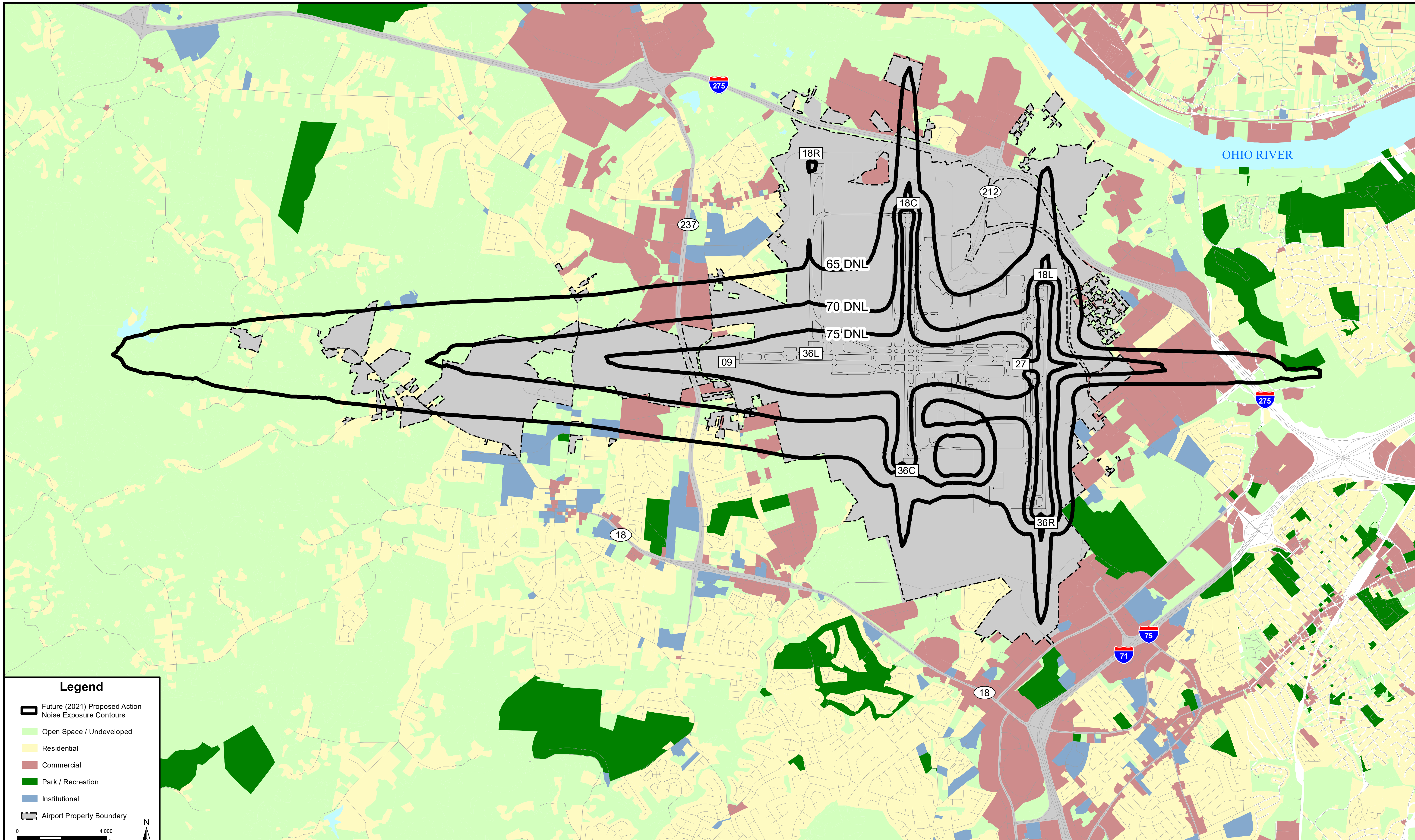
NEWLY IN FUTURE (2021) PROPOSED ACTION	65-70 DNL	70-75 DNL	75+DNL	TOTAL
RESIDENCES				
Mitigated[1]	**0**	**0**	**0**	**0**
Unmitigated	**0**	**0**	**0**	**0**
Previously Offered but Refused	0	0	0	0
Never Offered Mitigation[2]	0	0	0	0
Total	**0**	**0**	**0**	**0**
ESTIMATED POPULATION				
Mitigated[1]	**0**	**0**	**0**	**0**
Unmitigated	**0**	**0**	**0**	**0**
Previously Offered but Refused	0	0	0	0
Never Offered Mitigation[2]	0	0	0	0
Total	**0**	**0**	**0**	**0**
NOISE-SENSITIVE FACILITIES (NSF)				
Schools	0	0	0	**0**
Churches	0	0	0	**0**
Nursing Homes	0	0	0	**0**
Hospitals	0	0	0	**0**
Libraries	0	0	0	**0**

1 Residences were mitigated through previous Part 150 Studies conducted by KCAB.
2 Residence was either built after Part 150 mitigation program, never in the 65 DNL of an official Noise Exposure Map, or an ineligible property.

Notes: Population numbers are estimates based on the 2010 U.S. Census average household size per number of housing units.

Source: Landrum & Brown, 2018.

27 FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, Section 4.3-3 Significance Thresholds.



Air Cargo Facility Environmental Assessment

Future (2021) Proposed Action Noise Exposure Contours

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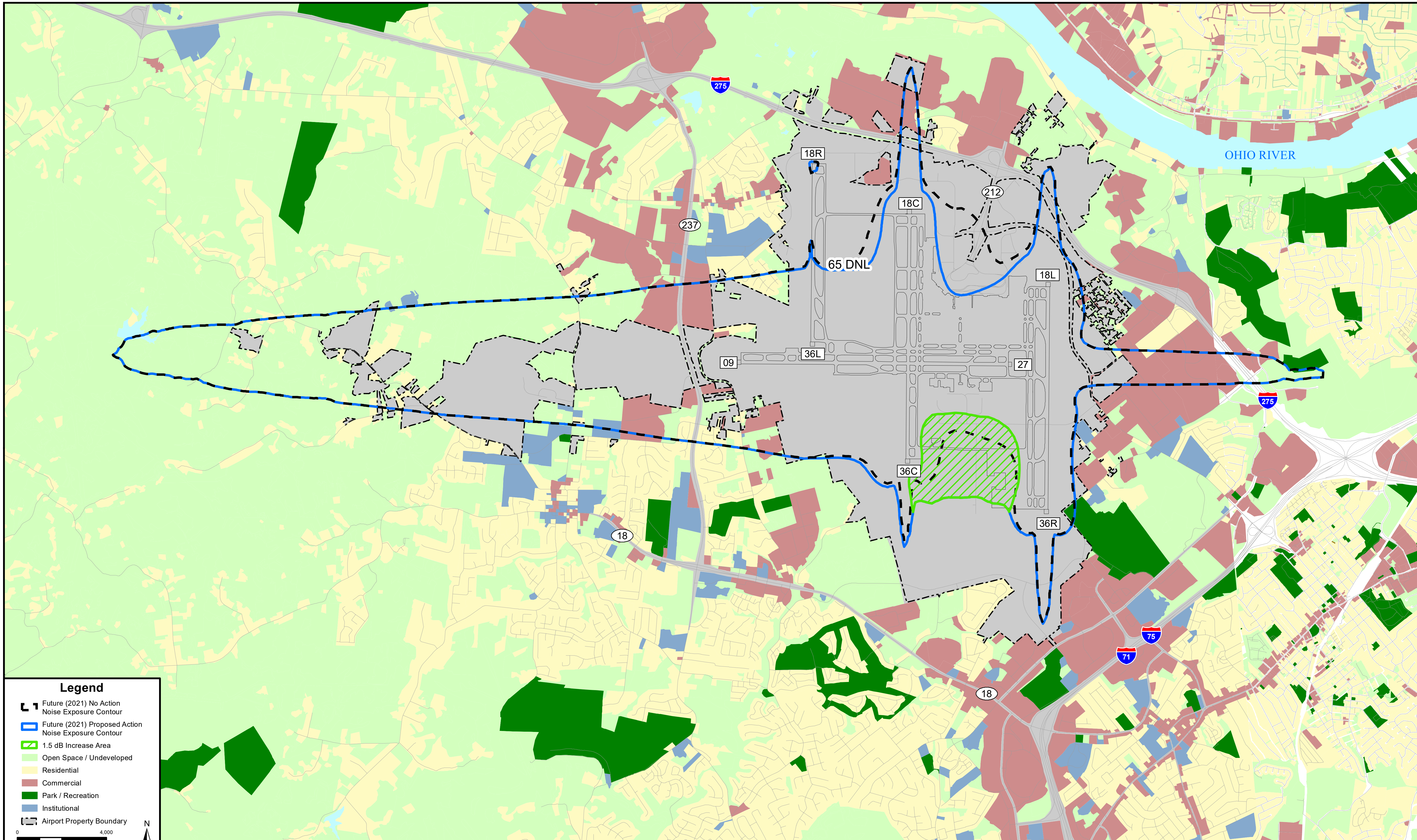

Air Cargo Facility Environmental Assessment

Future (2021) No Action Noise Exposure Contours Compared to Future (2021) Proposed Action Noise Exposure Contours

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5.12.2.2 Future (2026) Proposed Action

The Future (2026) Proposed Action Noise Exposure Contour, showing 65, 70, and 75 DNL levels, is presented on **Exhibit 5-5, *Future (2026) Proposed Action Noise Exposure Contours***. The 65+ DNL of the Future (2026) Proposed Action Noise Exposure Contour encompasses approximately 13.9 square miles. Summaries of the residential population and housing units affected by noise levels exceeding 65 DNL for the Future (2026) Proposed Action Noise Exposure Contours are provided in **Table 5-15**.

Table 5-15
FUTURE (2026) PROPOSED ACTION INCOMPATIBILITIES

FUTURE (2026) PROPOSED ACTION	65-70 DNL	70-75 DNL	75+DNL	TOTAL
RESIDENCES				
Mitigated[1]	**245**	**6**	**0**	**251**
Unmitigated	**209**	**5**	**0**	**214**
Previously Offered but Refused	44	3	0	47
Never Offered Mitigation[2]	165	2	0	167
Total	**454**	**11**	**0**	**465**
ESTIMATED POPULATION				
Mitigated[1]	**650**	**17**	**0**	**667**
Unmitigated	**477**	**14**	**0**	**491**
Previously Offered but Refused	118	9	0	126
Never Offered Mitigation[2]	359	6	0	365
Total	**1,127**	**31**	**0**	**1,158**
NOISE-SENSITIVE FACILITIES (NSF)				
Schools	0	0	0	**0**
Churches	0	0	0	**0**
Nursing Homes	0	0	0	**0**
Hospitals	0	0	0	**0**
Libraries	0	0	0	**0**

[1] Residences were mitigated through previous Part 150 Studies conducted by KCAB
[2] Residence was either built after Part 150 mitigation program, never in the 65 DNL of an official Noise Exposure Map, or an ineligible property.

Notes: Population numbers are estimates based on the 2010 U.S. Census average household size per number of housing units.

Source: Landrum & Brown, 2018.

The Future (2026) Proposed Action Noise Exposure Contour retains a similar shape as the Future (2026) No Action Noise Exposure Contour, but is larger due to the increase in aircraft operations that would occur as a result of the implementation of the Proposed Action. Similar to 2021, the primary difference in the shape of the Future (2026) Proposed Action noise contour compared to the Future (2026) No Action noise contour is due to the location of the aircraft run-ups associated with the cargo facility.

Exhibit 5-6, *Future (2026) No Action Noise Exposure Contours Compared to Future (2026) Proposed Action Noise Exposure Contours* shows the Future (2026) Proposed Action compared to the Future (2026) No Action and the area of 1.5 dB increase within the 65 DNL. The 1.5 DNL increase area remains over compatible Airport-owned land. Therefore, no significant noise impacts would occur with the Proposed Action. However as shown in **Table 5-16**, there are 52 new residences exposed to 65 DNL. Of the 52 residences, 14 were mitigated through a previous Part 150 Study, two were offered mitigation but refused, and 36 were never offered mitigation. Of the 36 residences never offered mitigation five were either built after the previous mitigation program or were considered ineligible due to the type of construction and 31 are newly in the 65 DNL.

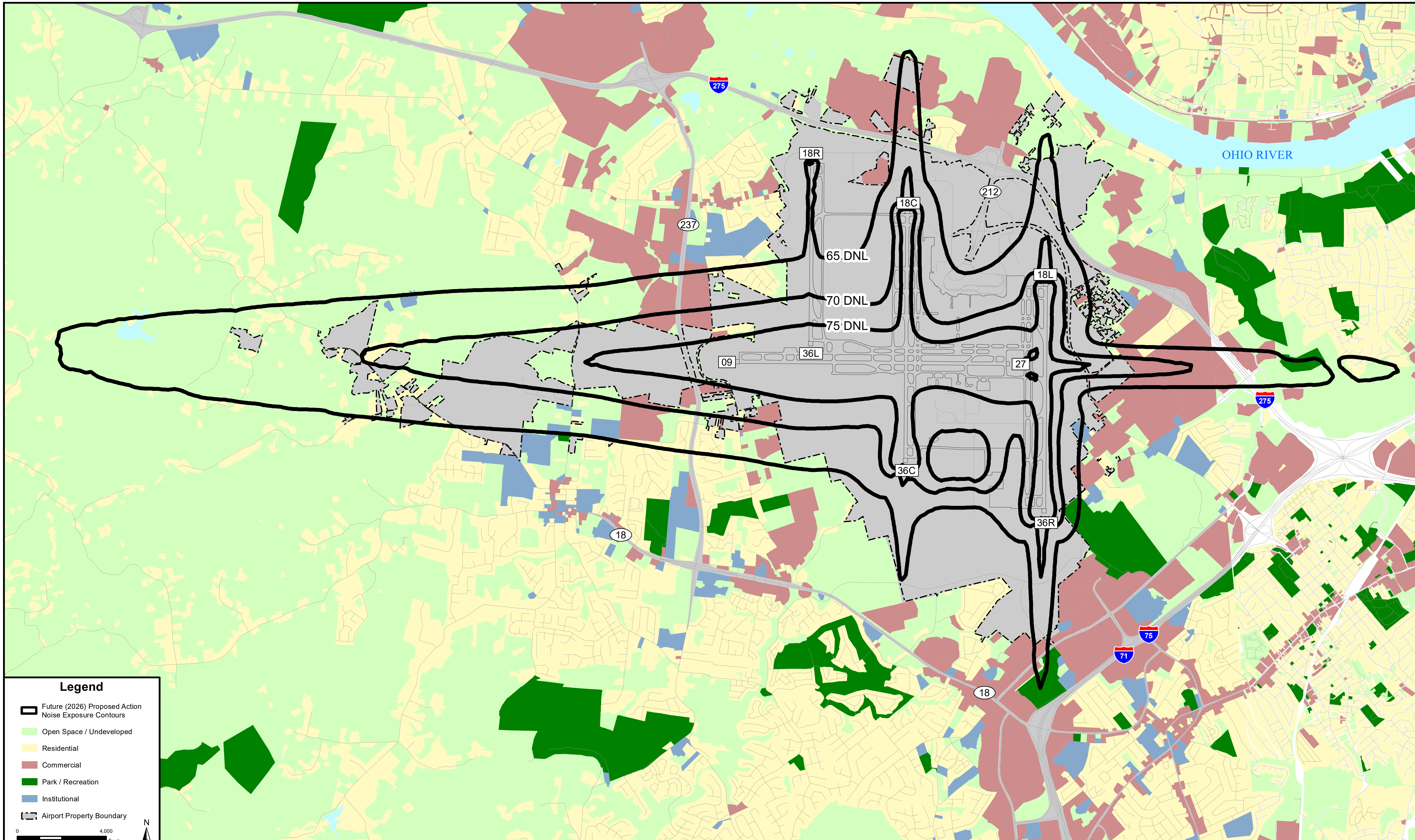
Table 5-16
NEW RESIDENCES AND NOISE-SENSITIVE FACILITIES EXPOSED TO 65 DNL IN THE FUTURE (2026) PROPOSED ACTION NOISE EXPOSURE CONTOUR

NEWLY IN FUTURE (2026) PROPOSED ACTION	65-70 DNL	70-75 DNL	75+DNL	TOTAL
RESIDENCES				
Mitigated[1]	**14**	**0**	**0**	**14**
Unmitigated	**38**	**0**	**0**	**38**
Previously Offered but Refused	2	0	0	**2**
Never Offered Mitigation[2]	36	0	0	**36**
Total	**52**	**0**	**0**	**52**
ESTIMATED POPULATION				
Mitigated[1]	**35**	**35**	**0**	**69**
Unmitigated	**68**	**68**	**0**	**136**
Previously Offered but Refused	5	5	0	**9**
Never Offered Mitigation[2]	63	63	0	**127**
Total	**102**	**102**	**0**	**205**
NOISE-SENSITIVE FACILITIES (NSF)				
Schools	0	0	0	**0**
Churches	0	0	0	**0**
Nursing Homes	0	0	0	**0**
Hospitals	0	0	0	**0**
Libraries	0	0	0	**0**

1 Residences were mitigated through previous Part 150 Studies conducted by KCAB
2 Residence was either built after Part 150 mitigation program, never in the 65 DNL of an official Noise Exposure Map, or an ineligible property.

Notes: Population numbers are estimates based on the 2010 U.S. Census average household size per number of housing units.

Source: Landrum & Brown, 2018.



Air Cargo Facility Environmental Assessment

Future (2026) Proposed Action Noise Exposure Contours

EXHIBIT: **5-5**

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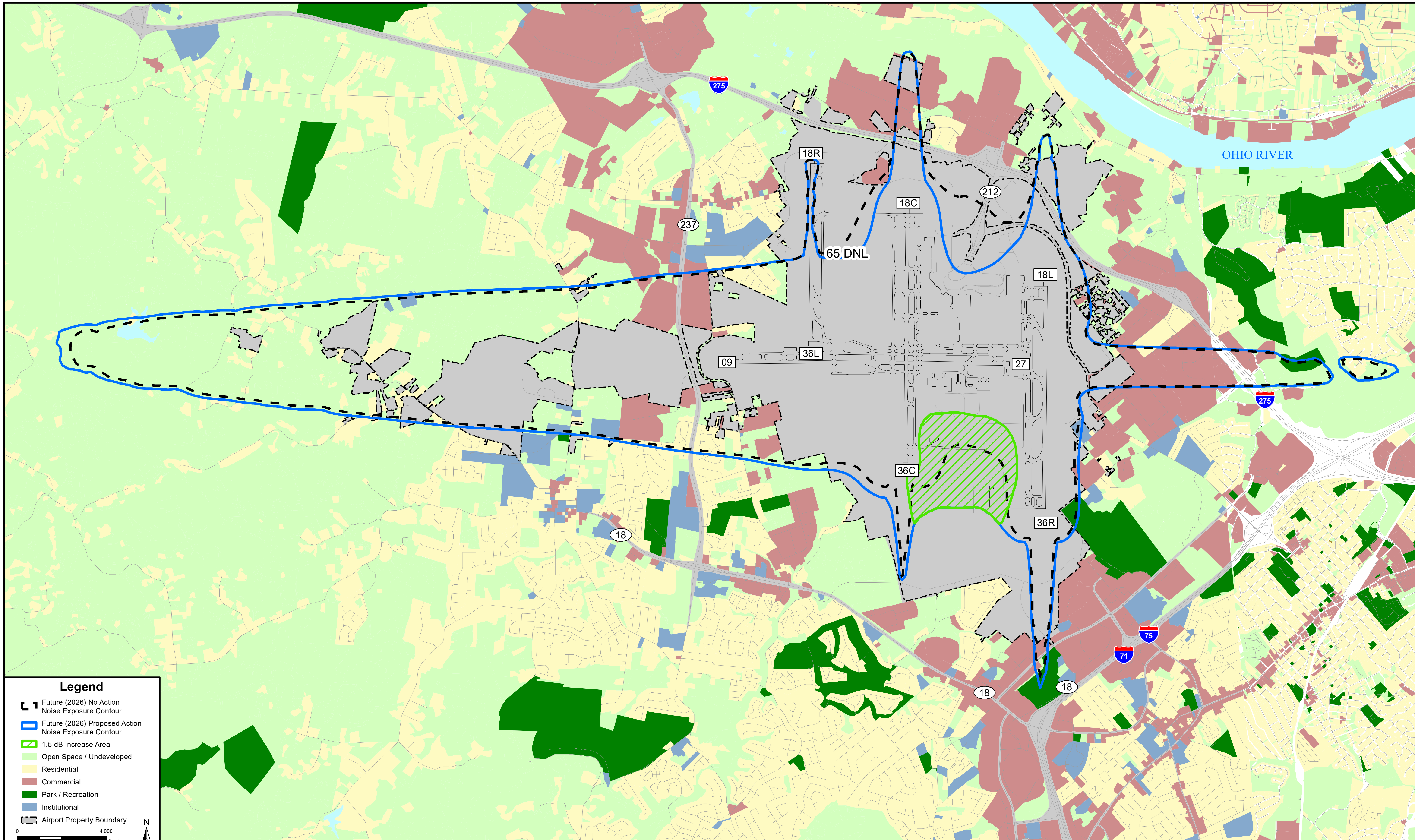

Air Cargo Facility Environmental Assessment

Future (2026) No Action Noise Exposure Contours Compared to Future (2026) Proposed Action Noise Exposure Contours

EXHIBIT: **5-6**

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Construction

Table 5-17 depicts an estimate of the typical maximum sound level energy from various types of construction equipment that is likely to be used during construction of the Proposed Action. The total sound energy would be a product of a machine's sound level, the number of such machines in service, and the average time they operate.

Construction activities associated with the Proposed Action would result in temporary noise impacts to the residential areas surrounding the DSA. However, major construction activities would be limited to daylight hours. Additionally, noise from construction equipment would likely not be discernible from other background noise sources such as aircraft and roadway noise in most locations.

Table 5-17
CONSTRUCTION EQUIPMENT NOISE

Construction Equipment	Typical Maximum Sound Level (Lmax) in dB(A) at 50 feet
Dump Truck	76
Concrete Mixer Truck	79
Chain Saw	84
Crane	81
Jackhammer	89
Scraper	84
Man Lift	75
Dozer	82
Tractor	84
Paver	77
Roller	80
Generator	81
Impact Pile Driver	101
Rock Drill	81
Pump	81
Pneumatic Tools	85
Backhoe	78

Source: Federal Highway Administration, *Construction Noise Handbook, 9.0 Construction Equipment Noise Levels and Ranges*. Available online at https://www.fhwa.dot.gov/Environment/noise/construction_noise/handbook/handbook09.cfm Accessed May 2018.

5.12.3 MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES

No significant noise impacts would occur due to the Proposed Action in 2021 or 2026; therefore, no mitigation measures are required. However, in 2026 it is acknowledged that 43 residences may be newly exposed to 65 DNL. Given that the certainty of these impacts is unclear, it is not prudent to offer mitigation at this time. In order to address these potential impacts, KCAB commits to updating the 2006 Part 150 Study Update a full calendar year after opening of the air cargo facility to analyze noise impacts and to determine if updates to the current noise abatement program, including offering mitigation, would minimize impacts to residences in the 65+ DNL contour.

5.13 SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S HEALTH AND SAFETY RISKS

This section presents the analysis of potential impacts to socioeconomic impacts, environmental justice impacts, and children's environmental health and safety risks that would occur as a result of the No Action and the Proposed Action.

5.13.1 NO ACTION

Socioeconomic Impacts

Socioeconomic impacts are assessed to determine the effect that the proposed airport development would have on human environment such as population, employment, housing, and public services. The types of socioeconomic impacts that typically arise from airport development are:

- Inducing substantial economic growth in an area, either directly or indirectly (e.g., through establishing projects in an undeveloped area);
- Disrupting or dividing the physical arrangement of an established community;
- Causing extensive relocation when sufficient replacement housing is unavailable;
- Causing extensive relocation of community businesses that would cause severe economic hardship for affected communities;
- Disrupting local traffic patterns and substantially reducing the levels of service of roads serving an airport and its surrounding communities; or
- Producing a substantial change in the community tax base.

Inducing Growth: With or without the development of the new air cargo facility, it is assumed the air cargo service provider would continue to operate at existing facilities and grow at CVG, as described in Chapter 3. As a result, it is anticipated the air cargo service provider would directly employ approximately 2,720 people by 2021 and 4,550 people by 2026 from the surrounding local communities. It is also expected, that indirect economic growth in the surrounding communities would occur to support the operation and the employees.

Disrupting Communities: The No Action would not disrupt or divide an established community. Therefore, no impacts to socioeconomic resources would occur as a result of disruption to an established community.

Relocation of Residences: The No Action would not result in the acquisition or relocation of residential properties. Therefore, no impacts to socioeconomic resources would occur as a result of relocation of residences.

Relocation of Businesses: The No Action would not result in relocation of community businesses located on or off-Airport. Therefore, no impacts to socioeconomic resources would occur as a result of relocation of businesses.

Disruptions of Local Traffic Patterns: The No Action would not result in modifications to off-Airport roadways. However, a reduction in the level of service on roads serving the Airport is expected from the increased traffic from employees and delivery trucks.

Substantial Loss in Community Tax Base: The No Action would not result in a substantial loss in community tax base. Therefore, no impacts to socioeconomic resources would occur as a result.

Environmental Justice

As previously described in the regulatory setting in Chapter Four, Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations,* requires all federal agencies to address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The EO also directs federal agencies to incorporate environmental justice as part of their overall mission by conducting their programs and activities in a manner that provides minority and low-income populations an opportunity to participate in agency programs and activities.

The USDOT Order 5610.2(a) provides definitions for minority and low income populations:

a. Low-Income means a person whose median household income is at or below the Department of Health and Human Services poverty guidelines.

b. Minority means a person who is:

   (1) Black: a person having origins in any of the black racial groups of Africa;

   (2) Hispanic or Latino: a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race;

   (3) Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent;

   (4) American Indian and Alaskan Native: a person having origins in any of the original people of North America, South America (including Central America), and who maintains cultural identification through tribal affiliation or community recognition; or

   (5) Native Hawaiian and Other Pacific Islander: people having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

c. Low-Income Population means any readily identifiable group of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed USDOT program, policy or activity.

d. Minority Population means any readily identifiable groups of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed USDOT program, policy or activity.

The EO relates to requirements in Title VI of the *Civil Rights Act of 1964* (Title VI), the NEPA, the *Uniform Relocation Assistance and Real Property Acquisition Policies Act* (Title 49 C.F.R. § 24), and other applicable statutes and regulations. Title VI provides that no person will, on the grounds of race, color, religion, sex, national origin, marital status, disability, or family composition, be excluded from participation in, be denied the benefits of, or be otherwise subject to discrimination under any program of the federal, state, or local government. Title VIII of the *1968 Civil Rights Act* guarantees each person equal opportunity in housing.

FAA Order 1050.1F provides guidance for the preparation of environmental justice analysis in support of an EA. The action would have the potential to lead to a disproportionately high and adverse impact to an environmental justice population, i.e., a low-income or minority population, due to:

- Significant impacts in other environmental impact categories; or
- Impacts on the physical or natural environment that affect an environmental justice population in a way that the FAA determines are unique to the environmental justice population and significant to that population.

Disproportionately high and adverse effect on minority and low-income populations means an adverse effect that:

1. Is predominately borne by a minority population and/or a low-income population; or
2. Will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the nonminority population and/or non-low-income population.

Based on a review of the direct and indirect effects and the population characteristics of the area around the Airport, no impact category would have significant impacts. Therefore, no impacts to minority or low-income populations would occur under the No Action.

Children's Environmental Health and Safety Risks

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, requires all federal agencies to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. No physical development would occur for the No Action. Therefore, no impacts to children's environmental health and safety risks would occur.

5.13.2 PROPOSED ACTION

Socioeconomic Impacts

<u>Inducing Growth:</u> With the development of the new air cargo facility, it is anticipated the air cargo service provider would directly employ approximately 2,720 people by 2021 and 5,120 people by 2026 from the surrounding local communities. The Future (2021) Proposed Action and the Future (2021) No Action have the same number of employees because it is assumed all of the forecasted activity would be accommodated at existing facilities at CVG. The Future (2026) Proposed Action, results in an increase of approximately 285 employees over the Future (2026) No Action. This increase is due to the air cargo facility accommodating all of the forecasted activity, where it was assumed the Future (2026) No Action would not accommodate all of the activity. It is also expected that indirect economic growth in the surrounding communities would occur to support the operation and the employees.

<u>Disrupting Communities:</u> The Proposed Action would not disrupt or divide an established community. Therefore, no impacts to socioeconomic resources would occur as a result of disruption to an established community.

<u>Relocation of Residences:</u> The Proposed Action would not result in the acquisition or relocation of residential properties. Therefore, no impacts to socioeconomic resources would occur as a result of relocation of residences.

Relocation of Businesses: The Proposed Action would not result in relocation of community businesses located on or off-Airport. Therefore, no impacts to socioeconomic resources would occur as a result of relocation of businesses.

Disruptions of Local Traffic Patterns: The Proposed Action, along with other planned development along Aero Parkway, would cause an increase in surface traffic. A Draft Traffic Impact Study (TIS) was prepared to describe and measure the impact of traffic generated by the proposed development on the existing roadway system. The TIS was coordinated with the Kentucky Transportation Council (KYTC), KCAB, Boone County, and the City of Florence. The TIS recommended roadway improvements for potential impacts related to the proposed air cargo facility. These recommendations are included in **Appendix H, *Traffic***. In addition, the State Kentucky and the Ohio Kentucky Indiana Regional Council on Governments (OKI) will be conducting a planning study for the region. With the implementation of the roadway improvements, no impacts to socioeconomic resources would occur as a result of disruptions of local traffic patterns.

The Proposed Action has the potential to change surface vehicle traffic patterns during construction. Standard traffic engineering techniques would be utilized to maintain traffic during construction. However, temporary construction impacts could include increased commercial traffic on neighborhood roads, increased traffic congestion, increased travel distances, and increased travel times for drivers. Normal neighborhood vehicular traffic patterns could also be disrupted if drivers chose to cut-through neighborhoods to avoid congestion induced by construction activities.

A construction management plan would be prepared which, based on the selected contractor(s) haul plan, would specify hours of operation, haul routes, and similar controls. It is expected that such a plan would be consistent with normal contracting practices. It is likely that a contractor would avoid scheduling haul activities during extreme congestion periods or weather conditions because it could increase costs to the contractor and affect the schedule.

During construction, traffic to and from the site would also increase and could potentially result in a reduction in the level of service of the local roadways. The majority of soil hauling would occur within the DSA to achieve the proper grade. A small amount of construction debris and trash removal would occur during construction and Wendell Ford Boulevard and Aero Parkway would be used for the hauling. To mitigate this potential impact, traffic on local roadways would be maintained during construction activities through the use of flaggers, arrow boards, and traffic control devices in order to reduce any potential congestion on the roads.

Substantial Loss in Community Tax Base: The Proposed Action would not result in a substantial loss in community tax base. The Proposed Action has the potential to increase the community tax base. Therefore, no adverse impacts to socioeconomic resources would occur as a result.

Environmental Justice

Under the Proposed Action, no significant or disproportionate impacts would be expected to occur to minority or low-income populations. As stated in Chapter Four, the AEDT did not identify census block groups composed of minority populations and/or 50 percent or more low income populations within the GSA. Therefore, potential indirect impacts from the Proposed Action would not disproportionately affect any one area and no significant environmental justice impacts would occur.

Children's Health and Safety Risks

Implementation of the Proposed Action would not be expected to create environmental health risks or safety risks for any persons, regardless of age. Therefore, there would be no potential significant impact to children's environmental health and safety under the Proposed Action.

5.13.3 MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES

The TIS being prepared for the Proposed Action will recommend roadway improvements for potential impacts to the local roadways as appropriate.

5.14 VISUAL EFFECTS

This section presents the analysis of potential visual effects, including impacts related to light emissions and visual resources and visual character, as a result of the No Action and the Proposed Action. Visual effects include the extent to which a proposed action would produce light emissions that create annoyance or interfere with activities, or contrast with, or detract from, the visual resources and/or the visual character of the existing environment.

Per FAA Order 1050.1F, light emission impacts are typically related to; the extent to which any lighting or glare associated with the proposed action or alternative(s) would create an annoyance for people in the vicinity; would interfere with their normal activities including work and recreation; or would contrast with or detract from the visual resources and/or the visual character of the existing environment. Visual resources include buildings, sites, traditional cultural properties, and other natural or manmade landscape features that are visually important or have unique characteristics. Visual character refers to the overall aesthetics of the existing landscape.

There are no federal special purpose laws or requirements specific to light emissions and visual effects although other special purpose laws, such as the NHPA or Section 4(f) of the USDOT Act have specific provisions for visual impacts to protected resources. In order to determine the potential visual effects, the Proposed Action conditions are compared to the No Action conditions to determine if there is a potential for annoyance and adverse impacts.

5.14.1 NO ACTION

Light Emissions

There would be no change to light emissions for the No Action.

Visual Resources and Visual Character

There would be no change to the existing visual resources or visual character for the No Action.

5.14.2 PROPOSED ACTION

Light Emissions

The Proposed Action would include development that would increase light emissions from the illumination of the proposed new buildings and parking areas. The potential lighting sources that could impact the closest residential area would be located in the parking lots and security lighting on the buildings. The parking lot lights would be directed at a downward angle and therefore would not impact the residences. The security lighting would illuminate the immediate area surrounding the building and would also be shielded or directed at angles that would not cause lighting impacts to the residences. Light emissions during the construction of the Proposed Action are not anticipated to cause any impact to the surrounding areas as most of the construction would occur during daytime hours. No significant increase in light intensity is expected to occur within residential areas due to: Aero Parkway and tree lines separating the proposed air cargo facility from residences (located approximately 550 feet to the south of the DSA) and the existing light emissions in the vicinity of the Proposed Action sites. Therefore, no significant impacts from light emissions would occur.

Visual Resources and Visual Character

As previously discussed, the DSA is located on the southern edge of the Airport in a predominantly commercial area. The Proposed Action would not affect the nature of the visual character of the area have the potential to contrast with the visual character, or to block/obstruct views of visual resources. In addition, Aero Parkway and a tree line separate the residences from the development. Therefore, the visual character would not change from the No Action and would not result in a significant impact.

5.14.3 MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES

The Proposed Action does not exceed the applicable thresholds of significance for light emissions, visual resources, or visual character. Therefore, no mitigation measures are required. However, angular adjustments would be made to lighting to direct light at appropriate angles to minimize potential light impacts to the closest residences.

5.15 WATER RESOURCES

This section presents the analysis of potential impacts to water resources as a result of the No Action and the Proposed Action.

5.15.1 NO ACTION

Wetlands / Streams

No physical development would occur for the No Action. Therefore, no impacts to wetlands would occur.

Floodplains

No physical development would occur for the No Action. Therefore, no impacts to floodplains would occur.

Surface Waters

No physical development would occur for the No Action. Therefore, no impacts to the Gunpowder Creek watershed would occur.

Groundwater

No physical development would occur for the No Action. Therefore, no impacts to groundwater would occur.

5.15.2 PROPOSED ACTION

Wetlands/Streams

As discussed in Chapter Four, field surveys were conducted in the DSA. The Proposed Action would result in wetland and streams within the DSA being impacted through filling or culverting. **Table 5-18** details the impacts on wetlands and streams from the Proposed Action for the air cargo facility at CVG.

Table 5-18
WETLAND AND STREAM IMPACTS

Stream		
	Linear Feet	**Acreage**
Ephemeral	12,698	NA
Intermittent	42,710	NA
Perennial	3,655	NA
Total	**59,063**	**NA**
Wetland		
	Linear Feet	**Acreage**
Palustrine Emergent Wetland (PEM)	NA	8.78
Palustrine Scrub-Shrub Wetland (PSS)	NA	0.08
Palustrine Forested Wetland (PFO)	NA	0.51
Palustrine Unconsolidated Bottom Wetland (PUB)	NA	0.27
Pond	NA	0.89
Total	**NA**	**10.53**

Source: Environment and Archaeology, 2018

Implementation of the Proposed Action would not result in significant impacts to wetlands and streams because compensatory mitigation will be provided. A detailed compensatory mitigation plan would be required to obtain the necessary authorizations to construct the Proposed Action. With implementation of a mitigation plan to compensate for the losses of wetland and streams resulting from the construction of the Proposed Action, the environmental impact of the Proposed Action would not be significant. The Proposed Action would impact approximately 12,698 linear feet of ephemeral streams, 42,710 linear feet of intermittent streams and 3,655 linear feet of perennial streams. In addition, 10.53 acres of wetland would be impacted. Coordination with the U.S. Army Corps of Engineers (USACE) and Kentucky Division of Water (DOW) is underway to obtain the appropriate permits per the U.S. Clean Water Act and identify mitigation requirements. All permit and mitigation conditions would be met; therefore, no significant impacts would occur to wetlands and streams. Section 5.15.3 outlines detailed mitigation measures for the impacts to the streams and wetlands.

In order for the USACOE to issue a CWA permit, the proposed activity must comply with the CWA Section 404 (b) (1) Guidelines. As discussed in Chapter Three, *Alternatives*, the other two alternative sites do not meet the project purpose; therefore they are considered not practicable. As no other alternative site was determined practicable, the Proposed Action is identified as the least environmentally damaging practicable alternative that meets the overall purpose of the proposed project. Implementation of the Proposed Action would meet the requirements of EO 11990 *Protection of Wetlands and* DOT Order 5660.1A *Preservation of the Nation's Wetlands*, because there is no less environmentally damaging practicable alternative to constructing the proposed project than the Proposed Action.

Floodplains

The Proposed Action would include development within the 100-year floodplain. As discussed in Chapter Two, *Purpose and Need*, and Chapter Three, *Alternatives* no other alternative sites meet the project purpose. Therefore, it is not practicable to implement the Proposed Action without constructing in an area currently in the 100-year floodplain. Although avoidance and minimization was incorporated into the project design, complete avoidance of floodplain impacts is not practical due to the air cargo facility design and layout that is dictated by the air cargo service provider's business model.

The Proposed Action would impact approximately 13 acres of a 100-year floodplain designated Zone AE[28]. However, these impacts would not be significant and would not result in: 1) a considerable probability of the loss of human life; 2) likely future damage associated with the encroachment that could be substantial in cost or extent, including interruption of service or loss of vital transportation facility; or 3) a notable adverse impact on natural and beneficial floodplain values. Design measures considered to minimize floodplain encroachments may include special flood related design criteria, elevating facilities above base flood levels, locating nonconforming structures and facilities out of the floodplain, or minimizing fill placed in floodplains. The air cargo facility would include a storm sewer to collect runoff from upstream areas and bypass it around the development to the existing outfall under Aero Parkway. However, if floodplain modeling conducted during final design indicates the proposed development has the potential to impact downstream elevations, the storm sewer would be tied into one of the detention facilities to provide further peak flow attenuation upstream of the outfall. As a result, this encroachment would not be significant.

Floodplain Management coordination would be required for the construction of the Proposed Action. The DOW requires permitting and documentation for a determination of compliance with state laws and regulations and of the effects of the project on the floodway and the flooding of the stream.

Surface Waters

The construction and implementation of the Proposed Action would result in impacts to surface waters. New detention facilities and outfalls are proposed for the development to provide post-construction stormwater quantity and quality control for stormwater runoff, in accordance with Northern Kentucky Sanitation District No. 1 (SD1) stormwater regulatory requirements for new and redevelopment. Although a majority of the DSA currently drains to the CVG Southwest Detention Facility, the existing detention facility does not have sufficient capacity to manage flows from the Proposed Action.

Separate stormwater management facilities are proposed for the western majority of the DSA and the southeastern portion of the DSA, based on the proposed drainage divide. The proposed detention basins would reduce post-construction stormwater discharge rates in accordance with SD1 stormwater quantity control requirements. These include restricting post-development discharge rates to less than pre-development runoff rates for the 2, 10, 25, 50, and 100-year design storms. Additionally, the 2-year storm post-development discharge rate would be controlled to meet SD1's "$Q_{critical}$" criteria, which is intended to protect the downstream receiving water from potentially erosive flows.

28 Zone AE is an area inundated by the 1 percent annual chance flooding event.

The proposed detention basins would also reflect the following additional design features and characteristics to comply with SD1 requirements for stormwater quantity control and quality control basins (dry extended detention basins), as well as FAA requirements for managing hazardous wildlife attractants:

- Maximum 48-hour drawdown time with no standing water, steep side slopes, and vegetation that minimizes attraction of wildlife, to comply with FAA criteria.
- Steep side slopes that are coordinated between SD1 and FAA requirements.
- Incorporation of an internal berm if needed to satisfy SD1 requirements for a 3:1 length to width ratio and FAA requirements for a narrow, linearly shaped basin.
- Access road and ramp into basin, with paved low flow channel to facilitate sediment removal and maintenance.

West Detention Basin: The West Detention Basin is proposed to meet SD1 requirements for stormwater runoff from the western majority of the air cargo facility that would drain to Gunpowder Creek. It would serve approximately 500 acres of development, including the sortation building, the aircraft apron, ground support equipment (GSE) landside and airside facilities, and adjacent development. The basin would discharge stormwater to a new outfall at Gunpowder Creek.

The West Detention Basin is proposed to be an unlined, open surface detention basin with a footprint of approximately 11 acres and a detention capacity of 44 million gallons. The basin capacity is subject to change based on final modeling in the design process and regulatory review by SD1. The West Detention Basin would discharge to a new outfall that drains into Gunpowder Creek. The outfall would include the following design features:

- Emergency overflow spillway on top of basin berm;
- Piped outlets from basin multi-stage outlet structure;
- Paved apron with baffles or other energy dissipation features to reduce velocities and potential for stream erosion;
- Paved or riprap spillway channel routing flows from all basin outlets to stream; and
- Riprap or other erosion control and channel protection within stream at channel outlet.

The outfall channel would be constructed along the existing slope north of the proposed detention basin. The channel would be oriented in a northwesterly direction to align flows with existing stream flows in Gunpowder Creek to the extent possible and reduce the potential for erosion along the opposite stream bank. As previously noted, erosion control features may need to be installed within Gunpowder Creek at the outfall tie-in point, potentially both above and below the high-water mark, and on both sides of the stream. The precise placement and extent of these features would be determined based on the results of stream erosion control modeling (associated with the $Q_{critical}$ criteria) and SD1 coordination.

Deicer would be collected from the aircraft apron and conveyed to West Detention Basin. The aircraft apron would be divided into four areas, each segregated individually based on deicer concentration. Low concentration deicer would be treated using an aerated gravel bed (AGB). High concentration deicer would be treated using an anaerobic fluidized bed reactor (AFBR). Effluent from the treatment systems would discharge to the stormwater detention basin.

Southeast Detention Basins: The Southeast Detention Basins are proposed to meet SD1 requirements for stormwater runoff from the southeastern portion of the DSA. These basins would discharge to the south through existing culverts under Aero Parkway, which drain to Powder Creek, a tributary of Gunpowder Creek. It would serve approximately 100 acres of development, including the area south of the sortation building and east of the apron, and a portion of the relocated Wendell Ford Boulevard. The basin would discharge stormwater to one of the two existing outfalls north of Aero Parkway to remain consistent with pre-development conditions to the extent possible, supporting regulatory requirements.

Several basins would be required to manage the post-construction stormwater flows. The Southeast Detention Basins are proposed to be unlined, open surface detention basin with a detention capacity of approximately 10 million gallons. The basin capacity is subject to change based on final modeling in the design process and regulatory review by SD1. The proposed basins would discharge to one of the two existing outfalls along Aero Parkway.

Permitting

SD1 requires a Land Disturbance Permit to demonstrate compliance with post-construction stormwater management requirements (for quantity and quality control) in SD1's *Storm Water Rules and Regulations* document and *Storm Water Best Management Practices Manual.* A Grading Permit can be acquired to allow grading activities to proceed in advance of the Land Disturbance Permit.

The new outfalls would require permit coverage under Kentucky Department of Environmental Protection's (KYDEP) National Pollutant Discharge Elimination System (NPDES) [29] permitting program for stormwater discharges associated with industrial activity. The permit may establish water quality based effluent limits for select parameters based on the results of a reasonable potential analysis that examines the potential for exceedance of state water quality standards. Limits may include parameters associated with deicing activities (e.g., chemical oxygen demand) to protect in-stream levels of dissolved oxygen.

Depending on the final height of the basin berm, the West Basin may trigger classification as a dam by the DOW (berm height of at least 25 feet above existing grade, or storage capacity of at least 50 acre-feet above existing grade). Coordination will occur with DOW during the design to confirm if a permit will be required.

Groundwater

The DSA is in a well-developed area with public water available. As noted in Chapter Four, Affected Environment, there are no drinking water wells or agricultural wells within a one-mile radius of the DSA. Construction and operation of the proposed development would abide by all applicable regulations related to spill prevention and control regulations to prevent spills from causing significant adverse impacts to groundwater. Therefore, no significant impacts to groundwater are anticipated.

[29] Clean Water Act, Section 402, National Pollutant Discharge Elimination System permit.

5.15.3 MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES

KCAB has initiated securing the anticipated compensatory mitigation requirement through the purchase of credits from the Northern Kentucky University (NKU) In-Lieu Fee (ILF) Payment Program and the Kentucky Department of Fish and Wildlife Resources (KDFWR). Jurisdictional waterbody impacts (wetlands) would require a 2:1 mitigation ratio. Perennial stream impacts for poor quality streams require a 1.5:1 ratio and a 3:1 ratio for excellent streams. Poor quality intermittent stream impacts require a 1:1 ratio and average quality intermittent stream impacts require a 1.5:1 ratio. Ephemeral streams would require a 0.5:1 ratio. The ILF Payment Program requires an increase of 20 percent for temporal loss. Therefore, the mitigation units require a 20 percent increase. Wetland impacts are rounded to the nearest tenth of an acre. The mitigation requirements for Proposed Action are shown in **Table 5-19**.

Table 5-19
MITIGATION REQUIREMENTS FOR WETLAND AND STREAM IMPACTS

WATERBODY	AMOUNT (ACRE/LINEAR FT.)	QUALITY	RATIO	IN-LIEU FEE	ADJUSTED MITIGATION UNITS (AMU)
Wetlands (all types)[1]	10.53 acres		2:1	1.2	25.3 acres
Perennial Stream	3,038 linear ft.	Poor	1.5:1	1.2	5,468 linear ft.
Perennial Stream	617 linear ft.	Excellent	3:1	1.2	2,221 linear ft.
Intermittent Stream	1,524 linear ft.	Average	1.5:1	1.2	2,743 linear ft.
Intermittent Stream	41,186 linear ft.	Poor	1:1	1.2	49,423 linear ft.
Ephemeral Stream	12,698 linear ft.	Poor	0.5	1.2	7,619 linear ft.
Total Wetland	**10.53 acres**				**25.3 acres**
Total Stream	**59,063 linear ft.**				**67,474 linear ft.**

1 Jurisdictional waters of the U.S.

Source: Environment & Archaeology, LLC

Based on the initial conversations with NKU and KDFWR, credits are available for purchase and KCAB initiated final negotiations with NKU and KDFWR.

Stormwater facilities would meet all applicable state and local regulations and stormwater discharges would comply with the terms of the Kentucky Pollution Discharge Elimination System (KPDES). A KPDES permit would be obtained. Best Management Practices (BMPs) would be incorporated into the construction. Contractors would be required to comply with all applicable federal, state, and local laws and regulations, including FAA guidance contained in AC 150/5370-10G, *Standards for Specifying Construction of Airports*, including Item P-156 Temporary Air and Water Pollution, Soil Erosion and Siltation Control; AC 150/5320-15A *Management of Airport Industrial Waste*; and AC 150/5320-5D, *Subsurface Drainage Design*.

5.16 CUMULATIVE IMPACTS

This section describes the past, present, and reasonably foreseeable future actions relevant to cumulative impacts. The analysis of cumulative impacts recognizes that while the impacts of individual actions may be small, when combined with the impacts of past, present, and reasonably foreseeable future actions on populations or resources in and around CVG, the impacts could be potentially significant.

Cumulative impacts are defined by the CEQ in 40 C.F.R. § 1058.7 as: "The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." Additionally, the CEQ further explained in *Considering Cumulative Effects under the National Environmental Policy Act* that "each resource, ecosystem, and human community must be analyzed in terms of its ability to accommodate effects, based on its own time and space parameters." Therefore, a cumulative effects analysis normally will encompass geographic boundaries beyond the immediate area of the Proposed Action, and a time-frame, including past actions and foreseeable future actions, in order to capture these additional effects.

The evaluation of cumulative impacts in this EA considers the past, present, and reasonably foreseeable future projects or actions undertaken by KCAB and other parties such as Boone County.

5.16.1 DEFINING THE CUMULATIVE IMPACT STUDY AREA AND TIMEFRAMES

For the purposes of this EA, other projects at the Airport or projects within the GSA as shown in Exhibit 4-1 will be considered to be within the overall Cumulative Impact Study Area. The FAA 1050.1F Desk Reference Section 15.2 states "*The study area for cumulative impacts analysis is the same area defined for a project's direct and indirect impact analysis. Thus, the study area will be different for each impact category.*" The Cumulative Impact Study Area(s) is consistent with the FAA 1050.1F Desk Reference using the DSA and the GSA and the specific study areas identified in Chapter Four, *Affected Environment* for each resource category.

The projects to be included in the Cumulative Impact analysis were identified through coordination with the KCAB, Boone County, Kenton County, City of Florence, City of Burlington, and the City of Hebron. The past actions are defined as those that were completed within the last five years from 2013 to 2018. Present actions are any other actions that are occurring in the same general timeframe as the proposal. Present actions for this EA are defined as those completed in 2018 or where construction is ongoing. Reasonably foreseeable future actions are actions that may affect projected impacts of a proposal and are not remote or speculative. Reasonably foreseeable future actions are defined as those planned to be completed between 2019 and 2024. This window of time represents a timeframe that is long enough to identify potential follow on impacts, yet near enough that realistic predictions of projects and impacts can be made. Potential projects beyond 2024 would be considered speculative. This section identifies those past, present, and reasonably foreseeable future projects.

5.16.2 PAST ACTIONS

Past actions that have occurred within the past five years in the Cumulative Impact Study Area are identified in **Table 5-20**.

Table 5-20
PAST ACTIONS

PROJECT NAME	LOCATION	DESCRIPTION	CURRENT STATUS
Interchange modification of Mall Road and I-75	Florence, KY	Add a southbound on-ramp to I-75	Completed
Single point urban interchange	Burlington, KY	Intersection of KY18 & KY237	Completed
Demolition of Terminal 1 & 2	Airport property	Demolition of Terminals 1 & 2	Completed
Development of non-aeronautical land	Airport property	Commercial development	Completed
A-One Pallet	Florence	Grading and concrete	Completed
Logistics One Tenant Improvements	Florence	Parking lot, fence sidewalk & guard house	Completed
Proposed Mattress Firm	Florence	5,004 square foot building	Completed
United Installs	Erlanger	14,988 square foot office and warehouse	Completed
Mubea	Florence	2 New Buildings - 119,416 square feet	Completed
Steve Greis RV & Boat Storage	Hebron	Boat & RV Storage	Completed
Team EPS Site Plan	Hebron	New building, parking area	Completed
James Sebree Site	Hebron	Storage building	Completed
Logistics One-CVG Lot 6A	Florence	Grading only	Completed
O'Reilly Auto Parts	Burlington	New building	Completed
AAA Cooper Transportation	Burlington	Office/Warehouse	Completed
US 25 Industrial Park Lot 10	Florence	Office with docks and parking	Completed
CVG-9 Parking Expansion	Hebron	Parking lot expansion	Completed
Meggitt Parking Lot Addition	Erlanger	Concrete Pad	Completed
Airpark International, Lot 26	Hebron	142,030 square foot distribution center	Completed
Fairways at Meadowood Ph C	Burlington	57 Units/14 Buildings/11 Acres	Completed
Logistics One at CVG	Florence	541,20 square foot building	Completed
Reigler Office	Florence	New office	Completed
Dominion Development	Florence	Office building	Completed
Anderson Contracting Point Pleasant	Hebron	Proposed warehouse	Completed

Table 5-20, *Continued*
PAST ACTIONS

PROJECT NAME	LOCATION	DESCRIPTION	CURRENT STATUS
Tente Casters	Hebron	16 space parking addition	Completed
Bluestar Building Addition	Hebron	Building addition	Completed
Brass Tap	Florence	New Building	Completed
Victory Lane Oil Change	Florence	Addition to building, parking lots	Completed
Litton Lane Parking Expansion	Hebron	Parking expansion	Completed
AutoZone #6094	Burlington	New building and parking	Completed
Point Pleasant Church of Christ	Hebron	New building and parking addition	Completed
CVG Site 6B East	Florence	Construction of industrial building	Completed
Tanner's Cove	Hebron	15 lots using approved plan	Completed
United Conveyor & Machinery	Hebron	Construction of 3,000 square foot building	Completed
Dunkin Donuts	Florence	2,150 square foot restaurant w/drive-thru	Completed
Cube-It Self Storage	Hebron	Self-storage buildings	Completed

Source: KCAB; https://transportation.ky.gov/Planning/Planning%20Studies%20and%20Reports/IMR%20Mall%20Road%20-%20Executive%20Summary.pdf

5.16.3 PRESENT ACTIONS

Present actions that are ongoin g in the Cumulative Impact Study Area are identified in **Table 5-21**.

Table 5-21
PRESENT ACTIONS

PROJECT NAME	LOCATION	DESCRIPTION	CURRENT STATUS
KY237	Hebron, KY	Add lanes	Under construction
Veterans Way	Burlington, KY	Two lane extension between KY 18 and KY 237	Under construction
Intersection of Idlewild Road and Jefferson Street	Burlington, KY	Sidewalk & realign Intersection	Under construction
Burlington Sanitary Sewer Project	Burlington, KY	Replace sanitary sewer on Allen Fork Creek between Rogers Ln & SD1 pump station off Orient St.	Completed March 2018
Lynx Hangar Development	Airport property	Aircraft maintenance hangar	Under construction
CVG CONRAC	Airport property	Construction of consolidated rental car facility	Under construction
Logistics One	Florence, KY	Construction of 540,000 square foot building	Under construction
Dominion Development	Florence, KY	Construction of office building	Under construction
Evergreen Apartments	Florence, KY	Construction of 90 townhome units	Under construction
Mineola Concrete Plant	Erlanger, KY	Demo, clearing & grading of site for concrete plant	Under construction
Whitestone Links	Florence, KY	106,652 square foot building	Under construction
Kona Ice	Florence, KY	Storage buildings	Under construction
Menards	Florence, KY	Proposed Menards Store	Under construction
Fairfield Inn & Suites	Florence, KY	4-Story Hotel	Under construction
Tru By Hilton	Florence, KY	Site development	Under construction
StoryPoint	Union, KY	Building, parking & utilities	Under construction
Central Bank	Union, KY	2,786 square foot bank	Under construction
Holiday Inn Express & Suites	Florence, KY	Proposed 90 room hotel with 107 parking spaces	Under construction

Table 5-21, *Continued*
PRESENT ACTIONS

PROJECT NAME	LOCATION	DESCRIPTION	CURRENT STATUS
Rider's Automotive	Florence, KY	New building	Under construction
St. Henry District H.S. Fine Arts	Erlanger, KY	29,845.6 square foot building	Under construction
Boonus, LLC/HBC Radiomatic	Hebron, KY	11,000 square foot building addition	Under construction
Panera Bread and Retail Shell	Union, KY	7,522 square foot building with parking	Under construction
Staybridge Inn & Suites	Florence, KY	70,436 square foot hotel	Under construction
Verizon Retail Store	Florence, KY	Proposed Verizon Retail Store	Under construction
Union Connection	Union, KY	Construct a 21,327 square foot of two buildings	Under construction
Best Way Transfer Station	Burlington, KY	Solid waste station with weigh station and driveway	Under construction
Faithful Friends Site Plan	Hebron, KY	New building 1800 square foot & parking	Under construction
Quality Inn & Suites Parking Lot Ad	Erlanger, KY	Construction of parking lot	Under construction
CVG Site 6B West Logistics Three	Florence, KY	Grading & erosion control for future building construction	Under construction

Source: KCAB; https://www.boonecountyky.org/document_center/PlanningCommission/FutureRoadProjects.pdf; http://www.sd1.org/Projects/SD1ProjectsinBooneCounty.aspx

5.16.4 REASONABLY FORESEEABLE FUTURE ACTIONS

Reasonably foreseeable future actions that may occur within the next five years in the Cumulative Impact Study Area are identified in **Table 5-22**.

Table 5-22
REASONABLY FORESEEABLE FUTURE ACTIONS

PROJECT NAME	LOCATION	DESCRIPTION	CURRENT STATUS
Pleasant Valley Road	Florence, KY	Extension from Valley View Drive to Rogers Ln	Anticipated in the next five years
Add Auxiliary Lanes on I-75	Mt Zion Road to U.S. 42	Design and right-of-way are underway.	Anticipated in the next five years
Improve Safety on KY 717 (Turfway Road)	Florence, KY	Change 90-degree turn.	Anticipated in the next five years
Extend Multi-Use Path from Stephens Elementary	Burlington, KY	Along KY 237 to KY 20 and Cougar Path, County Project, SNK Funds, 2019 Bid Date	Anticipated in the next five years
Extend Center Turn Lane on Ted Bushelman Boulevard	Florence, KY	From Doering Drive to Aero Parkway, Airport Project, SNK Funds, Hiring Engineer	Anticipated in the next five years
Construct Sidewalk & Multi-Use Path on Dolwich Drive	Erlanger, KY	From Mineola Pike to I-275, Erlanger Project, SNK Funds, 2019 Bid date	Anticipated in the next five years
CVG Common Use Cargo Facilities	Airport property	Construction of cargo hangars	Anticipated in the next five years
DHL South Airfield Development	Airport property	Development of a new cargo distribution building, apron expansion, employee parking lot, at the DHL facility on the southeast side of CVG property	Anticipated in the next five years
Development of non-aeronautical land	Airport property	Commercial development	Anticipated in the next five years
NEPA Document to Change the ATCT Tower Order	Airport property	NEPA document to analyze the potential impacts due to changes in the Tower Order runway use directives. This NEPA document would incorporate measures OP-17 and OP-19 from the 2006 Part 150 Study.	Anticipated in the next five years
United Installs Detention Pond (Wall)	Erlanger, KY	Site plan	Anticipated in the next five years
Airpark International, Lot 25	Hebron, KY	Site plan	Anticipated in the next five years
Reladyna Site Improvements	Hebron, KY	Site plan	Anticipated in the next five years
Obara Corp Manufacturing	Florence, KY	Building addition	Anticipated in the next five years
Anderson Manufacturing	Hebron, KY	32,160 square foot building	Anticipated in the next five years

Source: KCAB; https://www.boonecountyky.org/document_center/PlanningCommission/FutureRoadProjects.pdf

5.16.5 CUMULATIVE IMPACT COMPARISON

Cumulative impacts must be evaluated relative to the direct and indirect effects of the Proposed Action for each environmental category. Significant cumulative impacts are determined according to the same thresholds of significance used in the evaluation of each environmental category in the environmental consequences discussion.

For environmental resources where construction and implementation of the Proposed Action would have no environmental impact, there is no potential for an adverse cumulative environmental impact to occur. Therefore, the following discussion of cumulative impacts discusses only those environmental categories where environmental impacts could result from implementation of the Proposed Action. Those categories are: air quality; biological resources; historic architectural, archeological, and cultural resources; noise and noise-compatible land use; traffic impacts; and water resources.

5.16.5.1 Air Quality

As discussed in Section 5.4, *Air Quality*, the increase in emissions due to construction and implementation of the Proposed Action would not exceed the applicable thresholds and are therefore not significant. Construction activities associated with the Proposed Action would result in temporary emissions from construction equipment, trucks, and fugitive dust emissions from site demolition and earthwork. The impacts would occur within the immediate vicinity of the construction site and would be mitigated through best management practices to reduce emissions, particularly fugitive particle emissions, during construction

While the Proposed Action would contribute to the cumulative emissions of air pollutants in Boone County, the cumulative effect of the net air emissions would not cause or contribute to any new violation of the NAAQS, would not increase the frequency or severity of an existing violation, and would not delay timely attainment of any standard. Therefore, the cumulative impact on air quality is not significant.

5.16.5.2 Biological Resources

As discussed in Section 5.5, *Biological Resources*, the Proposed Action would result in impacts to the Indiana bat and the northern long-eared bat due to the removal of 244 acres of habitat for the full build out of the air cargo facility. Through formal ESA Section 7 consultation with the USFWS suitable mitigation options, including mitigation through payment into the IBCF were determined.

Implementation of the Proposed Action combined with the implementation of one or more of the past, present, and reasonably foreseeable future actions would not result in a cumulative impact to biological resources because each of these projects is required to have their own protective measures to avoid, minimize, and provide habitat compensation during implementation of their project. Therefore, implementation of the Proposed Action, when combined with other past, present, or reasonably foreseeable projects would not result in significant adverse impacts to biological resources.

5.16.5.3 Historical, Architectural, Archeological, and Cultural Resources

As discussed in Section 5.9, *Historical, Architectural, Archeological, and Cultural Resources*, the Proposed Action would result in adverse impacts to three historical resources. Through formal Section 106 consultation and development of an MOA with the KHC, suitable mitigation options were agreed upon.

Implementation of the Proposed Action combined with the implementation of one or more of the past, present, and reasonably foreseeable future actions would not result in a cumulative impact to historical, architectural, archeological, and cultural resources because each projects would be required to adhere to measures to avoid, minimize, and provide mitigation during implementation of their project. Therefore, implementation of the Proposed Action, when combined with other past, present, or reasonably foreseeable projects would not result in significant adverse impacts to historical, architectural, archeological, and cultural resources.

5.16.5.4 Noise and Noise-Compatible Land Use

As discussed in Section 5.12, *Noise and Noise-Compatible Land Use*, the Proposed Action would not result in significant noise increases, defined as an increase of 1.5 dB or more within the DNL 65 dB contour over noise sensitive land uses. However, additional residences would be located within the +65 DNL contour. However, this is not considered a significant impact. A noise impact would be considered to be significant if there were an increase of 1.5 decibel (dB) or more over noise-sensitive facilities within the 65 DNL contour when comparing the No Action and Proposed Action of the same corresponding year.

Implementation of the Proposed Action combined with the implementation of one or more of the past, present, and reasonably foreseeable future actions would not result in a cumulative impact to noise and noise-compatible land uses because each project with a significant impact due to noise is required to have their own mitigation measures to minimize impacts during implementation of their project. Therefore, implementation of the Proposed Action, when combined with other past, present, or reasonably foreseeable future projects would not result in significant adverse impacts to noise and noise-compatible land uses.

5.16.5.5 Socioeconomics, Environmental Justice, and Children's Health and Safety Risks

As discussed in Section 5.13, *Socioeconomics, Environmental Justice, and Children's Health and Safety Risks*, the Proposed Action would result in disruptions to local traffic patterns. Through consultation with the local jurisdictions and traffic agencies, mitigation measures will be recommended to reduce impacts when the Proposed Action is implemented.

Implementation of the Proposed Action combined with the implementation of one or more of the past, present, and reasonably foreseeable future actions would not result in a cumulative traffic impact, because the TIS prepared for this EA included the other roadway projects into the traffic analysis. Therefore, implementation of the Proposed Action, when combined with other past, present, or reasonably foreseeable future projects would not result in significant adverse traffic impacts.

5.16.5.6 Water Resources

As discussed in Section 5.15, *Water Resources*, the Proposed Action would result in impacts to streams and wetlands located in the DSA. Coordination with the USACE has determined that a permit under Section 404 of the CWA would be required for construction of the Proposed Action. Permitting under Section 401 of the CWA would also be required for the Proposed Action. Furthermore, a NPDES permit would need to be obtained.

The storage volume necessary to attenuate the 100-year onsite surface water flows due to the Proposed Action would be met through the construction of on-site detention basins. As a result, the proposed detention basins would provide a cumulatively beneficial impact.

Implementation of the Proposed Action combined with the implementation of one or more of the past, present, and reasonably foreseeable future actions would not result in a cumulative impact to water resources because each of these projects is required to have their own protective measures and permits to avoid and minimize impacts during implementation of their project.

The other past, present, or reasonably foreseeable future projects would be required to comply with all existing and future water quality regulatory criteria and permit requirements. In addition, these past, present, or reasonably foreseeable future projects would also be required to develop BMPs that would ensure that concentrations of pollutants of concern do not exceed regulatory criteria. Therefore, there would be no significant cumulative impacts to water resources.

5.16.6 CONCLUSION

The level of cumulative impacts anticipated to occur within these environmental resource categories is not significant due to the types of past, present, and reasonably foreseeable future projects, the extent of the built environment in which they would occur, the lack of certain environmental resources in the area, and the mitigation measures identified for the Proposed Action. Therefore, implementation of the Proposed Action would not result in significant cumulative environmental impacts.

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Chapter Six

CHAPTER SIX
PUBLIC INVOLVEMENT

6.1 DRAFT ENVIRONMENTAL ASSESSMENT

To satisfy requirements for public involvement, an advertisement announcing the availability of the Draft Environmental Assessment (EA) was published in the *Cincinnati Enquirer* on September 25, 2018. The advertisement provided the public meeting date, time, and location, informed the public on how to obtain a copy of the Draft EA, and initiated the public comment period. Copies of this notice are provided in **Appendix A, *Agency and Public Involvement***. The Draft EA was available at the locations identified below during normal business hours.

Kenton County Airport Board Offices
77 Comair Boulevard
Erlanger, KY 41018

Federal Aviation Administration
Memphis Airports District Office
2600 Thousand Oaks Blvd, Suite 2250
Memphis, TN 38118-2462

The Draft EA was made available for review online at the following website:

https://www.airportprojects.net/CVG-AirCargo-EA

In addition, the following agencies listed were sent a notice of the Draft EA availability for review via email or letter.

Ms. Kimberly J. Simpson
U.S. Army Corps of Engineers: Louisville District
600 Dr. Martin Luther King, Jr. Place
Louisville, KY 40201

Ms. Jessica Miller
U.S. Fish and Wildlife Service
JC Watts Federal Building – Room 265
330 West Broadway
Frankfort, KY 40601

Mr. Craig Potts
Kentucky Heritage Council
300 Washington Street
Frankfort, KY 40601-1824

Mr. Larry Taylor
Kentucky Department for Environmental Protection
Office of the Commissioner
300 Sower Boulevard
Frankfort, KY 40601

Mr. Christopher Militscher
Chief, NEPA Program Office
U.S. Environmental Protection Agency
Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303-8960

The comment period ended on **Tuesday November 6, 2018**. No public comments were received on the Draft EA. Four agencies provided comments on the Draft EA, which are provided in Appendix A.

6.2 PUBLIC INVOLVEMENT

A public meeting was held on October 25, 2018 from 5:00 p.m. to 7:00 p.m. The meeting was held on the 1st floor of the CVG Centre located at 77 Comair Boulevard, Erlanger, Kentucky 41018. Presentation boards displayed at the public meeting are included in Appendix A.

Notice of the public meeting and a link to the Draft EA were also placed on the CVG Airport website (http://www.cvgairport.com). Both the public meeting and Draft EA were also discussed at the quarterly Boone County Ad-Hoc Meeting attended by Kenton County Airport Board (KCAB) and Boone County officials, and a Boone County meeting to discuss local roads held on October 22, 2018. This meeting was attended by officials from Boone County; City of Florence; Commonwealth of Kentucky Highway District 6; KCAB; Transit Authority of Northern Kentucky (TANK), consultants, and Ohio, Kentucky, Indiana Regional Council of Governments.

Chapter Seven

CHAPTER SEVEN
LIST OF PREPARERS

7.1 FEDERAL AVIATION ADMINISTRATION (FAA)

Kristi Ashley, Environmental Protection Specialist, provided input throughout the process and responsible for the review of the Environmental Assessment.

7.2 KENTON COUNTY AIRPORT BOARD (KCAB)

Barb Schempf, A.A.E., IAP, Vice President of Planning & Development, provided input and direction on goals for the Airport facility in regards to the Environmental Assessment

Alison Chadwell, PE, PTOE, LEED AP, Senior Project Manager/Engineer, provided input and Airport information throughout the process and responsible for managing and review of the Environmental Assessment.

Debbie Conrad, Senior Project Manager, provided input and Airport information throughout the preparation of the Environmental Assessment.

7.3 LANDRUM & BROWN, INCORPORATED (L&B)

Sarah Potter, Associate Vice President, responsible for project management, technical input, and principal author of the Environmental Assessment.

Rob Adams, Officer, provided input and review of the Environmental Assessment.

Chris Sandfoss, Managing Consultant, provided technical input and assisted with the preparation of the Environmental Assessment.

Charles Babb, Managing Consultant, responsible for preparing the air quality analysis.

Chuck Lang, Senior Consultant, responsible for the preparation of the graphics for the Environmental Assessment.

Gabriela Elizondo, Analyst, assisted with the preparation of the Environmental Assessment.

7.4 ENVIRONMENT & ARCHAEOLOGY, LLC (E&A)

Jeff Tingle, President, assisted with the preparation of the Historic, Architectural, Archeological, and Cultural Resources; Biological Resources; and Wetlands/Streams analysis.

Courtney Stoll, MA, RPA, Principal Investigator, assisted with the preparation of the Historic, Architectural, Archeological, and Cultural Resources field surveys and analysis.

Christina Lovins, Vice President/Senior Biologist, assisted with the preparation of the Biological Resources and Wetlands/Streams Analysis.

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Chapter Eight

CHAPTER EIGHT
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Appendix A

APPENDIX A
AGENCY AND PUBLIC INVOLVEMENT

The following agencies an d stakeholders were coordinated with throughout the development of the Environmental Assessment.

U.S. Army Corps of Engineers
Louisville District
600 Dr. Martin Luther King, Jr. Place
Louisville, KY 40201

U.S. Fish and Wildlife Service
JC Watts Federal Building – Room 265
330 West Broadway
Frankfort, KY 40601

Kentucky Heritage Council
300 Washington Street
Frankfort, KY 40601-1824

Duke Energy Ohio and Duke Energy Kentucky
139 East 4th Street
Cincinnati, OH 45244

Northern Kentucky Sanitation District No. 1
1045 Eaton Drive
Ft. Wright, KY 41017

Kentucky Transportation Cabinet (KYTC)
District 6
421 Buttermilk Pike
Covington, KY 41017

Boone County
Administration Building
First Floor 2950 Washington Square
Burlington, KY 41005

City of Florence
8100 Ewing Blvd.
Florence, KY 41042

Ohio Kentucky Indiana Regional Council of Governments (OKI)
720 E. Pete Rose Way, Suite 420
Cincinnati, Ohio 45202

Natural Resources Conservation Service
Burlington Service Center
6028 Camp Ernst Rd
Burlington, KY 41005-8369

Boone County Water District
2475 Burlington Pike
Burlington, KY 41005

Northern Kentucky Water District
2835 Crescent Springs Road
Erlanger, Kentucky 41018

Spectrum
11427 Reed Hartman Hwy
Cincinnati, OH 45242

Cincinnati Bell
221 E 4th Street
Cincinnati, OH 45202

Kentucky Division of Water
300 Sower Boulevard, 3rd Floor
Frankfort, Kentucky 40601

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Agency Comments on the Draft EA

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Sarah Potter

From: Gissentanna, Larry <Gissentanna.Larry@epa.gov>
Sent: Wednesday, October 24, 2018 9:03 AM
To: CVGCargo HubEA
Cc: Militscher, Chris; Buskey, Traci P.
Subject: RE: Air Cargo Facility Development Cincinnati/Northern Kentucky International Airport Draft Environmental Assessment

Ms. Sarah Potter
Associate Vice President
Landrum & Brown
11279 Cornell Park Drive
Cincinnati, OH 45242
CVGCargoHubEA@landrum-brown.com

Dear Ms. Potter:

The U. S. Environmental Protection Agency (EPA) is in receipt of and has reviewed the referenced document in accordance with Section 309 of the Clean Air Act and Section 102(2)(C) of the National Environmental Policy Act. The EPA understands that the Federal Aviation Administration's (FAA's) proposed project includes the development of land at the Cincinnati/Northern Kentucky International Airport (CVG). The Kenton County Airport Board (KCAB), the owner and operator of CVG, proposed action consists of the development and operation of an air cargo facility at CVG. The proposed site is located on undeveloped land north of Aero Parkway and bordered on the west by Gunpowder Creek and extends east to the existing DHL facility. The purpose of this project is to provide suitable air cargo facilities at CVG as a hub for large-scale air cargo operations.

Upon review of the documents provided to this office, the EPA concludes that appropriate alternatives were considered and analyzed and supportive of CVG requirements to have a viable location to accommodate an air cargo service provider with the facilities necessary to meet its operational goals, the integration of airside, landside, and sorting facilities as required by CVG. It also appears that this project will not have a significant impact on human health and the environment. As noted in the Draft Environmental Assessment (DEA) FAA, the implementation of the proposed project would impact 13.58 acres of wetlands and 64,243 linear feet of streams. To minimize the impact, a detailed compensatory mitigation plan to compensate for the losses of wetland and streams resulting from the construction of the Proposed Action would be required. The EPA recommends continued coordination with the U.S. Army Corps of Engineers Louisville District to determine wetlands permitting and mitigation requirements.

Thank you for the opportunity to provide comments on your proposed project. Please provide this office with a hard copy and electronic version of the final NEPA documents. Please remember to keep the local community informed and involved throughout the project process through community meetings and through local and social media outlets. If you have any questions, feel free to contact me via the information provided below.

Sincerely,

Larry O. Gissentanna
DoD and Federal Facilities, Project Manager

U.S. Environmental Protection Agency/ Region 4
Resource Conservation and Restoration Division
National Environmental Policy Act (NEPA) Program Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
330 West Broadway, Suite 265
Frankfort, Kentucky 40601
(502) 695-0468

October 9, 2018

Ms. Sarah Potter
Landrum & Brown
11279 Cornell Park Drive
Cincinnati, OH 45242

Re: FWS 2017-B-0389; 2017-F-0412; Federal Aviation Administration; Kenton County Airport Board; new air cargo hub at CVG; Kenton County, Kentucky

Dear Ms. Potter:

The U.S. Fish and Wildlife Service (Service) has reviewed your September 24, 2018 correspondence including a link to the draft Environmental Assessment (EA) for a proposed development at the Cincinnati / Northern Kentucky Airport (CVG). The Federal Aviation Administration is preparing the EA to meet requirements of the National Environmental Policy Act of 1969 (NEPA) in regards to its potential approval of the proposed change to the Airport Layout Plan at CVG. The Service offers the following comments on the draft EA:

- The first sentence in section 4.2.2.3 on page 4-8 states: "No federally-protected or state-protected plant or animal species were observed in the areas surveyed." While the paragraph continues to state that surveys were conducted for running buffalo clover, we are not aware of any other species-specific surveys conducted in the DSA. We suggest changing the first sentence in this section to: "There are no known records of federally-protected or state-protected plant of animal species in the DSA."
- Under the "Indiana bat" and "Northern long-eared bat" headings in section 5.5.2 on page 5-11, forested habitat removal is listed as a cause of potential "direct impacts" to the species. The potential for indirect impacts to the species as a result of forested habitat removal should also be included in that statement.
- The last sentence on p. 5-12 states: "FAA's finding was submitted to the USFWS on July 20, 2018." The letter referenced was dated July 17 and received by the USFWS on July 23, 2018.
- The second sentence of section 5.5.3 on page 5-12 states: "Impacts to Potential Habitat requires mitigation per guidelines of the KFO *Revised Conservation Strategy for Forest-Dwelling Bats* into the Imperiled Bat Conservation fund (IBCF)." Mitigation is not required for the impacts, as other options are available. We suggest changing that sentence to the following: "Rather than choosing to conduct presence / probable absence surveys for the Indiana bat and northern long-eared bat, presence of these species will be

assumed in the DSA and assumed impacts will be offset by a voluntary contribution to the Imperiled Bat Conservation fund (IBCF)."

- Also in section 5.5.3, rather than describe how the contribution is calculated, we recommend using the amount, $608,007.60, stated in the BA.
- Also in section 5.5.3, the third sentence of the second paragraph states: "This contribution to the IBCF is expected to promote the survival and recovery of Indiana bats and northern long-eared bats *through the protection and management of existing forested habitat to support potential maternity populations, particularly those that would expand existing conservation ownerships*" (emphasis added). Because the funds in the IBCF are used to support a variety of conservation activities, we recommend omitting the italicized potion of that statement.

Thank you for the opportunity to review and provide comments on the draft EA for this proposed project. If you have any questions regarding the comments that we have provided, please contact Jessica Blackwood Miller at (502) 695-0468 extension 104 or jessica_miller@fws.gov.

Sincerely,

Virgil Lee Andrews, Jr.
Field Supervisor

Sarah Potter

From: Miller, Jessica <jessica_miller@fws.gov>
Sent: Thursday, October 25, 2018 9:54 AM
To: Sarah Potter
Cc: kristi.ashley@faa.gov
Subject: additional comments for FAA EA for new air cargo hub at CVG

Ms. Potter,

I have an additional comment on the draft EA that replaces two of the comments I provided in the 4th and 5th bullet points in our October 9, 2018 letter.

I recommend removing the following sentences in section 5.5.3:

"Impacts to Potential Habitat requires mitigation per guidelines of the KFO Revised Conservation Strategy for Forest-Dwelling Bats into the Imperiled Bat Conservation Fund (IBCF). The current rate for mitigation for the February to March timeframe is $1,710/acre, and the current mitigation rate for April to May is $3,420/acre. The IBCF mitigation rate/acre is updated in August of each year."

and replacing them with the following:

"Rather than choosing to conduct presence / probable absence surveys for the Indiana bat and northern long-eared bat, presence of these species will be assumed in the DSA and assumed impacts will be offset by a voluntary contribution to the Imperiled Bat Conservation fund (IBCF) as detailed in the Biological Assessment."

The revised sentence would be consistent with what is in the BA (which states a total amount) and would would remain consistent if the BA needs to be amended in the future to modify the timing of the tree removal.

--
Jessica Blackwood Miller
Fish & Wildlife Biologist
Kentucky Field Office
U.S. Fish & Wildlife Service
330 W. Broadway, Rm 265
Frankfort, KY 40601
Ph: (502) 695-0468 ext. 104
Fax: (502) 695-1024

MATTHEW G. BEVIN
GOVERNOR

CHARLES G. SNAVELY
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

ANTHONY R. HATTON
COMMISSIONER

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601

October 29, 2018

Ms. Sarah Potter
Associate Vice President
Landrum & Brown
11279 Cornell Park Drive
Cincinnati, OH 45242

Re: SERO 2018-25 Draft Environmental Assessment Air Cargo Facility Development

Ms. Potter,

The Energy and Environment Cabinet serves as the state clearinghouse for review of environmental documents generated pursuant to the National Environmental Policy Act (NEPA). Within the Cabinet, the Commissioner's Office in the Department for Environmental Protection coordinates the review for Kentucky state agencies. We received your correspondence dated September 24, 2018. Your letter requested a review of the project by the department and we are providing the following comments.

Division for Air Quality

401 KAR 63:010, *Fugitive Emissions, states that no person shall cause, suffer, or allow any material to be handled, processed, transported, or stored without taking reasonable precaution to prevent particulate matter from becoming airborne. Additional requirements include the covering of open bodied trucks, operating outside the work area transporting materials likely to become airborne, and that no one shall allow earth or other material being transported by truck or earth-moving equipment to be deposited onto a paved street or roadway. Please note the Fugitive Emissions Fact Sheet located at* http://air.ky.gov/SiteCollectionDocuments/Fugitive%20Dust%20Fact%20Sheet.pdf

401 KAR 63:005 *states that open burning shall be prohibited except as specifically provided. Open Burning is defined as the burning of any matter in such a manner that the products of combustion resulting from the burning are emitted directly into the outdoor atmosphere without passing through a stack or chimney. However, open burning may be utilized for the expressed purposes listed on the Open Burning Brochure located at* http://air.ky.gov/Pages/OpenBurning.aspx

The Division would like to offer the following suggestions on how this project can help us stay in compliance with the NAAQS. These air quality control strategies are beneficial to the health of citizens of Kentucky.

- Utilize alternatively fueled equipment.
- Utilize other emission controls that are applicable to your equipment.

- Reduce idling time on equipment.

The Division also suggests an investigation into compliance with applicable local government regulations. Please let me know if you need anything further regarding this assessment.

Division of Waste Management

UST Branch records indicate no underground storage tank issues identified within the project impact area. If any UST's are encountered during the project construction they should be reported to KDWM.

Superfund Branch records include the following interests near the project impact area:

- Steves Towing - Diesel Spill - Closed and Restored 1996.
- DHL Express – Jet Fuel Spill – Closed No Action Necessary 2018.
- Petroleum groundwater contamination – Investigation and cleanup still Active.
- Delta Private Jets – Petroleum Spill – Closed No Action Necessary 2009.

Any additional issues or questions should be directed to the Superfund Branch.

Solid Waste Branch records indicate no active or historic landfills located within the project impact area.

Hazardous Waste Branch records include the following interests near the project impact area:

- The Former Fire Training Area and Former Firing Range Area which have an environmental covenant that regulates use and management of those areas.

Any additional issues or questions should be directed to the Hazardous Waste Branch.

RLA Branch records indicate there are no active or inactive open dump sites within the project impact area.
Any solid waste generated by this project must be disposed of at a permitted facility.
If asbestos, lead paint and/or other contaminants are encountered during the project construction contact the Division of Waste Management for proper disposal and closure.
The information provided is based on those facilities or sites that KDWM currently has in its database. If you would like additional information on any of these facilities or sites, you may contact the file room custodian at (502) 782-6357. Please keep in mind additional locations of releases, potential contamination or waste facilities may be present but unknown to the agency. Therefore, it is recommended that appropriate precautions be taken during construction activities. Please report any evidence of illegal waste disposal facilities and releases of hazardous substances, pollutants, contaminants or petroleum to the 24-hour Environmental Response Team at 1-800-928-2380.

Division of Water

Water Quality Branch:

This project was previously commented on and those comments were incorporated into the Environmental Assessment. Questions should be directed to Andrea Fredenburg, Water Quality Branch, (502) 782-6950, Andrea.Fredenburg@ky.gov.

Watershed Management:

Per KRS 151 and 401 KAR 4:010, permits or authorizations are required for any water withdrawals of 10,000 gallons per day or more of public water of Commonwealth. The proposed project is within the Louisville Water Company designated Source Water Protection Area, Zone 2. Questions should be directed to Chloe Brantley at 502-782-6898 or Chloe.Brantley@ky.gov. KRS 151.250 and 401 KAR 4:060, the proposed project may require a DOW Application for Permit to Construct Across or Along a Stream. Questions should be directed to Ron Dutta at 502-782-6941 or Ramendra.Dutta@ky.gov.

There are no permits, certifications or formal approvals need for the description of work from the Groundwater Section of the Watershed Management Branch. However, it is our recommendation that site be made aware of the requirements of 401 KAR 5:037 and the need to develop a Groundwater Protection Plan (GPP) for the protection of groundwater resources within that area during both construction and in operation if necessary. Additionally, if applicable, please be aware of the requirements of 401 KAR 6:350 in consideration nearby or future monitoring wells on the property. Questions should be directed to Wei Ji, Watershed Management Branch, (502) 782-6934, Wei.Ji@ky.gov or David Jackson, Watershed Management Branch, (502) 782-6986, DavidA.Jackson@ky.gov.

Compliance & Technical Assistance Branch:
The contractor is to obtain all necessary permits and/or approvals from the DOW (KPDES General Storm Water Construction , Stream Construction (floodplain), 401 WQC approval) and from the US Army Corps of Engineers (401/404 permitting approval).

Their preferred proposal will have impacts to ephemeral, intermittent, and perennial streams. Additional impacts will occur within 13 acres of wetlands. To obtain necessary permits listed above they will need to continue the process of working with DOW & USACE for development and implementation of a Compensatory Mitigation Plan to compensate for the losses in water resources. Questions should be directed to Connie Coy, Compliance and Technical Assistance Branch, (502) 782-6587, Constance.Coy@ky.gov.

Enforcement Branch:
The Division of Enforcement does not object to the project proposed by the applicant. Questions should be directed to Tim Harrod, Division of Enforcement, (502) 782-6858, Timothy.Harrod@ky.gov.

This review is based upon the information that was provided by the applicant. An endorsement of this project does not satisfy, or imply, the acceptance or issuance of any permits, certifications or approvals that may be required from this agency under Kentucky Revised Statutes or Kentucky Administrative Regulations. Such endorsement means this agency has found no major concerns from the review of the proposed project as presented other than those stated as conditions or comments.

If you should have any questions, please contact me at (502) 782-6785.

Sincerely,

Larry C. Taylor

MATTHEW G. BEVIN
GOVERNOR

DON PARKINSON
SECRETARY

TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY HERITAGE COUNCIL

THE STATE HISTORIC PRESERVATION OFFICE
410 HIGH STREET
FRANKFORT, KENTUCKY 40601
PHONE (502) 564-7005
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www.heritage.ky.gov

REGINA STIVERS
DEPUTY SECRETARY

CRAIG A. POTTS
EXECUTIVE DIRECTOR
& STATE HISTORIC
PRESERVATION OFFICER

October 24, 2018

Ms. Sarah Potter
Associate Vice President
Landrum and Brown
11279 Cornell Park Dr.
Cincinnati, OH 45242

Re: **DRAFT: Environmental Assessment, Air Cargo Facility Development, Cincinnati/Northern Kentucky International Airport,** prepared by Landrum and Brown. Report dated September 2018.

Dear Ms. Potter:

Thank you for your letter and enclosed draft of the Environmental Assessment (EA) for the proposed Air Cargo Hub Facility at the Cincinnati/Northern Kentucky International Airport, Boone County, Kentucky. Our office is still in consultation with the Federal Aviation Administration to identify, and assess effects to, historic properties that the proposed project may have. While the draft EA therefore necessarily reflects an incomplete record of consultation, we offer comments that we hope will strengthen the final document.

After review of the document, we find that the discussion of previously identified archaeological sites within the project APE is incomplete. The draft EA presents only those resource identified within those portion of the APE that had not been previously surveyed. Thus, the list appears to only consider the recent work completed by Great Rivers, K & V Consulting, and Environment and Archaeology – the three archaeological consultants involved in these surveys. A cursory review of our records indicates that there are at least eleven previously identified archaeological sites within the project APE that are omitted from the draft EA. These should be included within the assessment of project effects.

Because the archaeological evaluation is incomplete, we have not concurred on the eligibility of all of the sites that will be directly affected by the proposed project. We anticipate completing this consultation soon, but do note that Table 4-4 will need to be updated to include the previously identified sites described above, as well as updating the eligibility status of sites determined to be eligible for the National Register of Historic Places. We additionally note that Section 5.9 of the draft EA incorrectly states the project's effects to historic properties. Under Section 106, a project can only have one determined effect to historic properties. Therefore, the statement of 'No Adverse Effect on Historic Properties' (page 5-21) should be removed. We anticipate that the project will result in an Adverse Effect to Historic Properties, and that would be the appropriate (single) determination to state in the EA. Please be aware that we are currently in consultation with the FAA to determine the scope of the adverse effect.

Our review of the draft EA also suggests that the consultation on above-ground historic properties is incomplete. Our office has not been consulted on the projects effects to the Ephraim Uitz House and Farmstead (Listed on the NRHP), the Joel Garnett House, England Idlewild Park, or World of Golf. These are presented in the EA and assessed for potential noise impacts. The location of these properties is not clearly presented in the EA, it is unclear whether these properties fall within the project's APE, and if noise impacts to these properties were addressed properly.

The discussion of Transportation Act Section 4(f) in the draft EA indicates that these four properties should have been reviewed under Section 106 prior to issuance of the *de minimis* finding. If the FAA was involved in the *de minimis* determination including these four properties as part of the review for this project we are not aware of it. We have not commented on the significance or integrity of these properties or made a recommendation on their National Register of Historic Places eligibility as a part of the Air Cargo Hub project.

We would additionally recommend that the EA include a list of aboveground resources affected by the proposed project, similar to the one provided for archaeological resources (Table 4-4). The document would be clearer if a table of identified aboveground resources was presented. It would also be clearer to include a field in that table showing which of those properties our office has provided a recommendation of NRHP eligibility.

Should you have any questions concerning archaeological resources, feel free to contact Chris Gunn of my staff at (502) 892-3615 or chris.gunn@ky.gov. Questions concerning above-ground resources can be directed to Jennifer Ryall at (502) 892-3619 or jennifer.ryall@ky.gov.

Sincerely,

Craig A. Potts,
Executive Director and
State Historic Preservation Officer

CP: cmg, jr KHC # 52490
cc: Kristi Ashley (FAA)

Public Meeting
October 25, 2018

Public Notice / Affidavit
Display Boards

Note: Due to no attendance at the public meeting, no sign-in sheets are provided.

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of the The Enquirer, a newspaper printed in Cincinnati, Ohio and published in Cincinnati, in said County and State, and of general circulation in said county, and as to the Kentucky Enquirer published in Ft. Mitchell, Kenton County, Kentucky, who being duly sworn, deposeth and saith that the advertisement of which the annexed is a true copy, has been published in the said newspaper times, once in each issue as follows:

09/25/18

Erin Oettinger
Subscribed and sworn to before me this 25th day of September, 2018

Vicky Felty
Notary Public

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VICKY FELTY
NOTARY PUBLIC
STATE OF WISCONSIN

Notice of Availability of a Draft Environmental Assessment (EA) for the development of an air cargo facility at the Cincinnati/Northern Kentucky International Airport (CVG). The proposed project includes construction of a primary package and sortation building and support buildings; construction of approximately 255-acre aircraft parking apron and apron taxilanes; construction of paved employee and visitor vehicle parking garage/lots; and supporting infrastructure. This notice and opportunity for public comment is pursuant to FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions.* As part of the EA, formal consultation is ongoing between the Federal Aviation Administration and the Kentucky Heritage Council per Section 106 of the National Historic Preservation Act and with the U.S. Fish and Wildlife Service per Section 7 of the Endangered Species Act. The results of this consultation will be incorporated into the Final EA document.

The Draft EA is available for public review until Tuesday November 6, 2018. The Draft EA is also available online at: https://www.airportprojects.net/CVG-AirCargo-EA. Copies of the Draft EA have also been provided to relevant Federal, state, and local agencies.

A public meeting on this Draft EA from 5:00 to 7:00 p.m. will be held on Thursday October 25, 2018 on the first floor of the CVG Centre, 77 Comair Boulevard, Erlanger, Kentucky. Comments on the adequacy of the information disclosed in the Draft EA may be submitted at the meeting. Written/emailed comments can also be submitted to the following address:

Ms. Sarah Potter
Associate Vice President
Landrum & Brown
11279 Cornell Park Drive
Cincinnati, OH 45242
CVGCargoHubEA@landrum-brown.com

The cutoff date for comment submission is not later than **5:00 PM – Eastern Time, Tuesday November 6, 2018.** If submitting a comment via the U.S. Postal Service, please allow enough time for mailing. Your comment must be postmarked by that date.

Before including your name, address and telephone number, email or other personal identifying information in your comment, be advised that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

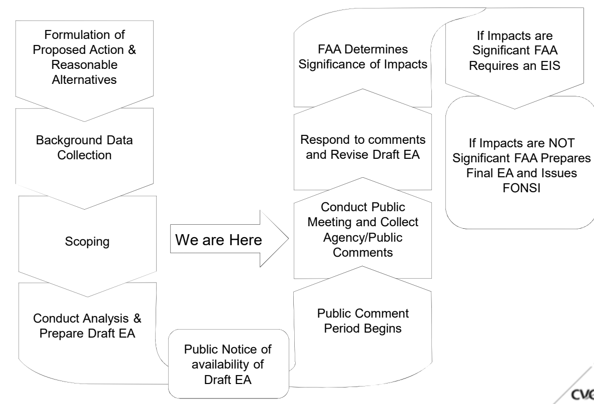
KY,Sep25,'18#3164283

What is an Environmental Assessment?

A concise document used to describe a proposed action's anticipated environmental impacts.

- Required by the National Environmental Policy Act of 1969 (NEPA) and FAA Orders 5050.4B and 1050.1F for federal actions (including FAA actions)
- Provides sufficient evidence and analysis for a federal determination of whether to prepare an Environmental Impact Statement (EIS) or issue a Finding of No Significant Impact (FONSI)
- Requires coordination with local, state, and Federal regulatory agencies

Environmental Assessment Process



Environmental Impact Categories

- Air Quality
- Biological Resources
- Climate
- Coastal Resources
- Department of Transportation Act, Section 4(F)
- Farmlands
- Hazardous Materials, Solid Waste, and Pollution Prevention
- Historical, Architectural, Archaeological, and Cultural Resources
- Land Use
- Natural Resources and Energy Supply
- Noise and Noise-Compatible Land Use
- Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks
- Visual Effects (including light emissions)
- Water Resources (including wetlands, floodplains, surface waters, groundwater, and wild and scenic rivers)
- Cumulative Impacts

Source: FAA Order 1050.1F, Environmental Impacts: Policies and Procedures

Proposed Action

The Proposed Action consists of the development and operation of an air cargo facility at CVG. The proposed site is located on undeveloped land north of Aero Parkway and bordered on the west by Gunpowder Creek and extends east to the existing DHL facility.

The Proposed Action includes the following major elements:

- Construct a primary package sortation building and support buildings (i.e., ground package sort building, equipment storage, equipment maintenance, and pilot services). The total building footprint would be up to 3.8 million square feet.
- Construct approximately 255-acre concrete aircraft parking apron and apron taxilanes.
- Construct paved employee and visitor parking garage/lots (approximately 781,000 square feet)

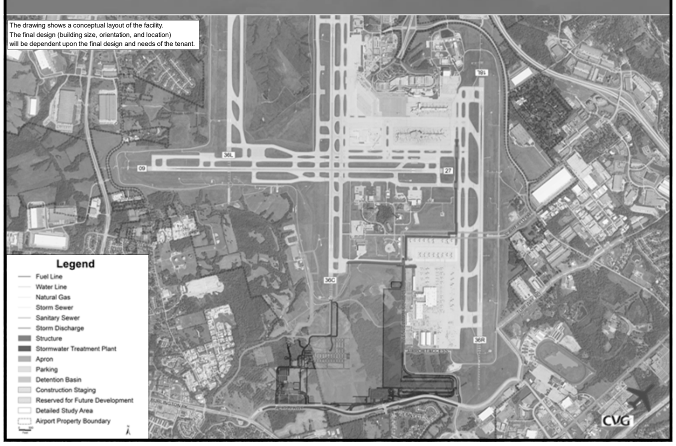
Supporting or Enabling Elements to the Proposed Action:

- Preparation (clear, grub, excavate, embank, and grade) of approximately 800 acres of land.
- Extend (approximately 4,200 feet in length by 60 feet wide) Wendell H. Ford Boulevard.
- Construct new on-airport access roads that provide vehicle and truck access to the new air cargo facility.
- Improve sections of Aero Parkway, an existing four-lane divided highway, to install new entrances, turn lanes, traffic lights, and lighting.
- Transfer all or a portion of off-airport property (totaling approximately 200 acres) to KCAB.
- Extend utilities to the project site, including electric service, natural gas, water, sanitary sewer, data/communications, and other related infrastructure.
- Modify and/or install new taxiway edge lights and airfield directional signs.

Supporting or Enabling Elements to the Proposed Action:

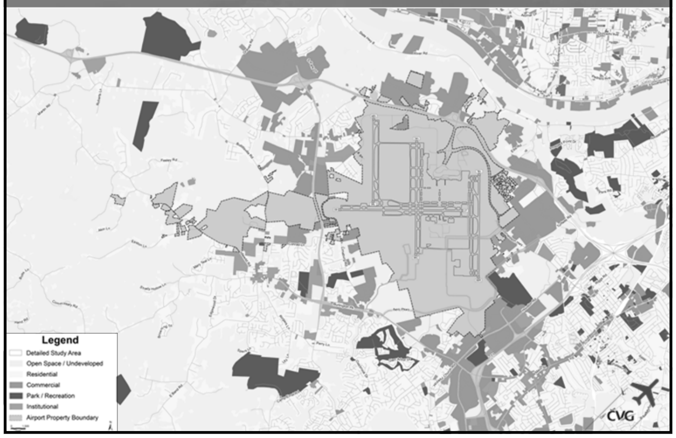
- Install exterior pole-mounted and building-mounted lighting at package sorting buildings, access roads, vehicle parking lots, truck courts, and portions of the aircraft parking aprons.
- Construct new drainage conveyances and detention ponds and/or modify the existing airfield stormwater management system.
- Install security fence and controlled-access vehicle gates and pedestrian gates.
- Expand airport existing fueling facilities.
- Installation of up to three 60,000-gallon glycol storage tanks.
- Relocate on-airport road south of Runway 18C/36C.

Proposed Action

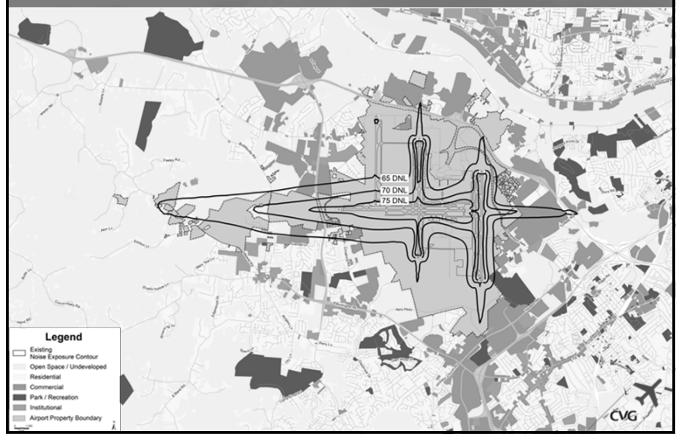


Study Areas

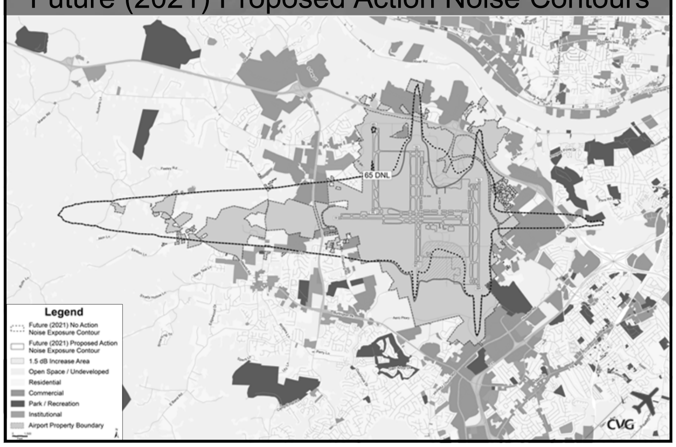
Existing Land Use



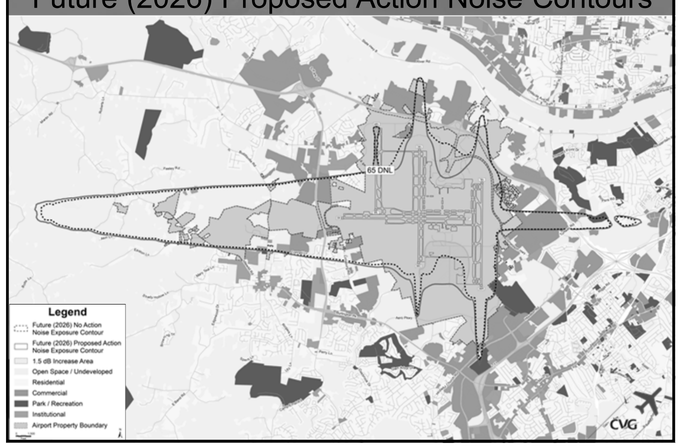
Existing Noise Exposure Contours



Future (2021) No Action Compared to Future (2021) Proposed Action Noise Contours



Future (2026) No Action Compared to Future (2026) Proposed Action Noise Contours



Water Resources

Summary of Environmental Analysis

IMPACT CATEGORY	NO ACTION	PROPOSED ACTION	MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES
Air Quality	No significant impact.	No significant impact. Would Not Exceed National Ambient Air Quality Standards.	For Construction – Obtain a fugitive dust activity permit and implement measures to control dust and other airborne particles during construction.
Biological Resources			
ESA Species (Indiana bat & Northern long-eared bat)	No impact.	May affect, is likely to adversely affect due to potential habitat removal for the Indiana and northern long-eared bat. Impacts not significant due to mitigation.	Impacts to potential habitat (244-acres) requires mitigation per guidelines of the Kentucky Field Office Revised Conservation Strategy for Forest-Dwelling Bats into the Imperiled Bat Conservation Fund.
Climate	No significant impact.	No significant impact.	No mitigation required.
DOT Section 4(f)	No Physical or Constructive Use	No Physical or Constructive Use	No mitigation required.
Hazardous Materials, Solid Waste, and Pollution Prevention	No significant impact. Increase in use of fuels and deicing fluids. Increase in solid waste.	No significant impact. Disposal of asbestos materials and increase use of use of fuels and deicing fluids. Increase in solid waste during construction and operation of the facility.	Follow regulations on handling and disposing hazardous materials. Measures to minimize the solid waste stream, such as source reduction and recycling strategies, would be developed and implemented by the air cargo service provider through the development of a Recycling and Waste Management Program.
Historical, Architectural, Archaeological, & Cultural Resources	No impact.	Adverse effect on three potentially eligible archaeological sites. Impacts not significant due to mitigation.	A Memorandum of Agreement (MOA) is being prepared between the FAA, KCAB, and the KHC for the Adverse Effect. A Mitigation Plan will be developed for sites by the FAA, KCAB, and in consultation with the KHC, specifying a data recovery plan. Mitigation will include documentation and excavation of all or portions of the sites. The data recovery plan will determine how fieldwork is to be conducted, as well as the structure and content of the mitigation report. The MOA will also include alternate mitigation for one site due to the Phase II archaeological work on this site not able to be completed due to safety concerns regarding asbestos contamination on the site.
Land Use	No impact.	No impact.	No mitigation required.
Natural Resources	Increase in fuel consumption. This resource is not in short supply and would not be depleted by the Proposed Action.	No significant impact. Increase in natural resources and fuel consumption. None of these resources are in short supply or would be depleted by the Proposed Action.	No mitigation required.
Energy Supply	No impact.	Local providers can meet increases in demand. No significant impact.	No mitigation required.

Summary of Environmental Analysis

IMPACT CATEGORY	NO ACTION	PROPOSED ACTION	MITIGATION, AVOIDANCE, AND MINIMIZATION MEASURES
Noise and Noise-Compatible Land Use			
Housing Units within DNL 65+ dB	Year 2021 - 265 Housing Units Year 2026 - 413 Housing Units 0 Housing Units in significant increase area (1.5 dB increase area within the 65 DNL over a noise-sensitive land use) in either year	Year 2021 - 265 Housing Units Year 2026 - 465 Housing Units 0 Housing Units in significant increase area (1.5 dB increase area within the 65 DNL over a noise-sensitive land use) in either year	No mitigation required.
Population within DNL 65+ dB	Year 2021 - 720 People Year 2026 - 1,055 People 0 Housing Units in significant increase area (1.5 dB increase area within the 65 DNL over a noise-sensitive land use) in either year	Year 2021 - 720 People Year 2026 - 1,158 People 0 Housing Units in significant increase area (1.5 dB increase area within the 65 DNL over a noise-sensitive land use) in either year	No mitigation required.
Noise Sensitive Facilities within DNL 65+ dB	No Noise Sensitive Facilities within DNL 65+ dB	No Noise Sensitive Facilities within DNL 65+ dB	No mitigation required.
Children's Health and Safety Risks	No impact.	No impact.	No mitigation required.
Visual Effects	No impact.	No impact.	No mitigation required.
Stream / Wetland	No impact.	Impacts to 64,243 linear feet of streams and 13.58 acres of wetlands. No significant impact.	Obtain applicable permits from USACE and KYDOW for impacts to jurisdictional waters of the United States. Purchase of credits from the Northern Kentucky University (NKU) In-Lieu Fee (ILF) Payment Program, the Kentucky Department of Fish and Wildlife Resources (KDFWR).
Floodplains	No impact.	Impact to 13-acres of floodplains. No significant impact.	Design measures to minimize floodplain encroachments including special flood related design criteria, elevating facilities above base flood levels, locating nonconforming structures and facilities out of the floodplain, or minimizing fill placed in floodplains.
Surface Waters	No impact.	Impacts to 64,243 linear feet of streams and 13.58 acres of wetlands. No significant impact.	Construction of stormwater facilities to mitigate additional impervious surface. Obtain applicable permits from USACE and KYDOW for impacts to jurisdictional waters of the United States. Erosion-control BMPs will be adopted to maintain runoff on-site and minimize the potential for adverse effects on downstream water quality.
Groundwater	No impact.	No impact.	No mitigation required.
Socioeconomic Impacts	No impact.	Reduction in the level of service on local roadways from the air cargo facility development	Roadway improvements to increase or restore the level of service.
Environmental Justice	No impact.	No impact.	No mitigation required.
Cumulative Impacts	No impact.	No significant impacts.	No mitigation required.

Appendix B

APPENDIX B
AIR QUALITY

This appendix contains the Technical Report presenting the Air Quality analysis prepared for the Environmental Assessment.

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AIR QUALITY TECHNICAL REPORT

For the Proposed Air Cargo Facility Development
at
Cincinnati/Northern Kentucky International Airport

January 2019

Prepared for:

Kenton County Airport Board

Prepared by:

Landrum & Brown, Incorporated
11279 Cornell Park Road
Cincinnati, Ohio 45242

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1.0 INTRODUCTION

The purpose of this Air Quality Technical Report is to provide supporting documentation for the Environmental Assessment (EA) being prepared for the Proposed Air Cargo Facility Development project at the Cincinnati/Northern Kentucky International Airport (CVG or Airport). The following document discloses the affected environment and environmental consequences of air quality for the projected future conditions in 2021 and 2026 for the following alternatives: Future (2021) No Action, Future (2021) Proposed Action, Future (2026) No Action, and Future (2026) Proposed Action. The Federal Aviation Administration (FAA) uses 2021 as a basis for analysis because 2021 is the projected implementation year of the proposed air cargo facility development. In addition, specific Airport activity levels and their associated air quality impacts are evaluated for a condition five years beyond the opening year in 2026.

2.0 REGULATORY SETTING

This air quality assessment of the Proposed Action and its alternatives was conducted in accordance with the guidelines provided in the most recent version of the FAA's *Aviation Emissions and Air Quality Handbook*.[1]

2.1 NATIONAL AMBIENT AIR QUALITY STANDARDS

The U.S. Environmental Protection Agency (USEPA) is the primary Federal agency responsible for regulating air quality. The USEPA implements the provisions of the Federal Clean Air Act (CAA). The CAA, including the 1990 Amendments, provides for the establishment of standards and programs to evaluate, achieve, and maintain acceptable air quality in the U.S. Under the CAA, the USEPA established a set of standards, or criteria, for six pollutants determined to be potentially harmful to human health and welfare.[2] The USEPA considers the presence of the following six criteria pollutants to be indicators of air quality:

- Ozone (O_3);
- Carbon monoxide (CO);
- Nitrogen dioxide (NO_2);
- Particulate matter (PM_{10} and $PM_{2.5}$);[3]
- Sulfur dioxide (SO_2); and,
- Lead (Pb).

The National Ambient Air Quality Standards for the criteria pollutants, known as the NAAQS, are summarized in **Table 1**. A detailed description of the criteria pollutants is provided in **Attachment 1 – *Description of Pollutants*** of this report. For each of the criteria pollutants, the USEPA established primary standards intended to protect public health, and secondary standards for the protection of other aspects of

1 Federal Aviation Administration, *Aviation Emissions and Air Quality Handbook*, Version 3 Update 1, January 2015.

2 USEPA, Code of Federal Regulations, Title 40, Part 50 (40 CFR Part 50) *National Primary and Secondary Ambient Air Quality Standards (*NAAQS), July 2011.

3 PM_{10} and $PM_{2.5}$ are airborne inhalable particles that are less than ten micrometers (coarse particles) and less than 2.5 micrometers (fine particles) in diameter, respectively.

public welfare, such as preventing materials damage, preventing crop and vegetation damage, and assuring good visibility. Areas of the country where air pollution levels consistently exceed these standards may be designated nonattainment by the USEPA.

Table 1
NATIONAL AMBIENT AIR QUALITY STANDARDS

POLLUTANT		PRIMARY / SECONDARY	AVERAGING TIME	LEVEL	FORM
Carbon Monoxide		primary	8 hour	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead		primary and secondary	Rolling 3-month average	0.15 µg/m3 (1)	Not to be exceeded
Nitrogen Dioxide		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone		primary and secondary	8 hour	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particulate Matter	$PM_{2.5}$	primary	1 year	12.0 µg/m^3	Annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m^3	Annual mean, averaged over 3 years
		primary and secondary	24 hour	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hour	0.5 ppm	Not to be exceeded more than once per year

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m^3 as a calendar quarter average) also remain in effect.
(2) The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.
(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.
(4) The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Notes: ppm is parts per million; ppb is parts per billion, and µg/m^3 is micrograms per cubic meter.
Source: EPA, https://www.epa.gov/criteria-air-pollutants/naaqs-table Accessed May 2018

A nonattainment area is a homogeneous geographical area[4] (usually referred to as an air quality control region) that is in violation of one or more NAAQS and has been designated as nonattainment by the USEPA as provided for under the CAA. Some regulatory provisions, for instance the CAA conformity regulations, apply only to areas designated as nonattainment or maintenance.

A maintenance area describes the air quality designation of an area previously designated nonattainment by the USEPA and subsequently redesignated attainment after emissions are reduced. Such an area remains designated as maintenance for a period up to 20 years at which time the state can apply for redesignation to attainment, provided that the NAAQS were sufficiently maintained throughout the maintenance period.

2.2 GENERAL CONFORMITY

The General Conformity Rule under the CAA is conducted in three phases: (1) applicability, (2) evaluation, and (3) determination. The General Conformity Rule establishes minimum values, referred to as the *de minimis* thresholds, for the criteria and precursor pollutants[5] for the purpose of:

- Identifying Federal actions with project-related emissions that are clearly negligible (*de minimis*);
- Avoiding unreasonable administrative burdens on the sponsoring agency, and;
- Focusing efforts on key actions that would have potential for significant air quality impacts.

The *de minimis* rates vary depending on the severity of the nonattainment area and further depend on whether the general Federal action is located inside an ozone transport region.[6] An evaluation relative to the General Conformity Rule (the Rule), published under 40 CFR Part 93,[7] is applicable to general Federal actions that would cause emissions of the criteria or precursor pollutants, and are:

- Federally-funded or Federally-approved;
- Not a highway or transit project[8];
- Not identified as an exempt project[9] under the CAA;

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4 A homogeneous geographical area, with regard to air quality, is an area, not necessarily bounded by state lines, where the air quality characteristics have been shown to be similar over the whole area. This may include several counties, encompassing more than one state, or may be a very small area within a single county.

5 Precursor pollutants are pollutants that are involved in the chemical reactions that form the resultant pollutant. Ozone precursor pollutants are NO_x and VOC, whereas $PM_{2.5}$ precursor pollutants include NO_x, VOC, SO_x, and ammonia (NH_3).

6 The ozone transport region is a single transport region for ozone (within the meaning of Section 176A(a) of the CAA), comprised of the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the Consolidated Metropolitan Statistical Area that includes the District of Columbia, as given at Section 184 of the CAA.

7 USEPA, 40 CFR Part 93, Subpart B, *Determining Conformity of General Federal Actions to State or Federal Implementation Plans*, July 1, 2006.

8 Highway and transit projects are defined under Title 23 U.S. Code and the Federal Transit Act.

9 The Proposed Action is not listed as an action exempt from a conformity determination pursuant to 40 CFR Part 93.153(c). An exempt project is one that the USEPA has determined would clearly have

- Not a project identified on the approving Federal agency's Presumed to Conform list;[10] and,
- Located within a nonattainment or maintenance area.

The Airport is located within Boone County, Kentucky, which is included in the Metropolitan Cincinnati Interstate Air Quality Region. The EPA has previously determined that Boone County's levels of the eight-hour concentration of ozone exceeded the federal standards defining healthful air quality. On July 5, 2017, the EPA determined the area had attained the 2008 eight-hour standard for ozone. However, on August 3, 2018, the area was designated as marginal non-attainment for the 2015 eight-hour standard for ozone.

The Proposed Action at CVG is included in a marginal nonattainment area for ozone. Therefore, the Proposed Action meets the remaining criteria for requiring an evaluation under the General Conformity Rule. When the action requires evaluation under the General Conformity regulations, the net total direct and indirect emissions due to the Federal action may not equal or exceed the relevant *de minimis* thresholds unless:

- An analytical demonstration is provided that shows the emissions would not exceed the NAAQS; or
- Net emissions are accounted for in the State Implementation Plan (SIP) planning emissions budget; or
- Net emissions are otherwise accounted for by applying a solution prescribed under 40 CFR Part 93.158.

The Federal *de minimis* thresholds established under the CAA are given in **Table 2**. Conformity to the *de minimis* thresholds is relevant only with regard to those pollutants and the precursor pollutants for which the area is nonattainment or maintenance. Notably, there are no *de minimis* thresholds to which a Federal agency would compare ozone emissions. This is because ozone is not directly emitted from a source. Rather, ozone is formed through photochemical reactions involving emissions of the precursor pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOC), in the presence of abundant sunlight and heat. Therefore, emissions of ozone on a project level are evaluated based on the rate of emissions of the ozone precursor pollutants, NO_x and VOC. Because conformity to the *de minimis* threshold is relevant only with regard to the ozone precursor pollutants, only NO_x and VOC emissions are presented and evaluated in this report.

If the General Conformity evaluation for this air quality assessment were to show that any of the applicable thresholds were equaled or exceeded due to the Proposed Action, further, more detailed analysis to demonstrate conformity would be required,

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no impact on air quality at the facility, and any net increase in emissions would be so small as to be considered negligible.

10 The provisions of the CAA allow a Federal agency to submit a list of actions demonstrated to have low emissions that would have no potential to cause an exceedance of the NAAQS and are presumed to conform to the CAA conformity regulations. This list would be referred to as the "Presumed to Conform" list. The FAA Presumed to Conform list was published in the Federal Register on February 12, 2007 (72 FR 6641-6656) and includes airport projects that would not require evaluation under the General Conformity regulations.

which is referred to as a General Conformity Determination. Conversely, if the General Conformity evaluation were to show that none of the relevant thresholds were equaled or exceeded, the Proposed Action would be presumed to conform to the applicable Kentucky SIPs and no further analysis would be required under the CAA.

Table 2
***DE MINIMIS* THRESHOLDS**

CRITERIA AND PRECURSOR POLLUTANTS	TYPE AND SEVERITY OF NONATTAINMENT AREA	TONS PER YEAR THRESHOLD
Ozone (VOC or NO_x)[1]	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other areas outside an ozone transport region	100
Ozone (NO_x)[1]	Marginal and moderate nonattainment inside an ozone transport regions[2]	100
	Maintenance	100
Ozone (VOC)[1]	Marginal and moderate nonattainment inside an ozone transport region[2]	50
	Maintenance within an ozone transport region[2]	50
	Maintenance outside an ozone transport region[2]	100
Carbon monoxide (CO)	All nonattainment & maintenance	100
Sulfur dioxide (SO_2)	All nonattainment & maintenance	100
Nitrogen dioxide (NO_2)	All nonattainment & maintenance	100
Coarse particulate matter (PM_{10})	Serious nonattainment	70
	Moderate nonattainment and maintenance	100
Fine particulate matter ($PM_{2.5}$) (VOC, NO_x, NH_3, and SO_x)[3]	All nonattainment and maintenance	100
Lead (Pb)	All nonattainment and maintenance	25

1 The rate of increase of ozone emissions is not evaluated for a project-level environmental review because the formation of ozone occurs on a regional level and is the result of the photochemical reaction of NO_x and VOC in the presence of abundant sunlight and heat. Therefore, USEPA considers the increasing rates of NO_x and VOC emissions to reflect the likelihood of ozone formation on a project level.

2 An OTR is a single transport region for ozone, comprised of the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the Consolidated Metropolitan Statistical Area that includes the District of Columbia.

3 For the purposes of General Conformity applicability, VOCs and NH_3 emissions are only considered $PM_{2.5}$ precursors in nonattainment areas where either a State or USEPA has made a finding that the pollutants significantly contribute to the $PM_{2.5}$ problem in the area. In addition, NO_X emissions are always considered a $PM_{2.5}$ precursor unless the State and USEPA make a finding that NO_X emissions from sources in the State do not significantly contribute to $PM_{2.5}$ in the area. Refer to 74 FR 17003, April 5, 2006.

Notes: Federal thresholds that are shaded are applicable to this project.

Code of Federal Regulations (CFR), Title 40, *Protection of the Environment*.

USEPA defines *de minimis* as emissions that are so low as to be considered insignificant and negligible.

Volatile organic compounds (VOC); Nitrogen oxides (NO_x); Ammonia (NH_3); Sulfur oxides (SO_x).

Sources: USEPA, 40 CFR Part 93.153(b)(1) & (2).

2.3 TRANSPORTATION CONFORMITY RULE APPLICABILITY

Although airport improvement projects are usually considered under the General Conformity regulations, there can be elements of a Federal action or its alternatives that may require an analysis to demonstrate Transportation Conformity, such as actions relating to transportation plans, programs, projects developed, funded, or approved under Title 23 United States Code (U.S.C.) or the Federal Transit Act (FTA),[11] or involve Federal highways. In such cases, the sponsoring Federal agency would be required to coordinate with the Federal Highway Administration (FHWA), the state Department of Transportation (DOT), and the local metropolitan planning organization (MPO) to assist in completing a Transportation Conformity evaluation.

As with General Conformity, Transportation Conformity regulations apply only to Federal actions located within a nonattainment or maintenance area. The Proposed Action under consideration at CVG would not be developed, funded, or approved by the FHWA or FTA. Therefore, the Transportation Conformity regulations would not apply.

2.4 INDIRECT SOURCE REVIEW

Some states require an air quality review when a Federal action has the potential to cause an increase in net emissions from indirect sources. Indirect sources cause emissions that occur later in time or are farther removed from the Federal action. Depending on the state, indirect sources may be identified as motor vehicles on highways, parking at sports and entertainment facilities, or an increase in aircraft operations. The state requirement may be referred to as the indirect source review (ISR) and each state requiring an ISR sets thresholds for increased operation of the indirect sources. When a Federal action has the potential to exceed these thresholds, an air quality review is required to assess the character and impact of the additional emissions and determine whether a permit is required, which is separate from the analyses required under NEPA or the CAA. According to FAA, *Aviation Emissions and Air Quality Handbook Version 3*,[12] Kentucky does not require an ISR.

If the General Conformity evaluation for this air quality assessment were to show that any of these thresholds were equaled or exceeded due to the Proposed Action, further, more detailed analysis to demonstrate conformity would be required, which is referred to as a General Conformity Determination. Conversely, if the General Conformity evaluation were to show that none of the relevant thresholds were equaled or exceeded, the Proposed Action at CVG would be presumed to conform to the Kentucky SIP and no further analysis would be required under the CAA.

[11] USEPA, 40 CFR Part 93.153, *Applicability*, July 1, 2006.
[12] *Aviation Emissions and Air Quality Handbook, Version 3*, January 2015.

2.5 AIR QUALITY MONITORING IN REGION

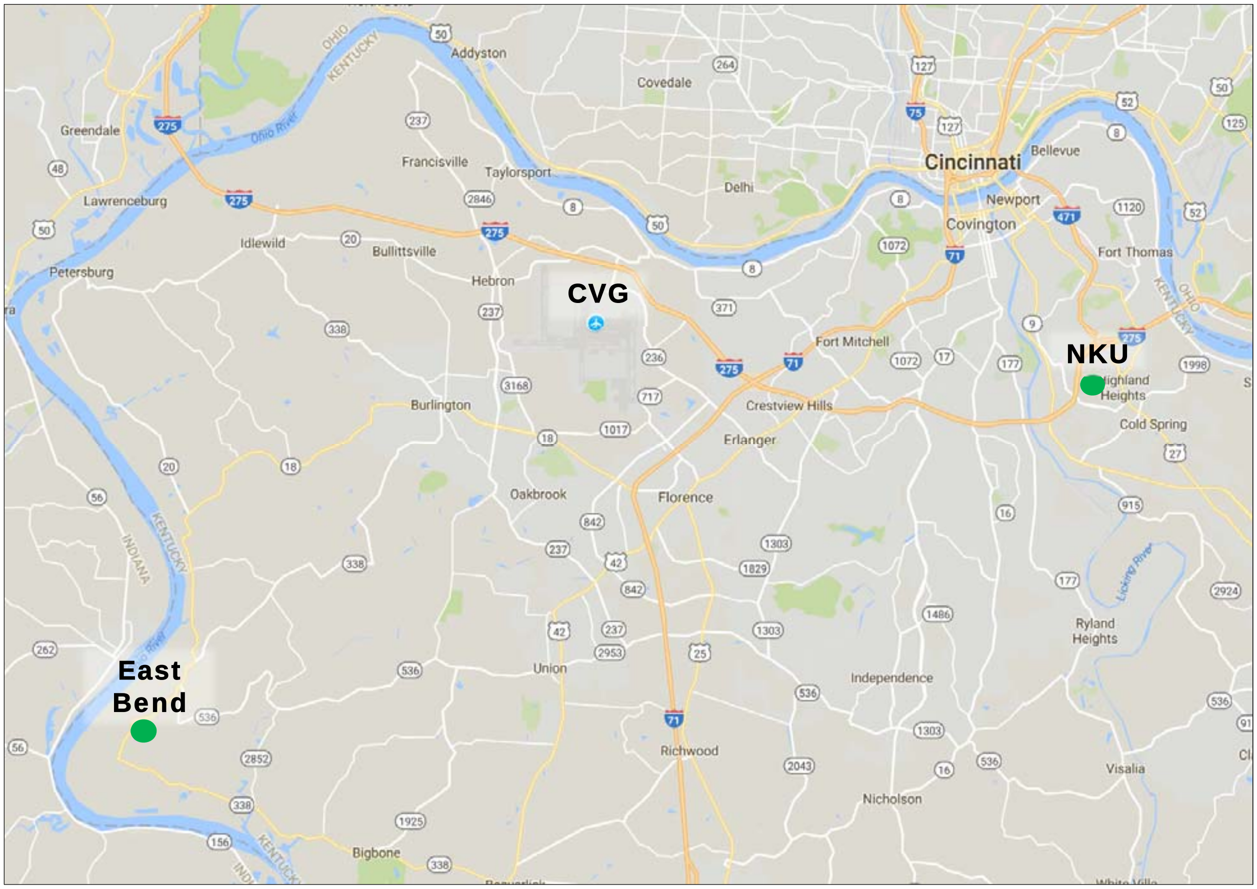
The Kentucky Division for Air Quality established an air monitoring network around the state that measures air pollution.[13] The two air quality monitoring stations closest to the Airport are in East Bend, Kentucky and at Northern Kentucky University (NKU) in Newport, Kentucky. The monitoring station at East Bend is pictured in **Figure 1**. The location of the monitoring stations relative to the Airport is provided in **Figure 2**. The East Bend station primarily monitors for the pollutant ozone while the NKU station monitors for the pollutants NO_2, $PM_{2.5}$, SO_2, and ozone. Data from these monitors indicate if the air quality exceeds the pollutant standard. There were no exceedances of any of the NO_2, $PM_{2.5}$, SO_2, and ozone standards at either of the air quality monitoring stations in 2016.

Figure 1
AIR QUALITY MONITORING STATION IN EAST BEND, KENTUCKY

Source: Kentucky Division for Air Quality, 2018.

[13] *2017 Annual Report*, Kentucky Division for Air Quality, September 2017. Available on-line: http://air.ky.gov/Division%20Reports/2017%20ANNUAL%20REPORT.pdf Accessed May 2018

Figure 2
AIR QUALITY MONITORING STATIONS NEAR CVG



Note: The two air quality monitoring stations (green identifier) nearest the Airport.
Source: Kentucky Division for Air Quality, 2018.

2.6 MODELING METHODOLOGY

The primary sources of air emissions accounted for in the inventory data presented in this report are derived from construction and operational activities. The following software were used to develop the emissions inventory attributed to the No Action and Proposed Action alternatives.

Airport Construction Emissions Inventory Tool

The Airport Construction Emissions Inventory Tool (ACEIT) was developed by the Transportation Research Board (TRB) to assist airports and other stakeholders in developing airport construction emissions inventories.[14] The ACEIT was used to estimate emissions resulting from construction activities attributed to the Proposed Action.

[14] ACEIT uses emission factors from the USEPA's Motor Vehicle Emissions Simulator (MOVES) and NONROAD modeling programs to estimate emissions resulting from construction activities. While ACEIT is not mentioned in Section 6.1.4 of the Aviation Emissions and Air Quality Handbook, Version 3, the Handbook recommends the use of MOVES and NONROAD emission factors to estimate emissions from construction activities. Furthermore, FAA Order 1050.1F, Paragraph 4-2.b allows the use of supplemental models for analysis of non-aviation sources "with prior approval."

Airport Environmental Design Tool Version 2d

The Airport Environmental Design Tool (AEDT) Version 2d is now the FAA's preferred software system that models aircraft performance in space and time to estimate fuel consumption, emissions, noise, and air quality consequences at airports.[15] The AEDT was used to estimate operational activity emissions resulting from aircraft, auxiliary power units (APUs), ground support equipment (GSE), and stationary sources.

Motor Vehicle Emissions Simulator

The USEPA's Motor Vehicle Emissions Simulator (MOVES) is an emission modeling system that estimates emissions for mobile sources at the national, county, and project level for criteria air pollutants, greenhouse gases, and air toxics. MOVES was used to estimate operational activity emissions resulting from ground access vehicles (GAVs).

3.0 CONSTRUCTION ACTIVITIES

Temporary impacts would result from construction activities associated with the Proposed Action. Air pollutants would be emitted by construction equipment and fugitive dust generated during demolition and construction of the proposed development as well as during clearing and grading of the site. The air cargo facility would have initial operational capability in 2021. The construction of the sortation building would be completed under a continuous development and construction program dependent on economic an operational requirements. The facility's final design, development phasing, and construction schedule have not been finalized at the time of the preparation of this EA. Therefore, this document assumes a full build out in three years to disclose maximum environmental impacts due to this project.

3.1 CONSTRUCTION PHASING

Construction estimates (including phase durations and estimated quantities) for the Proposed Action were based on the preliminary engineering data available at the time the modeling was completed for this EA. The estimates were provided by the air cargo service provider. The construction phasing plans identify three main phases proposed to occur over three years, beginning in 2019. The Proposed Action construction phases, elements, and estimated footprints are detailed in **Table 3** and shown in Exhibit 1-3 and 1-4 in Chapter 1 of the EA.

[15] Because this study began in April 2018, the use of AEDT 2d is in accordance with FAA policies. Specifically, "all FAA actions requiring noise, fuel burn or emissions modeling and for which the environmental analysis process has begun on or after September 27, 2017 are required to use AEDT 2d." Available on-line: https://aedt.faa.gov/2d_information.aspx Accessed May 2018.

Table 3
PROPOSED ACTION CONSTRUCTION PHASING AND ELEMENTS

PHASE	ACTIVITY	DURATION (MONTHS)	FOOTPRINT	UNIT
1	Clearing & Site Grading	18	733	acres
1	Building Demo	3	20,875	sq ft
1	Sortation Building	15	26.8	acres
1	Load Wing Building	21	11.6	acres
1	Load Wing Parking Pavement	9	21.8	acres
1	South Parking Garage/Lot	9	1,187	parking spaces
1	West Parking Lot	18	21	acres
1	GSE Services/Maintenance Area Buildings	12	4.2	acres
1	GSE Services/Maintenance Area Pavement	9	15,5508	sq ft
1	North Parking Garage/Lot	9	990	parking spaces
1	East Parking Garage/Lot	9	50	parking spaces
1	Ramp Construction	21	243.3	acres
1	Aero Parkway Improvements	18	32,946	Linear feet
1	Detention Basin	6	15	acres
2	Sortation Building	24	26.8	acres
3	Sortation Building	24	16.3	acres

Source: Air cargo service provider, 2018; Landrum & Brown analysis, 2018.

3.2 CONSTRUCTION EMISSIONS

A construction emissions inventory was prepared to reflect the use of construction equipment and vehicles attributed to the Proposed Action. ACEIT defaults were used for construction equipment and trip generation data. The ACEIT output files are available in **Attachment 2 – *Computer Modeling Files***. The annual construction emissions inventory is provided in **Table 4**.

Table 4
CONSTRUCTION EMISSIONS – PROPOSED ACTION

ACTIVITY / YEAR	ANNUAL EMISSIONS (SHORT TONS)					
	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Construction - 2019	94.5	23.7	28.8	0.2	9.7	1.4
Construction - 2020	173.5	57.7	62.0	0.4	18.7	2.9
Construction - 2021	40.7	9.7	13.3	0.1	1.8	0.6

Source: ACEIT, Landrum & Brown analysis, 2018.

Construction of the Proposed Action would result in the highest NO_x and VOC emissions during the second construction year in 2020 when a majority of the building, pavement construction, and rough grading would take place.

4.0 OPERATIONAL ACTIVITIES

This section presents the analysis of operational air quality emissions from the implementation of the Proposed Action in 2021 and 2026 compared to the No Action for each year.

4.1 FUTURE (2021) NO ACTION

In the Future (2021) No Action alternative, it is assumed the air cargo service provider's operational activities would be accommodated with existing facilities as described in Chapter 3, Section 3.2 of the EA. Therefore, only the emission sources resulting from the accommodation of the air cargo service provider were modeled. This section discusses the methodology and the emissions inventory for the Future (2021) No Action alternative, accordingly.

4.1.1 AIRCRAFT AND ASSOCIATED ACTIVITIES

Takeoffs, Landings, and APUs

The number and type of aircraft operations directly affects emissions. Therefore, the air cargo service provider would operate 23,360 annual operations; 11,680 annual daytime operations at DHL's existing facility and 11,680 annual nighttime operations on the northwest side of the terminal area.

Some cargo aircraft use APUs while parked to operate the heating, air conditioning, and electric systems. The APU can also be used to 'start up' or restart the aircraft engines before departing. APU usage causes emissions and is under the control of the pilot; therefore, APU use and emissions can vary greatly from one aircraft to another. AEDT defaults for aircraft APU usage were used to model APU usage by the air cargo service provider at the Airport.

Taxiing

In the Future (2021) No Action alternative, the air cargo service provider's daytime operations would experience an average taxi-in time of 4 minutes and 19 seconds and would experience an average taxi-out time of 15 minutes and 3 seconds due to their operation out of DHL's existing facility. Furthermore, the air cargo service provider's nighttime operations would experience an average taxi-in time of 5 minutes and 32 seconds and an average taxi-out time of 15 minutes and 36 seconds due to their operation out of the northwest side of the terminal area. The taxi times were calculated based on the average taxi times to the primary runways and the location on the airfield from which the provider would operate.

Ground Support Equipment

Typical GSE includes air conditioning, air start, baggage tractors, belt loaders, and emergency vehicles that support airport operations. The GSE annual usage under the Future (2021) No Action alternative was estimated based on the aircraft activity level, the inefficient use of multiple sortation facilities, and the suboptimal location on the airfield from which the provider would operate. GSE were modeled in AEDT by population, fuel type, and annual usage. The air cargo service provider's operations in the Future (2021) No Action alternative would require the GSE provided in **Table 5**.

Table 5
GROUND SUPPORT EQUIPMENT – FUTURE (2021) NO ACTION

GSE TYPE	FUEL TYPE	ANNUAL USAGE (HOURS PER YEAR)
Air Conditioner	Diesel	21,900
Aircraft Tractor	Diesel	3,650
Belt Loader	Electric*	7,300
Cargo Loader	Electric*	43,800
Cargo Tractor	Electric*	21,900
Deicer	Diesel	1,825
Service Truck	Diesel	4,867
Water Service	Diesel	4,867

* Electric vehicles produce zero direct emissions
Source: Air cargo service provider, 2018; Landrum & Brown analysis, 2018

4.1.2 STATIONARY SOURCES

Stationary sources of air pollution include generators and boilers located on airport property. These stationary sources are a small percentage of the overall emissions inventory and are unlikely to change significantly from year-to-year. New or replacement Airport facilities may result in a change in stationary source emissions.

Under the Future (2021) No Action alternative, the air cargo service provider would be accommodated through existing facilities. Although no new facilities would be constructed, an increase in stationary sources would be required to support the energy demands of the air cargo service provider through the existing facilities. The estimated stationary source use for the Future (2021) No Action alternative is provided in **Table 6**.

Table 6
STATIONARY SOURCES: BOILER – FUTURE (2021) NO ACTION

SOURCE	DESCRIPTION	FUEL TYPE	1,000s OF CUBIC METERS USED PER YEAR
Wall Fired Boiler	100 Million BTU/hour, Uncontrolled	Natural gas	4,000

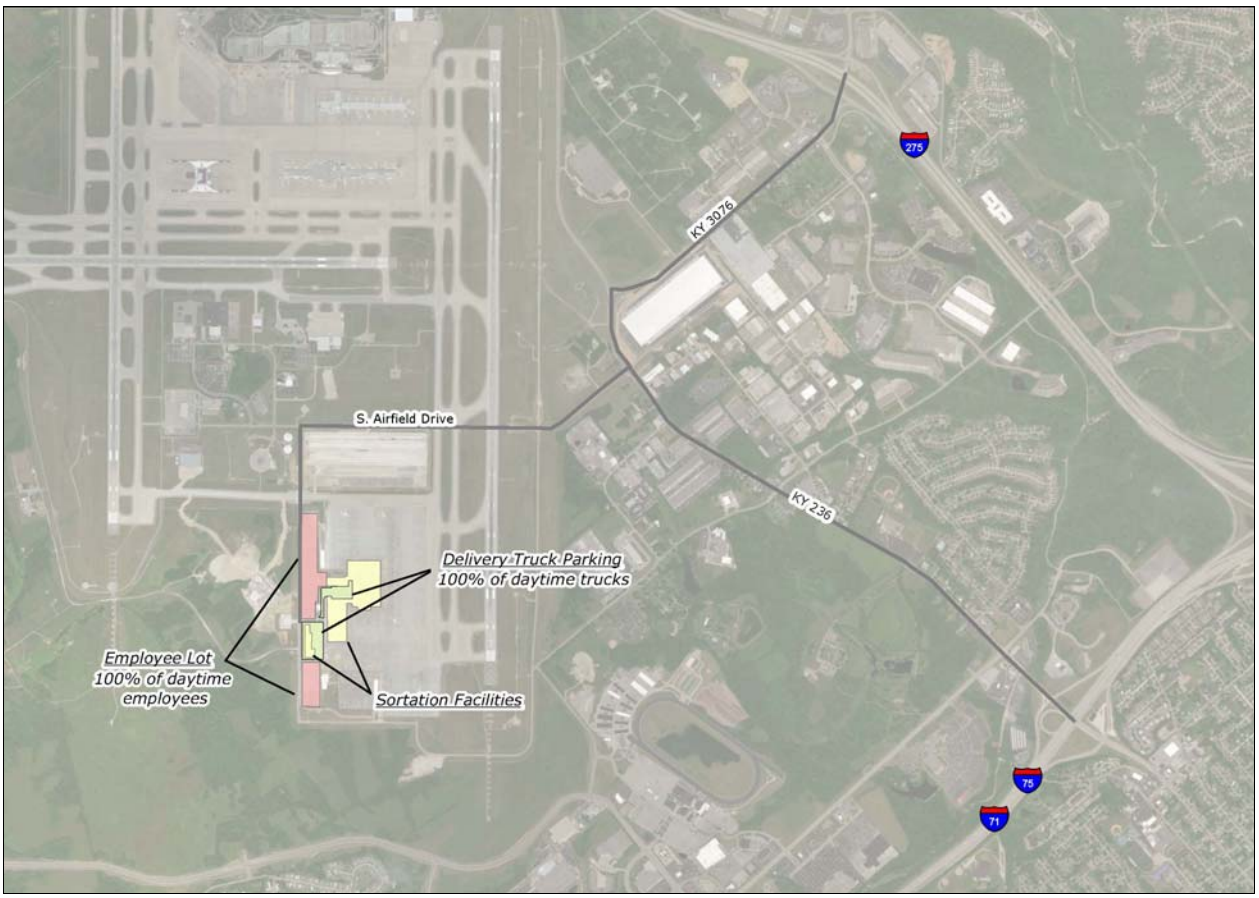
Source: Landrum & Brown analysis, 2018

4.1.3 GROUND ACCESS VEHICLES

Mobile sources of air pollution include motor vehicles and other engines and equipment that can be moved from one location to another. Road sources, or GAVs, include vehicles used to transport people and goods.

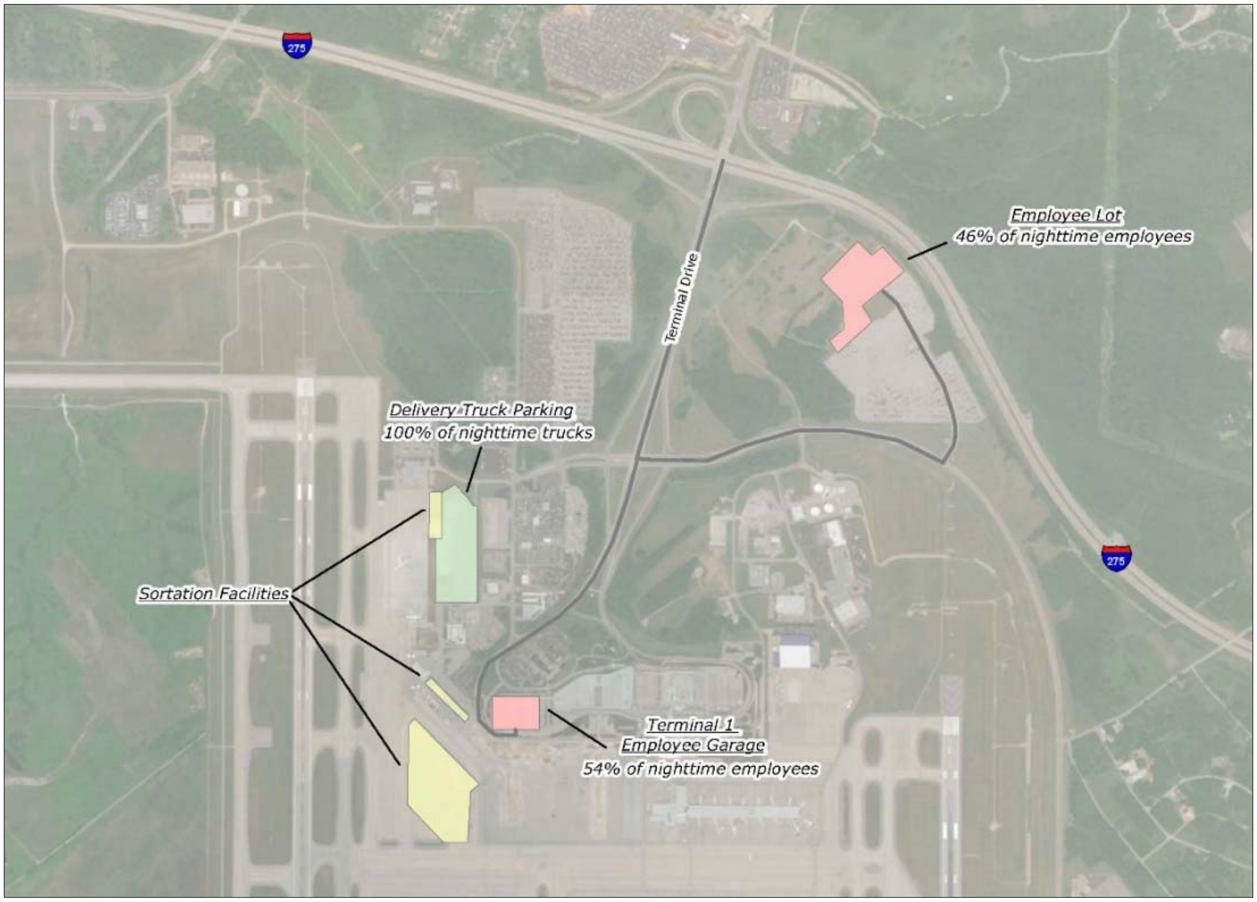
The Future (2021) No Action alternative would require GAV activity, including employee vehicles, delivery trucks, and shuttle buses to transfer employees from parking areas to the facilities. Under the Future (2021) No Action alternative, it is assumed the air cargo service provider would be accommodated at DHL's existing facility during the daytime and at existing facilities on the northwest side of the terminal area during the nighttime. See **Figure 4** and **Figure 5** for the daytime and nighttime operational facilities, respectively. The daily GAV activity for the Future (2021) No Action alternative is provided in **Table 7**.

Figure 3
DAYTIME GAV OPERATIONAL FACILITIES - FUTURE (2021) NO ACTION



Source: Air cargo service provider, 2018; Landrum & Brown analysis, 2018.

Figure 4
NIGHTTIME GAV OPERATIONAL FACILITIES - FUTURE (2021) NO ACTION



Source: Air cargo service provider, 2018; Landrum & Brown analysis, 2018.

Table 7
GAV ACTIVITY – FUTURE (2021) NO ACTION

GAV CATEGORY	VEHICLE TRIPS PER DAY
Employee vehicles	5,432
Delivery trucks	258
Shuttles	32

Source: Air cargo service provider, 2018.

MOVES was used to model the annual emissions for GAVs. The methodology used is consistent with guidance provided by the FAA for developing an emissions inventory for general conformity analysis.[16] Default MOVES inputs specific to Boone County were used in this model when available. For the purpose of this study, GAV activity includes any vehicle activity occurring on Airport property and off Airport property between an Airport entry point to a major roadway. It was assumed that daytime GAVs would travel on Interstate-275 via KY 3076 and Interstate-71/75 via KY 236 to access DHL's existing facility on South Airfield Drive. It was also assumed that nighttime GAVs would use Interstate-275 via Terminal Drive to access the existing facilities in the northwest side of the terminal area.

[16] FAA, Using MOVES with AEDT, September 27, 2017.

Employee Vehicles

Employee vehicles were modeled as passenger cars and passenger trucks. Approximately 75% of the vehicle population was assigned to gasoline passenger cars and 25% of the vehicle population was assigned to gasoline passenger trucks. It was assumed that half of all employee vehicle trips would depart from (or "start" their engines in) the parking lot once a day.

Delivery Trucks

All delivery trucks were modeled as diesel long-haul combination trucks. It was assumed that half of all delivery truck vehicle trips would depart from (or "start" their engines in) the parking lot once a day and that each delivery truck would idle for approximately 45 minutes after arriving to the existing facility. The idle time was based on the assumption that the existing facilities would not provide immediate access to loading docks for arriving delivery trucks.

Shuttles

Shuttles would be used during the nighttime to transfer employees from parking areas to the facilities as existing parking facilities are not located adjacent to the sortation facilities. The shuttles were modeled as diesel intercity buses. It was assumed that half of all shuttle trips would depart from (or "start" their engines in) the parking lot once a day.

4.1.4 EMISSIONS INVENTORY

The operational emissions inventory for the Future (2021) No Action alternative is shown in **Table 8**.

Table 8
OPERATIONAL EMISSIONS INVENTORY – FUTURE (2021) NO ACTION

SOURCE	ANNUAL EMISSIONS (SHORT TONS PER YEAR)					
	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Aircraft Takeoffs and Landings	17.6	8.2	200.7	11.1	0.7	0.7
APUs	1.3	0.2	5.3	0.6	0.3	0.3
Aircraft Taxiing	86.7	17.2	13.5	3.6	0.3	0.3
GSE	287.0	30.1	100.1	2.4	5.5	5.3
Stationary Sources	5.7	0.4	7.1	0.0	0.5	0.5
GAVs	32.0	3.3	10.3	0.0	0.4	0.4
Future (2021) No Action - Operational Total	***430.4***	***59.4***	***337.0***	***17.7***	***7.7***	***7.5***

Note: Operational activities were modeled under the assumption that the development was operational during 365 days in 2021 to account for the maximum annual operational emissions.
Source: Landrum & Brown analysis, 2018

4.2 FUTURE (2021) PROPOSED ACTION

In the Future (2021) Proposed Action, it is assumed the air cargo service provider's operational activities could be accommodated with the proposed development as described in Chapter 3, Section 3.2 of the EA. Therefore, the emission sources resulting from the operation of the air cargo service provider in the proposed development were modeled. This section discusses the methodology and the emissions inventory for the Future (2021) Proposed Action alternative, accordingly.

4.2.1 AIRCRAFT AND ASSOCIATED ACTIVITIES

Takeoffs, Landings, and APUs

Under the Future (2021) Proposed Action, the air cargo service provider's annual aircraft operations would be accommodated by the Proposed Action on the south side of the Airport. The Future (2021) Proposed Action alternative would accommodate the same annual aircraft operations as the Future (2021) No Action alternative; 23,360 annual aircraft operations (11,680 in the daytime and 11,680 in the nighttime). AEDT defaults for aircraft APU usage were used to model APU usage by the air cargo service provider at the Airport.

Taxiing

In the Future (2021) Proposed Action alternative, the air cargo service provider's daytime and nighttime operations would experience an average taxi-in time of 4 minutes and 19 seconds and taxi-out time of 15 minutes and 3 seconds due to their operation out of the proposed development. The taxi times were calculated based on the average taxi times of to the primary runways and the location on the airfield from where the provider would operate under the Proposed Action.

Ground Support Equipment

The GSE annual usage under the Future (2021) Proposed Action alternative was estimated based on the aircraft activity level, the continuous use of a single sortation facility, and the optimal location of the airfield from which the provider would operate. For this reason, it is anticipated that the GSE usage for the Future (2021) Proposed Action alternative is more efficient than that of the Future (2021) No Action alternative. The air cargo service provider's operations in the Future (2021) Proposed Action alternative would require the GSE provided in **Table 9**.

Table 9
GROUND SUPPORT EQUIPMENT – FUTURE (2021) PROPOSED ACTION

GSE TYPE	FUEL TYPE	ANNUAL USAGE (HOURS PER YEAR)
Air Conditioner	Diesel	17,520
Aircraft Tractor	Diesel	2,920
Belt Loader	Electric*	5,840
Cargo Loader	Electric*	35,040
Cargo Tractor	Electric*	17,520
Deicer	Diesel	1,460
Service Truck	Diesel	3,894
Water Service	Diesel	3,894

* Electric vehicles produce zero direct emissions
Source: Air cargo service provider, 2018; Landrum & Brown analysis, 2018

4.2.2 STATIONARY SOURCES

The Future (2021) Proposed Action alternative would result in an increase in stationary sources to support the energy demands of the air cargo service provider with the proposed development. The estimated stationary source use for the Future (2021) Proposed Action alternative is provided in **Table 10** and **Table 11**.

Table 10
STATIONARY SOURCES: BOILER – FUTURE (2021) PROPOSED ACTION

SOURCE	DESCRIPTION	FUEL TYPE	1,000s OF CUBIC METERS USED PER YEAR
Wall Fired Boiler	100 Million BTU/hour, Uncontrolled	Natural gas	18,000

Note: Annual boiler usage was estimated based on the square footage of the Sortation Building and Load Wing.
Source: Landrum & Brown analysis, 2018

Table 11
STATIONARY SOURCES: EMERGENCY GENERATOR – FUTURE (2021) PROPOSED ACTION

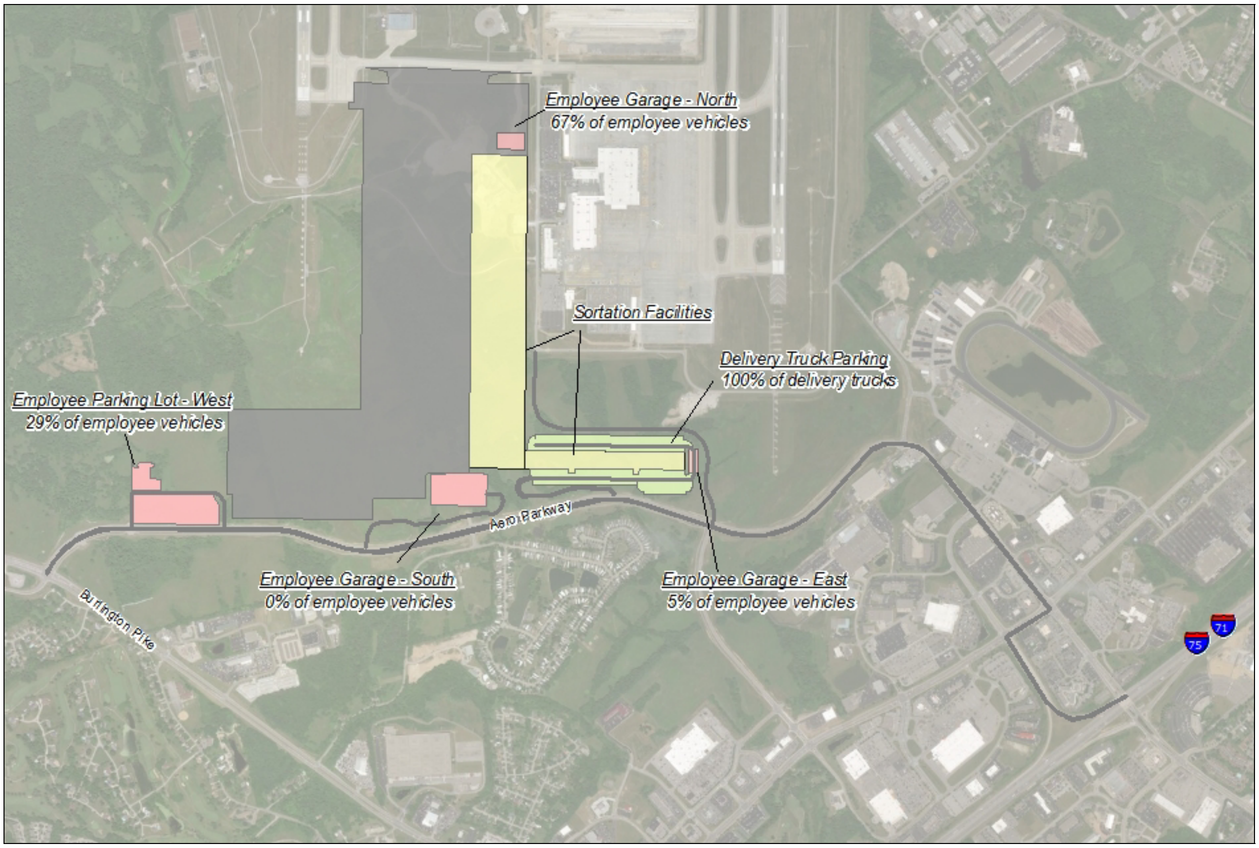
SOURCE	DESCRIPTION	FUEL TYPE	POPULATION	ANNUAL OPERATING HOURS PER UNIT
Emergency Generator	1500 kW Generator	Diesel	4	6

Note: Each generator is assumed to be used for a maximum of 30-minute tests conducted on a monthly basis for all of 2021. The population of emergency generators is based on the assumption that the entire site will be constructed and in operation by 2021.
Source: Air cargo service provider, 2018; Landrum & Brown analysis, 2018

4.2.3 GROUND ACCESS VEHICLES

Under the Future (2021) Proposed Action alternative, GAVs would be accommodated by the proposed development. See **Figure 6** for the operational facilities. It is important to note that the same volume of employee vehicles and delivery trucks would occur in the Future (2021) Proposed Action as the Future (2021) No Action. However, no shuttles are required with the proposed development as employee parking would be located on-site. The daily GAV activity for the Future (2021) Proposed Action alternative is provided in **Table 12**. It was assumed that GAVs would use Burlington Pike and Interstate-71/75 via Aero Parkway and other roadways to access the proposed development.

Figure 5
GAV OPERATIONAL FACILITIES - FUTURE (2021) PROPOSED ACTION



Source: Air cargo service provider, 2018; Landrum & Brown analysis, 2018.

Table 12
GAV ACTIVITY – FUTURE (2021) PROPOSED ACTION

GAV CATEGORY	VEHICLE TRIPS PER DAY
Employee vehicles	5,432
Delivery trucks	258

Source: Air cargo service provider, 2018.

Employee Vehicles

Employee vehicles were modeled as passenger cars and passenger trucks. Approximately 75% of the vehicle population was assigned to gasoline passenger cars and 25% of the vehicle population was assigned to gasoline passenger trucks. It was assumed that half of all employee vehicle trips would depart from (or "start" their engines in) the parking lot once a day.

Delivery Trucks

All delivery trucks were modeled as diesel long-haul combination trucks. It was assumed that half of all delivery truck vehicle trips would depart from (or "start" their engines in) the parking lot once a day and that each delivery truck would idle for approximately 30 minutes after arriving to the proposed development. The estimated idle time was based on the assumption that the proposed development would provide immediate access to loading docks for arriving delivery trucks.

4.2.4 EMISSIONS INVENTORY

The operational emissions inventory for the Future (2021) Proposed Action alternative is shown in **Table 13**.

Table 13
OPERATIONAL EMISSIONS INVENTORY – FUTURE (2021) PROPOSED ACTION

SOURCE	ANNUAL EMISSIONS (SHORT TONS PER YEAR)					
	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Aircraft Takeoffs and Landings	17.6	8.2	200.7	11.1	0.7	0.7
APUs	1.3	0.2	5.3	0.6	0.3	0.3
Aircraft Taxiing	77.2	15.2	12.2	3.5	0.2	0.2
GSE	229.6	24.1	80.1	1.9	4.4	4.2
Stationary Sources	26.0	1.8	32.5	0.2	2.4	2.4
GAVs	29.1	3.7	8.8	0.0	0.3	0.3
Future (2021) Proposed Action - Operational Total	***380.7***	***53.2***	***339.6***	***17.3***	***8.4***	***8.2***

Note: Operational activities were modeled under the assumption that the development was operational during 365 days in 2021 to account for the maximum annual operational emissions.

Source: Landrum & Brown analysis, 2018

4.3 FUTURE (2026) NO ACTION

In the Future (2026) No Action alternative, it is assumed the air cargo service provider's aircraft operational activities would be accommodated with existing facilities as described in Chapter 3, Section 3.2 of the EA. However, unlike the 2021 operating levels, all of the anticipated growth in activity could not be accommodated at the Airport due to a lack of ramp and cargo processing facilities. Therefore, only the emission sources resulting from the accommodation of the air cargo service provider were modeled. This section discusses the methodology and the emissions inventory for the Future (2026) No Action alternative, accordingly.

4.3.1 AIRCRAFT AND ASSOCIATED ACTIVITIES

Takeoffs, Landings, and APUs

Under the Future (2026) No Action alternative, the air cargo service provider's aircraft operations would be accommodated through existing facilities. The air cargo service provider would operate 46,720 annual operations; 26,280 annual daytime operations at DHL's existing facility and 20,440 annual nighttime operations on the northwest side of the terminal area. AEDT defaults for aircraft APU usage were used to model APU usage by the air cargo service provider at the Airport.

Taxiing

The daytime and nighttime aircraft average taxi times for the Future (2026) No Action alternative are expected to remain the same as those of the Future (2021) No Action alternative.

Ground Support Equipment

The GSE annual usage under the Future (2026) No Action was estimated based on the aircraft activity level, the inefficient use of multiple sortation facilities, and the suboptimal location on the airfield from which the provider would operate. The air cargo service provider's operations accommodated in the Future (2026) No Action alternative would require the GSE provided in **Table 14**.

Table 14
GROUND SUPPORT EQUIPMENT – FUTURE (2026) NO ACTION

GSE TYPE	FUEL TYPE	ANNUAL USAGE (HOURS PER YEAR)
Air Conditioner	Diesel	43,800
Aircraft Tractor	Diesel	7,300
Belt Loader	Electric*	14,600
Cargo Loader	Electric*	87,600
Cargo Tractor	Electric*	43,800
Deicer	Diesel	3,650
Service Truck	Diesel	9,734
Water Service	Diesel	9,734

* Electric vehicles produce zero direct emissions
Source: Air cargo service provider, 2018; Landrum & Brown analysis, 2018

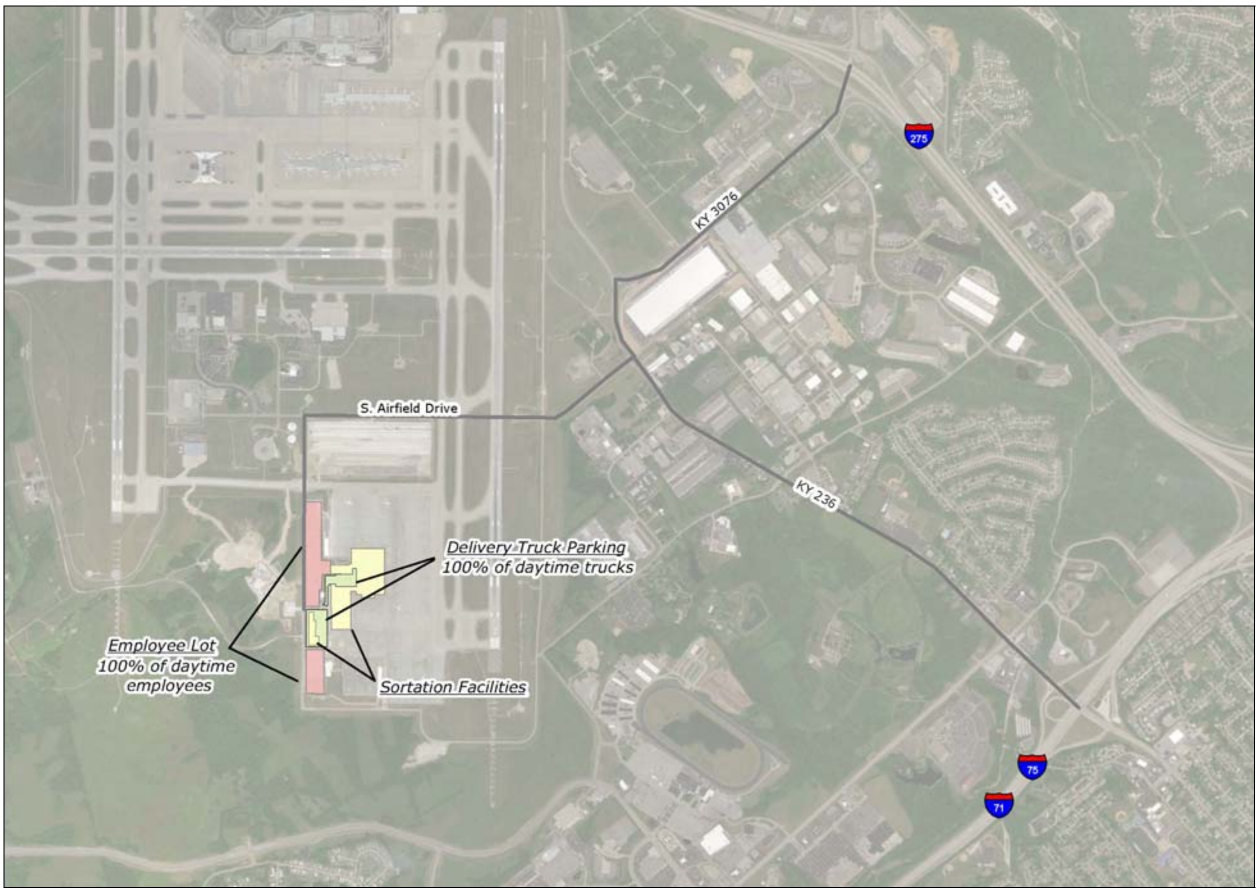
4.3.2 STATIONARY SOURCES

Stationary sources are unlikely to change significantly from year-to-year. Therefore, the energy demands of the air cargo service provider for the Future (2026) No Action alternative were assumed to be the same as those of the Future (2021) No Action alternative.

4.3.3 GROUND ACCESS VEHICLES

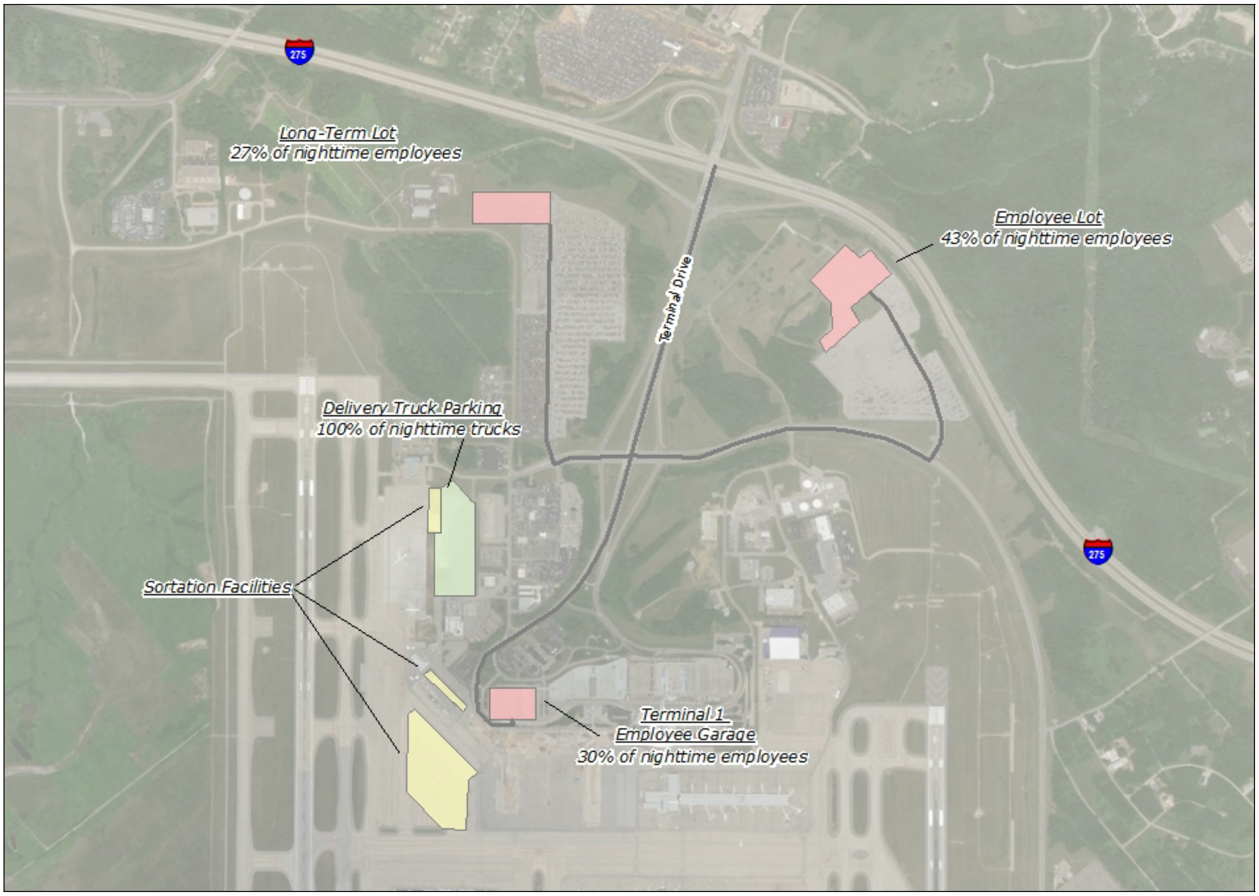
The Future (2026) No Action alternative would increase GAV activity, including employee vehicles, delivery trucks, and shuttle buses to transfer employees from parking areas to the facilities. Under the Future (2026) No Action alternative, it is assumed the air cargo service provider would be accommodated at DHL's existing facility during the daytime and in existing facilities in the northwest side of the terminal area during the nighttime. See **Figure 7** and **Figure 8** for the daytime and nighttime operational facilities, respectively. The daily GAV activity for the Future (2026) No Action alternative is provided in **Table 15**.

Figure 6
DAYTIME GAV OPERATIONAL FACILITIES - FUTURE (2026) NO ACTION



Source: Air cargo service provider, 2018; Landrum & Brown analysis, 2018.

Figure 7
NIGHTTIME GAV OPERATIONAL FACILITIES - FUTURE (2026) NO ACTION



Source: Air cargo service provider, 2018; Landrum & Brown analysis, 2018.

Table 15
GAV ACTIVITY – FUTURE (2026) NO ACTION

GAV CATEGORY	VEHICLE TRIPS PER DAY
Employee vehicles	11,058
Delivery trucks	578
Shuttles	90

Source: Air cargo service provider, 2018.

MOVES was used to model the annual emissions from GAVs. The same methodology used to model the Future (2021) No Action alternative GAV activity was employed to model that of the Future (2026) No Action alternative.

4.3.4 EMISSIONS INVENTORY

The operational emissions inventory for the Future (2026) No Action alternative is shown in **Table 16**.

Table 16
OPERATIONAL EMISSIONS INVENTORY – FUTURE (2026) NO ACTION

SOURCE	ANNUAL EMISSIONS (SHORT TONS PER YEAR)					
	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Aircraft Takeoffs and Landings	29.5	14.8	354.3	18.2	1.1	1.1
APUs	3.4	0.3	10.0	1.1	0.7	0.7
Taxiing	117.6	21.6	22.3	5.6	0.4	0.4
GSE	430.5	54.3	122.4	4.7	5.7	5.4
Stationary Sources	5.7	0.4	7.1	0.0	0.5	0.5
GAVs	48.4	4.9	15.1	0.0	0.8	0.7
Future(2026) No Action - Operational Total	***635.0***	***96.3***	***531.1***	***29.7***	***9.2***	***8.9***

Note: Operational activities were modeled under the assumption that the development was operational during 365 days in 2026 to account for the maximum annual operational emissions
Source: Landrum & Brown analysis, 2018

4.4 FUTURE (2026) PROPOSED ACTION

In the Future (2026) Proposed Action alternative, it is assumed the air cargo service provider's operational activities could be accommodated with the proposed development as described in Chapter 3, Section 3.2 of the EA. Therefore, the emission sources resulting from the operation of the air cargo service provider in the proposed development were modeled. This section discusses the methodology and the emissions inventory for the Future (2026) Proposed Action alternative, accordingly.

4.4.1 AIRCRAFT AND ASSOCIATED ACTIVITIES

Takeoffs, Landings, and APUs

Under the Future (2026) Proposed Action alternative, the air cargo service provider's annual aircraft operations would fully be accommodated by the Proposed Action on the south side of the Airport. The Future (2026) Proposed Action alternative would accommodate 52,560 annual aircraft operations (26,280 in the daytime and 26,280 in the nighttime). AEDT defaults for aircraft APU usage were used to model APU usage by the air cargo service provider at the Airport.

Taxiing

The aircraft average taxi time for the Future (2026) Proposed Action is expected to remain the same as the Future (2021) Proposed Action.

Ground Support Equipment

The GSE annual usage under the Future (2026) Proposed Action alternative was estimated based on the aircraft activity level, the continuous use of a single sortation facility, and the optimal location on the airfield from which the provider would operate. For this reason, it is anticipated that the GSE usage for the Future (2026) Proposed Action alternative is more efficient than that of the Future (2026) No Action alternative. The air cargo service provider's operations in the Future (2026) Proposed Action alternative would require the GSE provided in **Table 17**.

Table 17
GROUND SUPPORT EQUIPMENT – FUTURE (2026) PROPOSED ACTION

GSE TYPE	FUEL TYPE	ANNUAL USAGE (HOURS PER YEAR)
Air Conditioner	Diesel	39,420
Aircraft Tractor	Diesel	6,570
Belt Loader	Electric*	13,140
Cargo Loader	Electric*	78,840
Cargo Tractor	Electric*	39,420
Deicer	Diesel	3,285
Service Truck	Diesel	8,760
Water Service	Diesel	8,760

* Electric vehicles produce zero direct emissions
Source: Air cargo service provider, 2018; Landrum & Brown analysis, 2018

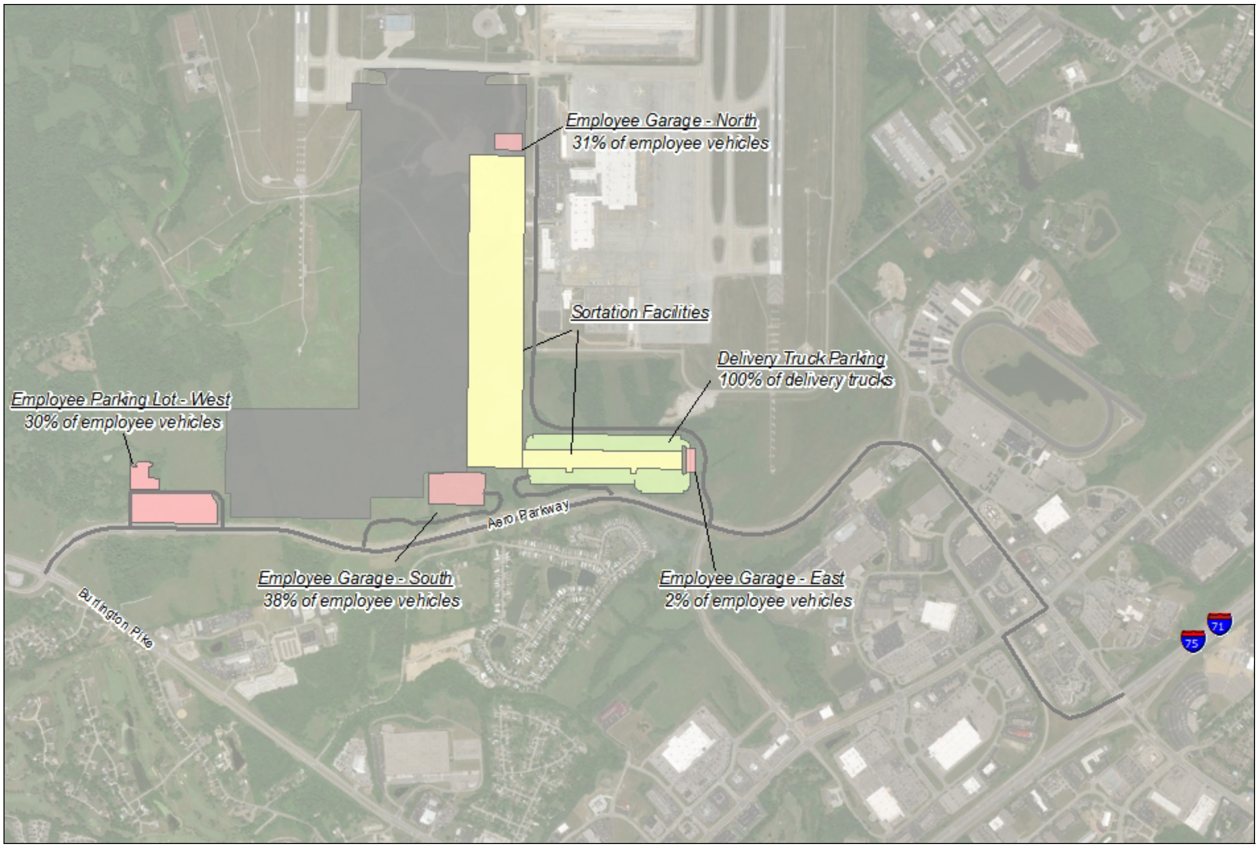
4.4.2 STATIONARY SOURCES

Stationary sources are unlikely to change significantly from year-to-year. Therefore, the energy demands of the air cargo service provider for the Future (2026) Proposed Action alternative were assumed to be the same as those of the Future (2026) Proposed Action alternative.

4.4.3 GROUND ACCESS VEHICLES

The Future (2026) Proposed Action alternative would increase GAV activity (including employee vehicles and delivery trucks) from the Future (2021) Proposed Action alternative. Under the Future (2026) Proposed Action alternative, GAVs would be accommodated by the proposed development. Additional parking facilities would be required to accommodate the increase in GAV activity. See **Figure 9** for the operational facilities. No shuttles are required in the proposed development as employee parking would be located on-site. The daily GAV activity for the Future (2026) Proposed Action alternative is provided in **Table 18**.

Figure 8
GAV OPERATIONAL FACILITIES - FUTURE (2026) PROPOSED ACTION



Source: Air cargo service provider, 2018; Landrum & Brown analysis, 2018.

Table 18
GAV ACTIVITY – FUTURE (2026) PROPOSED ACTION

GAV CATEGORY	VEHICLE TRIPS PER DAY
Employee vehicles	12,440
Delivery trucks	650

Source: Air cargo service provider, 2018.

MOVES was used to model the annual emissions from GAVs. The same methodology used to model the Future (2021) Proposed Action alternative GAV activity was employed to model that of the Future (2026) Proposed Action alternative.

4.4.4 EMISSIONS INVENTORY

The operational emissions inventory for the Future (2026) Proposed Action alternative is shown in **Table 19**.

Table 19
OPERATIONAL EMISSIONS INVENTORY – FUTURE (2026) PROPOSED ACTION

SOURCE	ANNUAL EMISSIONS (SHORT TONS PER YEAR)					
	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Aircraft Takeoffs and Landings	33.4	16.7	404.2	20.7	1.3	1.3
APUs	3.8	0.4	11.3	1.3	0.8	0.8
Taxiing	135.5	24.7	26.0	6.9	0.4	0.4
GSE	387.4	48.9	110.1	4.2	5.1	4.9
Stationary Sources	26.0	1.8	32.5	0.2	2.4	2.4
GAVs	47.5	6.0	13.2	0.0	0.6	0.5
Future (2026) Proposed Action - Operational Total	***633.5***	***98.5***	***597.2***	***33.3***	***10.7***	***10.4***

Note: Operational activities were modeled under the assumption that the development was operational during 365 days in 2021 to account for the maximum annual operational emissions.
Source: Landrum & Brown analysis, 2018

5.0 TOTAL EMISSIONS

The emissions inventories prepared for the Proposed Action were compared to the emissions inventories prepared for the No Action alternative of the same future year to disclose the potential increase in emissions caused by the Proposed Action. The comparison of the emission inventories, which included an inventory of construction and operational emissions, were used for the evaluation of General Conformity as required under the CAA (including the 1990 Amendments). Because conformity to the *de minimis* threshold is relevant only with regard to the ozone precursor pollutants, only NO_x and VOC emissions are presented and evaluated in this report. **Table 20** shows that neither of the relevant Federal thresholds were equaled or exceeded for the Future (2021) Proposed Action or the Future (2026) Proposed Action.

In 2019 and 2020, there is an increase in net emissions due to construction activities associated with the Proposed Action. In 2021, there is an increase in net emissions of NOx and VOCs due to construction activities and usage of stationary sources associated with the Proposed Action. However, there is also decrease in in net emissions of CO due to the inefficient usage of GSE and increased aircraft taxiing associated with the No Action. In 2026, there is an increase in net emissions of NOx and VOCs due to increased aircraft activity and taxiing levels associated with the Proposed Action. Additionally, there is decrease in in net emissions of CO due to the inefficient usage of GSE and increased aircraft taxiing associated with the No Action.

The air quality assessment demonstrates that the Proposed Action would not cause an increase in air emissions above the applicable *de minimis* thresholds. Therefore, the Proposed Action conforms to the SIP and the CAA and would not create any new violation of the NAAQS, delay the attainment of any NAAQS, nor increase the frequency or severity of any existing violations of the NAAQS. As such, no adverse impact on local or regional air quality is expected by construction of the Proposed Action. No further analysis or reporting is required under the CAA or NEPA.

Table 20
TOTAL ANNUAL EMISSIONS

SOURCE	ANNUAL EMISSIONS(SHORT TONS PER YEAR)					
	CO	VOC	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Federal de minimis Threshold	***N/A***	***100***	***100***	***N/A***	***N/A***	***N/A***
2019						
Construction - Proposed Action	94.5	23.7	28.8	0.2	9.7	1.4
2019 Proposed Action Subtotal	*94.5*	*23.7*	*28.8*	*0.2*	*9.7*	*1.4*
2019 Proposed Action Net Emissions	***94.5***	***23.7***	***28.8***	***0.2***	***9.7***	***1.4***
2020						
Construction - Proposed Action	173.5	57.7	62.0	0.4	18.7	2.9
2020 Proposed Action Subtotal	*173.5*	*57.7*	*62.0*	*0.4*	*18.7*	*2.9*
2020 Proposed Action Net Emissions	***173.5***	***57.7***	***62.0***	***0.4***	***18.7***	***2.9***
2021						
Aircraft Takeoffs and Landings - No Action	17.6	8.2	200.7	11.1	0.7	0.7
APUs – No Action	1.3	0.2	5.3	0.6	0.3	0.3
Aircraft Taxiing - No Action	86.7	17.2	13.5	3.6	0.3	0.3
GSE – No Action	287.0	30.1	100.1	2.4	5.5	5.3
Stationary Sources – No Action	5.7	0.4	7.1	0.0	0.5	0.5
GAVs - No Action	32.0	3.3	10.3	0.0	0.4	0.4
2021 No Action Subtotal	***430.4***	***59.4***	***337.0***	***17.7***	***7.7***	***7.5***
Aircraft Takeoffs and Landings - Proposed Action	17.6	8.2	200.7	11.1	0.7	0.7
APUs – Proposed Action	1.3	0.2	5.3	0.6	0.3	0.3
Aircraft Taxiing - Proposed Action	77.2	15.2	12.2	3.5	0.2	0.2
GSE – Proposed Action	229.6	24.1	80.1	1.9	4.4	4.2
Stationary Sources - Proposed Action	26.0	1.8	32.5	0.2	2.4	2.4
GAVs - Proposed Action	29.1	3.7	8.8	0.0	0.3	0.3
Construction - Proposed Action	40.7	9.7	13.3	0.1	1.8	0.6
2021 Proposed Action Subtotal	***421.4***	***62.9***	***352.9***	***17.4***	***10.2***	***8.8***
2021 Proposed Action Net Emissions	***- 8.9***	***3.4***	***15.8***	***-0.3***	***2.5***	***1.3***
2026						
Aircraft Takeoffs and Landings - No Action	29.5	14.8	354.3	18.2	1.1	1.1
APUs – No Action	3.4	0.3	10.0	1.1	0.7	0.7
Aircraft Taxiing - No Action	117.6	21.6	22.3	5.6	0.4	0.4
GSE - No Action	430.5	54.3	122.4	4.7	5.7	5.4
Stationary Sources – No Action	5.7	0.4	7.1	0.0	0.5	0.5
GAVs - No Action	48.4	4.9	15.1	0.0	0.8	0.7
2026 No Action Subtotal	***635.0***	***96.3***	***531.1***	***29.7***	***9.2***	***8.9***
Aircraft Takeoffs and Landings - Proposed Action	33.4	16.7	404.2	20.7	1.3	1.3
APU - Proposed Action	3.8	0.4	11.3	1.3	0.8	0.8
Aircraft Taxiing - Proposed Action	135.5	24.7	26.0	6.9	0.4	0.4
GSE - Proposed Action	387.4	48.9	110.1	4.2	5.1	4.9
Stationary Sources - Proposed Action	26.0	1.8	32.5	0.2	2.4	2.4
GAVs - Proposed Action	47.5	6.0	13.2	0.0	0.6	0.5
2026 Proposed Action Subtotal	***633.5***	***98.5***	***597.2***	***33.3***	***10.7***	***10.4***
2026 Proposed Action Net Emissions	***-1.5***	***2.1***	***66.1***	***3.6***	***1.5***	***1.5***

Note: Numbers may not sum due to rounding.
Source: Landrum & Brown analysis, 2018

6.0 CLIMATE

6.1 AFFECTED ENVIRONMENT

GHGs are gases that trap heat in the earth's atmosphere. Both naturally occurring and man-made GHGs primarily include water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Sources that require fuel or power at an airport are the primary sources that would generate GHGs. Aircraft are probably the most often cited air pollutant source, but they produce the same types of emissions as ground access vehicles.

Research has shown there is a direct correlation between fuel combustion and GHG emissions. In terms of U.S. contributions, the General Accounting Office (GAO) reports that "domestic aviation contributes about three percent of total carbon dioxide emissions, according to EPA data," compared with other industrial sources including the remainder of the transportation sector (20 percent) and power generation (41 percent).[17] The International Civil Aviation Organization (ICAO) estimates that GHG emissions from aircraft account for roughly three percent of all anthropogenic GHG emissions globally.[18] Climate change due to GHG emissions is a global phenomenon, so the affected environment is the global climate.[19]

The scientific community is continuing efforts to better understand the impact of aviation emissions on the global atmosphere. The FAA is leading and participating in a number of initiatives intended to clarify the role that commercial aviation plays in GHG emissions and climate. The FAA, with support from the U.S. Global Change Research Program and its participating federal agencies (e.g., National Aeronautics and Space Administration (NASA), National Oceanic and Atmospheric Administration (NOAA), USEPA, and Department of Energy (DOE)), has developed the Aviation Climate Change Research Initiative (ACCRI) in an effort to advance scientific understanding of regional and global climate impacts of aircraft emissions. FAA also funds the Partnership for Air Transportation Noise & Emissions Reduction (PARTNER) Center of Excellence research initiative to quantify the effects of aircraft exhaust and contrails on global and U.S. climate and atmospheric composition. Similar research topics are being examined at the international level by the International Civil Aviation Organization.[20]

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17 *Aviation and Climate Change.* GAO Report to Congressional Committees, (2009).

18 Alan Melrose, "European ATM and Climate Adaptation: A Scoping Study," in *ICAO Environmental Report.* (2010).

19 As explained by the U.S. Environmental Protection Agency, "greenhouse gases, once emitted, become well mixed in the atmosphere, meaning U.S. emissions can affect not only the U.S. population and environment but other regions of the world as well; likewise, emissions in other countries can affect the United States." Climate Change Division, Office of Atmospheric Programs, U.S. Environmental Protection Agency, *Technical Support Document for Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act* 2-3 (2009).

20 Lourdes Q. Maurice and David S. Lee. *Chapter* 5: *Aviation Impacts on Climate.* Final Report of the International Civil Aviation Organization (ICAO) Committee on Aviation and Environmental Protection (CAEP) Workshop. October 29th November 2nd 2007, Montreal.

6.2 CLIMATE ENVIRONMENTAL CONSEQUENCES

Although there are no federal standards for aviation-related GHG emissions, it is well-established that GHG emissions can affect climate.[21] The Council on Environmental Quality (CEQ) has indicated that climate should be considered in NEPA analyses. The following provides an estimate of GHG emissions. This report used the carbon dioxide equivalent (CO_2E) method to show relative impacts on climate change of different chemical species. The resulting CO_2E is provided for information only as no federal NEPA standard for the significance of GHG emissions from individual projects on the environment has been established. **Table 21** provides the CO_2E emissions inventory for the construction and operational activities previously discussed in Section 3.0 and 4.0 of this document.

Table 21
TOTAL ANNUAL GHG EMISSIONS

SOURCE	ANNUAL EMISSIONS (METRIC TONS) CO_2E
2019	
Construction - Proposed Action	17,921.5
2019 Proposed Action Net Emissions	***17,921.5***
2020	
Construction - Proposed Action	40,988.5
2020 Proposed Action Net Emissions	***40,988.5***
2021	
Aircraft Takeoffs and Landings - No Action	27,144.4
Aircraft Taxiing - No Action	8,796.2
GAVs - No Action	2,493.0
2021 No Action Subtotal	*38,433.7*
Aircraft Takeoffs and Landings - No Action	27,144.4
Aircraft Taxiing - Proposed Action	8,526.6
GAVs - Proposed Action	2,238.4
Construction - Proposed Action	9,356.9
2021 Proposed Action Subtotal	*47,266.3*
2021 Proposed Action Net Emissions	***8,832.6***
2026	
Aircraft Takeoffs and Landings - No Action	44,423.4
Aircraft Taxiing - No Action	13,746.8
GAVs - No Action	5,062.9
2026 No Action Subtotal	*63,233.0*
Aircraft Takeoffs and Landings - Proposed Action	50,508.1
Aircraft Taxiing - Proposed Action	16,817.6
GAVs - Proposed Action	4,882.2
2026 Proposed Action Subtotal	*72,207.9*
2026 Proposed Action Net Emissions	***8,974.8***

CO_2E: Carbon Dioxide equivalent
Note: GHG emissions for stationary sources, GSE, and APUs are not reported because AEDT does not have the capability of calculating GHG emissions for these emission sources. Numbers may not sum due to rounding.
Source: Landrum & Brown analysis, 2018

[21] See *Massachusetts* v. *E.P.A.*, 549 U.S. 497, 508-10, 521-23 (2007).

6.3 CLIMATE CUMULATIVE IMPACTS

The cumulative impact of this Proposed Action on the global climate when added to other past, present, and reasonably foreseeable future actions is not currently scientifically predictable. Aviation has been calculated to contribute approximately 3 percent of global carbon dioxide (CO_2) emissions; this contribution may grow to 5 percent by 2050. Actions are underway within the U.S. and by other nations to reduce aviation's contribution through such measures as new aircraft technologies to reduce emissions and improve fuel efficiency, renewable alternative fuels with lower carbon footprints, more efficient air traffic management, market-based measures and environmental regulations including an aircraft CO_2 standard. The U.S. has ambitious goals to achieve carbon-neutral growth for aviation by 2020 compared to a 2005 baseline, and to gain absolute reductions in GHG emissions by 2050. At present there are no calculations of the extent to which measures individually or cumulatively may affect aviation's CO_2 emissions. Moreover, there are large uncertainties regarding aviation's impact on climate. The FAA, with support from the U.S. Global Change Research Program and its participating federal agencies (e. g., NASA, NOAA, EPA, and DOE), has developed the Aviation Climate Change Research Initiative (ACCRI) in an effort to advance scientific understanding of regional and global climate impacts of aircraft emissions, with quantified uncertainties for current and projected aviation scenarios under changing atmospheric conditions.[22]

[22] Nathan Brown, et. al. *The U.S. Strategy for Tackling Aviation Climate Impacts*, (2010). 27th International Congress of the Aeronautical Sciences.

ATTACHMENT 1
DESCRIPTION OF POLLUTANTS

Ozone (O_3) - Ozone is a pollutant which is not directly emitted, rather, ozone is formed in the atmosphere through photochemical reaction with nitrogen oxides (NO_X), volatile organic compounds (VOC), sunlight, and heat. It is the primary constituent of smog and problems can occur many miles away from the pollutant sources.

People with lung disease, children, older adults, and people who are active can be affected when ozone levels are unhealthy. Numerous scientific studies have linked ground-level ozone exposure to a variety of problems, including:

- lung irritation that can cause inflammation much like a sunburn;
- wheezing, coughing, pain when taking a deep breath, and breathing difficulties during exercise or outdoor activities;
- permanent lung damage to those with repeated exposure to ozone pollution; and
- aggravated asthma, reduced lung capacity, and increased susceptibility to respiratory illnesses like pneumonia and bronchitis.

Carbon Monoxide (CO) - Carbon monoxide is a colorless, odorless gas primarily associated with the incomplete combustion of fossil fuels in motor vehicles. Carbon monoxide combines with hemoglobin in the bloodstream and reduces the amount of oxygen that can be circulated through the body. High carbon monoxide concentrations can lead to headaches, aggravation of cardiovascular disease, and impairment of central nervous system functions. Carbon monoxide concentrations can vary greatly over comparatively short distances. Relatively high concentrations are typically found near crowded intersections, along heavily used roadways carrying slow-moving traffic, and at or near ground level. Even under the most severe meteorological and traffic conditions, high concentrations of carbon monoxide are limited to locations within a relatively short distance of heavily traveled roadways. Overall carbon monoxide emissions are decreasing as a result of the Federal Motor Vehicle Control Program, which has mandated increasingly lower emission levels for vehicles manufactured since 1973.

Volatile Organic Compound (VOC) – Volatile Organic Compounds are gases that are emitted from solids or liquids, such as stored fuel, paint, and cleaning fluids. VOCs include a variety of chemicals, some which can have short and long-term adverse health effects. As previously stated, VOCs are precursor pollutants that react with heat, sunlight and nitrogen oxides (NO_X) to form ozone (O_3). VOC can also mix with other gases to form particulate matter $PM_{2.5}$ as referenced below.

Nitrogen Dioxide (NO_2) - Nitrogen gas, normally relatively inert (unreactive), comprises about 80% of the air. At high temperatures (i.e., in the combustion process) and under certain other conditions it can combine with oxygen, forming several different gaseous compounds collectively called nitrogen oxides (NO_x). Nitric oxide (NO) and nitrogen dioxide (NO_2) are the two most important compounds. Nitric oxide is converted to nitrogen dioxide in the atmosphere. Nitrogen dioxide (NO_2) is a red-brown pungent gas. Motor vehicle emissions are the main source of NO_x in urban areas.

Nitrogen dioxide is toxic to various animals as well as to humans. Its toxicity relates to its ability to form nitric acid with water in the eye, lung, mucus membrane and skin. In animals, long-term exposure to nitrogen oxides increases susceptibility to respiratory infections lowering their resistance to such diseases as pneumonia and influenza. Laboratory studies show susceptible humans, such as asthmatics, exposed to high concentrations of NO_2 can suffer lung irritation and potentially, lung damage. Epidemiological studies have also shown associations between NO_2 concentrations and daily mortality from respiratory and cardiovascular causes and with hospital admissions for respiratory conditions.

While the NAAQS only addresses NO_2, NO and the total group of nitrogen oxides is of concern. NO and NO_2 are both precursors in the formation of ozone and secondary particulate matter. Because of this and that NO emissions largely convert to NO_2, NOx emissions are typically examined when assessing potential air quality impacts.

Sulfur Dioxide (SO_2) - Sulfur oxides (SO_x) constitute a class of compounds of which sulfur dioxide (SO_2) and sulfur trioxide (SO_3) are of greatest importance. SO_2 is commonly expressed as SO_X since it is a larger subset of sulfur dioxides (SO_2). SO_2 is a colorless gas that is typically identified as having a strong odor and is formed when fuel containing sulfur, like coal, oil and jet fuel, is burned. SO_2 combines easily with water vapor, forming aerosols of sulfurous acid (H_2SO_3), a colorless, mildly corrosive liquid. This liquid may then combine with oxygen in the air, forming the even more irritating and corrosive sulfuric acid (H_2SO_4). Peak levels of SO_2 in the air can cause temporary breathing difficulty for people with asthma who are active outdoors. Longer-term exposures to high levels of SO_2 gas and particles cause respiratory illness and aggravate existing heart disease.

Particulate Matter (PM_{10} and $PM_{2.5}$) - Particulate matter includes both aerosols and solid particles of a wide range of size and composition. PM_{10} is considered coarse particles with a diameter of 10 micrometers or less, and $PM_{2.5}$, fine particles with a diameter of 2.5 micrometers or less. Emissions of $PM_{2.5}$ are a subset of emissions of PM_{10}. Particulate matter can be any particle of these sizes, including dust, dirt, and soot. Smaller particulates are of greater concern because they can penetrate deeper into the lungs than large particles.

$PM_{2.5}$ is directly emitted in combustion exhaust and formed from atmospheric reactions between various gaseous pollutants including nitrogen oxides (NO_x) sulfur oxides (SO_x) and volatile organic compounds (VOC). PM_{10} is generally emitted directly as a result of mechanical processes that crush or grind larger particles or the resuspension of dusts, most typically through construction activities and vehicular movements. $PM_{2.5}$ can remain suspended in the atmosphere for days and weeks and can be transported over long distances. PM_{10} generally settles out of the atmosphere rapidly and is not readily transported over large distances.

The principal health effect of airborne particulate matter is on the respiratory system. Short-term exposures to high $PM_{2.5}$ levels are associated with premature mortality, increased hospital admissions, and emergency room visits. Long-term exposures to high $PM_{2.5}$ levels are associated with premature mortality and development of chronic respiratory disease.

Carbon Dioxide (CO_2) - Carbon dioxide is a colorless, odorless gas produced through the incomplete combustion of fossil fuels. Carbon dioxide is considered to be the most significant GHG that traps heat in the earth's atmosphere.

Carbon Dioxide Equivalent (CO_2E) - The CO_2E method is a way to show relative impacts on climate change of different chemical species, including both naturally occurring and man-made greenhouse gases such as CO_2, water vapor (H_2O), methane (CH_4), and nitrous oxide (N_2O). These different chemical species that are emitted have a different effect on climate known as Global Warming Potential (GWP). Specifically, it is a measure of how much energy the emission of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of CO_2. The CO_2E method accounts for each GHG's GWP in order to represent the relative impacts on climate change by different chemical species.

Lead (Pb) - Lead is a stable compound, which persists and accumulates both in the environment and in animals. In humans, it affects the blood-forming or hematopoletic, the nervous, and the renal systems. In addition, lead has been shown to affect the normal functions of the reproductive, endocrine, hepatic, cardiovascular, immunological, and gastrointestinal systems, although there is significant individual variability in response to lead exposure. Since 1975, lead emissions have been in decline due in part to the introduction of catalyst-equipped vehicles, and decline in production of leaded gasoline. In general, an analysis of lead is limited to projects that emit significant quantities of the pollutant (i.e. lead smelters) and are generally not applied to transportation projects.

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Appendix C

APPENDIX C
SECTION 7 CONSULTATION

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U.S. Department
of Transportation
**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 17, 2018

Jessica Blackwood Miller
Fish & Wildlife Biologist
Kentucky Field Office
U.S. Fish & Wildlife Service
330 W. Broadway, Room 265
Frankfort, KY 40601

RE: Section 7 Consultation for the Development of a Proposed Air Cargo Hub Cincinnati/Northern Kentucky International Airport, Covington, KY

Dear Ms. Miller:

The Federal Aviation Administration (FAA), as lead federal agency, is preparing an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) of 1969, as amended, for the proposed air cargo hub development project at the Cincinnati Northern Kentucky International Airport (CVG) Covington, KY. CVG is a publicly owned passenger and air cargo airport operated by the Kenton County Airport Board (KCAB). CVG is located in the northeast section of Boone County, Kentucky, approximately one mile south of the Ohio River and eight miles southwest of downtown Cincinnati.

The purpose of this letter is to initiate formal consultation with U.S. Fish and Wildlife (Service) under Section 7 of the Endangered Species Act (ESA) for the proposed project. We are enclosing a Biological Assessment (BA), prepared by KCAB's consultant, Environment & Archaeology. This BA provides information in support of FAA's determinations of effect on federally listed threatened and endangered species and designated critical habitat.

Project Background:

KCAB intends to enter into a long-term lease with an air cargo services provider for the development and operation of an air cargo facility at CVG. The *purpose* of this project is to provide suitable air cargo facilities for a large-scale air cargo operation on land presently owned by the KCAB. This proposal would be consistent with the Airport's current and long-term plans.

FAA has a statutory mission to ensure the safe and efficient use of navigable airspace in the U.S. as set forth under Title 49, United States Code (U.S.C.) § 47101 (a) (1). The FAA must ensure that the Proposed Action does not derogate the safety of aircraft and airport operations at CVG. Moreover, it is the policy of the United States to support growth and development of air cargo hub airports and intermodal connections on airport property under 49 USC § 47101 (a)(4) and (5).

The federal action requiring compliance with NEPA is approval of the CVG's Airport Layout Plan depicting the Proposed Action.

Project Description:

The Proposed Action includes the following major elements:

- Construct a primary package sortation building and support buildings (i.e., ground package sort building, equipment storage, equipment maintenance, and pilot services). The total building footprint would be approximately 3.8 million square feet.
- Construct approximately 255-acre concrete aircraft parking apron and apron taxilanes.
- Construct paved employee and visitor vehicle parking garage/lots (approximately 781,000 square feet/96,000 square yards).

The following are supporting or enabling elements to the Proposed Action major elements:

- Prepare (clear, grub, excavate, embank, and grade) approximately 800 acres of land.
- Extend (approximately 4,200 feet in length by 60 feet wide) Wendell H. Ford Boulevard.
- Construct new on-airport access roads that provide vehicle and truck access to the new air cargo facility.
- Improve sections of Aero Parkway, an existing four-lane divided highway, to install new entrances, turn lanes, traffic lights, and lighting.
- Transfer all or a portion of off-airport property (totaling approximately 200 acres) to KCAB.
- Extend utilities to the project site, including electric service, natural gas, water, sanitary sewer, data/communications, and other related infrastructure.
- Modify and/or install new taxiway edge lights and airfield directional signs.
- Install exterior pole-mounted and building-mounted lighting at package sorting buildings, access roads, vehicle parking lots, truck courts, and portions of the aircraft parking aprons.
- Construct new drainage conveyances and detention ponds and/or modify the existing airfield stormwater management system.

- Install security fence and controlled-access vehicle gates and pedestrian gates.
- Expand Airport existing fueling facilities.

Effects on Federally Listed Species and Designated Critical Habitat:

The Proposed Action has been reviewed for its effects on federally- listed threatened and endangered species, and designated critical habitat. Based on the analysis contained in the attached Biological Assessment, the FAA has designated that two federally-listed species have a reasonable potential to occur in the Action Area as defined in Title 50, Code of Federal Regulations (CFR) § 402.02[1] and are evaluated in the BA: Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*). There is no proposed or designated critical habitat for either of these species in the Detailed Study Area, which covers the entire area where physical disturbance may occur.

As discussed in the BA, the primary threats to both the northern long-eared bat are white –nose syndrome, destruction/degredation of hibernacula, and loss/degredation of forested habitat. A total of 244 acres of potential habitat suitable for Indiana and northern-long eared bat roosting, commuting, and foraging would be removed as part of the Action. As compensation for these effects, the project proponent will commit to the required payment into the Imperiled Bat Conservation Fund (IBCF). FAA will make sure that payment is made by the KCAB before tree removal.

After reviewing the status of the Indiana bat and northern-long eared bat, the FAA has determined the proposed action is likely to adversely affect this threatened and endangered species. Tree clearing in the amount of 244 acres will occur for the proposed Action. Mitigation will occur in the form of a contribution to the IBCF to offset potential negative impacts to ESA-listed bat.

In addition, to the Indiana bat and northern-long eared bat, surveys were conducted for the running buffalo clover (*Trifolium stoloniferu)*, the gray bat (*Myotis grisescens)*, and the seven listed mussels species which include clubshell (*Pleurobema clava)*, fanshell (*Cyprogenia stegaria)*, orangefoot pimpleback (*Plethobasus cooperianus)*, pink mucket (*Lampsilis abrupta)*, ring pink (*Obovaria retusa)*, rough pigtoe (*Pleurobema plenum)*, and sheepnose (*Plethobasus cyphyus)*. No running buffalo clover was identified on the project site during May 5, 2018 and May 22-25, 2018 species-specific surveys. In addition, habitat is lacking within the project site for the seven mussel species and the gray bat. Therefore, FAA is making a no effect determination on these nine species.

FAA seeks the Service's concurrence with our determinations made pursuant to 50 CFR Part 402, for the proposed air cargo hub development. FAA also requests the Service provide a Draft Biological Opinion to this office for review as soon as it is available.

---

1 50 CFR 402.02 defines Action Area as: *"all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action."*

Please contact Kristi Ashley of my staff at (901) 322-8197 or by email at Kristi.ashley@faa.gov if you have any questions or need additional information concerning this matter.

Sincerely,

Phillip J. Braden
Manager, Memphis Airports District Office

ENCLOSURES

cc: Debbie Conrad, KCAB, Sarah Potter, L&B

BIOLOGICAL ASSESSMENT

CINCINNATI / NORTHERN KENTUCKY INTERNATIONAL AIRPORT
AIR CARGO HUB
DEVELOPMENT PROJECT

Boone County, Kentucky

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1.0 INTRODUCTION

This biological assessment (BA), prepared by *Environment & Archaeology*, LLC on behalf of the Kenton County Airport Board (KCAB), addresses the proposed action associated with new development activities at properties within and adjacent the Cincinnati/Northern Kentucky International Airport (CVG). The new development is referred to as the CVG Air Cargo Hub Development Project. The National Environmental Policy Act of 1969 (NEPA) requires federal authorization from the Federal Aviation Administration (FAA) for potential environmental effects of the proposed Action associated with this project in compliance with Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended. Section 7 assures that, through consultation (or conferencing for proposed species) with the Service, federal actions do not jeopardize the continued existence of any threatened, endangered, or proposed species, or result in the destruction or adverse modification of critical habitat. The purpose of this BA is to address the effect of the CVG Air Cargo Hub Development Project on species listed as endangered or threatened under the ESA and under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS). This BA document addresses potential effects to the Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*). Per discussion with the USFWS, listed mussel species, grey bat, and running buffalo clover will be addressed in a follow-up consultation.

1.1 Project Purpose and Need

The purpose of the proposed Action is to provide sufficient air cargo facilities on land presently owned by KCAB in a way that would help the Airport meet the air cargo carrier’s existing and future demands. The need for the Project is that the existing apron area and facilities at CVG are inadequate to meet the air cargo service provider’s requirements for a delivery and sortation support complex, while still meeting the safety and design requirements of the FAA.

1.2 Consultation History

Early coordination and pre-consultation with the USFWS was conducted during a series of meetings and phone conversation including:

- June 6, 2017 – New project notification submitted to Lee Andrews (Field Supervisor, USFWS Kentucky Field Office) with preliminary project plans.
- October 31, 2017 – Phone conversation with Jessica Miller (Fish & Wildlife Biologist, USFWS Kentucky Field Office) regarding the Imperiled Bat Conservation Fund (IBCF) policy change. The Information for Planning and Consultation (IPaC) for this Project was completed prior to policy change and the IBCF could be utilized for this project.
- February 9, 2018 – In-person meeting with USFWS for a project introduction overview. A BA would be required for the project if greater than 100 acres of bat habitat removal (tree clearing).
- February 12, 2018 – Phone conversation with Jessica Miller clarifying BA trigger and requirements for the Indiana bat and northern long-eared bat
- February 28, 2018 – Phone conversation with Jessica Miller confirming no restrictions on time of year clearing and options to pay different ratios for portions of the clearing. Ratio would vary based on when clearing is set to occur if the schedule is known.

- May 14, 2018 – Phone conversation with Santiago Martin (Fish & Wildlife Biologist, USFWS Kentucky Field Office). Ms. Miller was out on vacation. Discussed the payment process layout within the BA when the schedule is variable. Also, confirmed the no tree clearing timing restrictions since the project will be issued a Biological Opinion.
- May 21, 2018 – Phone conversation with Jessica Miller discussing the likely to adversely affect determination and separate Biological Opinion.
- May 22, 2018 – Phone conversation with Jessica Miller clarifying the how to address an unknown clearing timeframe within the BA.
- June 15, 2018 – Phone conversation with Jessica Miller that clarified several BA items. To assist with the review process, the Draft BA could be submitted to Ms. Miller in advance of FAA initiating formal Section 7 consultation. The USFWS stated that a tree-clearing phasing plan will be needed in the formal BA submittal. The USFWS was provided an addendum letter regarding other project-related listed species. Ms. Miller informally responded and indicated that FAA should make a No Effect determination in the Formal Section 7 transmittal of the BA.
- June 18, 2018 - Draft BA was submitted via email to USFWS/Jessica Miller for review.
- July 2, 2018 – USFWS provided review comments to the draft BA.
- July 5, 2018 – USFWS confirmed IBCF fees for project tree clearing.

2.0 DESCRIPTION OF THE ACTION & ACTION AREA

2.1 Proposed Action Area

For purposes of consultation under ESA §7, the Action Area is defined as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” (50 CFR §402.02). The proposed Action Area is located on the underdeveloped land north of Aero Parkway within the existing CVG facilities. The CVG Airport is situated in the northeast section of Boone County, Kentucky, approximately one (1) mile south of the Ohio River and eight (8) miles southwest of downtown Cincinnati, Ohio. The proposed Action Area for the CVG Air Cargo Hub Development Project consists of a total of 900 acres, which will be used to construct package sortation and support buildings, an aircraft parking apron and apron taxi lane, and a paved vehicle parking garage and lots. Approximately 1,512 acres were surveyed for the proposed Action. Appendix A, Figures 1-7, depict the Action Area, survey area and surrounding landscape.

According to data maintained by the USFWS Kentucky Field Office (KFO), the proposed Action Area does not intercept any known Summer or Swarming habitat for Indiana or northern long-eared bats. Based on maps dated from January 2018 of known Indiana and northern long-eared bat habitat in Kentucky, the Action Area for this project is located entirely within "Potential" habitat for both species (Appendix B). Two hundred and forty four (244) acres of forested Potential Indiana and northern long-eared bat habitat is present within the Action Area’s disturbance limits and would be permanently removed as a result of the Action (Figure 4).

2.1.1 Conservation Measures

Conservation measures are those proposed actions taken to reduce potential impacts and offset unavoidable potential adverse effects of the proposed Action in order to promote the recovery of the species. KCAB intends to implement the following conservation measures in the proposed Action for the development and operation of the project.

- Best management practices and sediment and erosion control measures will be utilized to control water runoff and minimize non-point source pollution and sediment damage. The reduction of water quality degradation would minimize direct and indirect effects on water sources used by bats for drinking and as habitat for aquatic insect prey items. Erosion and sedimentation controls will be installed in conjunction with the grubbing to prevent adverse impacts to the adjacent lands outside of the project area. Best management practices will include temporary and permanent measures. Temporary measures include silt fence, hay bales, berms, dikes, silt/sediment traps, brush barriers, mulching, sweeping, and dust control. Permanent measures include seeding and/or sodding, and sedimentation basins. A KPDES permit will be obtained for the project. A grading plan and site-specific Erosion Control Plan is required as a part of the KPDES permit. The site-specific plan will be submitted to Sanitation District #1 prior to the start of construction.

A contribution will be made to the Imperiled Bat Conservation fund (IBCF) to compensate for adverse effects on the species and the permanent loss and modification of potential Indiana and northern long-eared bat foraging and roosting habitat. A total of 244 acres of tree clearing is anticipated. The timeframe for tree clearing in the amount of 122 acres is to occur February-March, 2019 and the remaining 122 acres of tree clearing will occur April-May, 2019. A contribution amount of $608,007.60 to the IBCF will be made prior to tree clearing using the mitigation multipliers and timeframes in the *Revised Conservation Strategy for Forest-Dwelling Bats* and per coordination with USFWS. All effort will be made to not remove trees in June and July.

2.2 Proposed Action

The proposed Action consists of both the development and operation of an air cargo facility located within and adjacent the existing CVG Airport facilities. Development associated with the Action will take place between 2019 and 2021. Once constructed, the proposed air cargo facility would continue to operate indefinitely.

2.2.1 Development Activities

Development activities associated with the Action area have the ability to potentially impact roosting, foraging or swarming Indiana and northern long-eared bat habitat by acting as a stressor to the species through impacts to baseline habitat conditions. Potential stressors associated with the development component of the proposed Action include noise and vibration, night lighting, collision, water quality degradation, and loss of forested habitat. A one (1) kilometer buffer around be Action area (Figure 8) has been established to also evaluate potential stressors extending beyond the Action area. Primary development activities associated with the proposed Action include the following components.

- **Construction of a primary package sortation building, ground package sortation building, and support buildings, with a total building footprint of approximately 70.95**

acres. The primary sorting building would be located on the south side of the airfield with access from Aero Parkway. The support buildings will include space for equipment storage and maintenance, as well as pilot services.

- **Construction of an approximate 255-acre concrete aircraft parking apron and apron taxi lanes.** These features will provide circulation and parking for up to seventy-seven (77) cargo aircrafts. Ground support equipment, unit load devices, staging areas, and fuel and de-icing pads will also be implemented.
- **Construction of a paved employee and visitor vehicle parking garage and parking lots totaling approximately 17.93 acres in size.** This portion of the proposed Action will include space for employee vehicle parking, truck courts, and vehicle circulation areas for additional trucks and cars moving throughout the cargo facility. These areas would additionally include space for employee parking service areas, unit load devices, and trailer staging.

The following are supporting or enabling elements to the proposed Action major elements:

- Preparation (clearing, grubbing, excavation, embankment, and grading) of approximately 900 acres of land.
- Improvement and widening of a section of Wendell H. Ford Boulevard, as well as construction of new on-airport access roads that provide vehicle and truck access between Wendell H. Ford Boulevard and the new air cargo facility.
- Improvement of sections of Aero Parkway, an existing four-lane divided highway located south of the Proposed Site, to install new entrances, turn lanes, traffic lights, and lighting.
- Extension of utilities to the project site, including electric service, natural gas, water, sanitary sewer, data/communications, and other related infrastructure.
- Modification and/or installation of new taxiway edge lights and airfield directional signs.
- Installation of exterior pole-mounted and building-mounted lighting at package sorting buildings, access roads, vehicle parking lots, truck courts, and portions of the aircraft parking aprons.
- Construction of new drainage conveyances and detention ponds and/or modification the existing airfield stormwater management system.
- Installation of security fence and controlled-access vehicle gates and pedestrian gates.
- Expansion of existing Airport fueling facilities.

2.2.2 Operation

Upon completion of the development of the air cargo facility, it will continue to operate indefinitely. Operation will include constant air traffic, vehicle traffic, and illumination of roadways and buildings. Potential stressors associated with the operation component of the proposed Action include noise and vibration, night lighting, collision, and water quality degradation. Stressors and their effects on Indiana and northern long-eared bats are addressed in Section 5.0 Effects of the Action.

2.3 Alternatives Considered

Various development alternative sites for the air cargo facility were considered for further environmental review. The following summarizes the development options that were thoroughly considered as alternatives to the Proposed Action at CVG.

A multi-step evaluation process took place for this EA to evaluate the various development alternative site locations. The alternatives were evaluated against the following pass or fail criteria:

- Does the alternative site provide minimum of 500 acres of contiguous land?

  In order to efficiently accommodate the operational needs of the air cargo facility, a site of at least 500 acres is needed. Air cargo facilities typically consist at a minimum of warehouse, aircraft apron, and ground support equipment (GSE) areas. A cargo warehouse is typically comprised of truck docks and doors on the landside portion of the building. On the airside of the building, vehicles have direct access to the apron and aircraft. The aircraft apron provides area for aircraft parking adjacent to the air cargo warehouse building and provides sufficient space for the vehicle, GSE, and unit load devise operation and storage. This space must be large enough to accommodate freighter aircraft, aircraft tugs, cargo containers and trailers, cargo vehicles, and fueling vehicles. In addition, apron space is needed for cargo sortation, large tractor trailers, and potentially space for aircraft tail-to-tail cargo transfer and bypass containers. GSE is the support equipment at airports located on the apron. The equipment is located on the apron to support the operations of the aircraft, including ground power operations, tugs, dollies, and loading devices. GSE storage areas are also needed to park and stage GSE when not in use. These areas are often located on the apron in close proximity to aircraft parking area.

  The space required for each of these areas (warehouse, apron, and GSE areas) depends on the existing and forecasted air cargo volume of the air cargo service provider. The air cargo service provider has determined, through extensive planning efforts, a minimum of 500 acres of contiguous land is needed to operate an efficient air cargo facility at CVG.

- Does the alternative site provide direct access to the DHL cargo facility?

  It is preferred that the air cargo facility be located in proximity to the existing DHL cargo facility. The air cargo service provider has various business arrangements with DHL. It is expected the two entities would continue to maintain such arrangements in the future. A successful air cargo operation is predicated upon the efficient interaction of a number of businesses with different operating requirements and facility needs. These businesses have different levels of involvement based on the nature of the cargo and the geographies through which the cargo moves. In an ideal environment, most of these operations would be co-located on the airport, creating an efficient, integrated, air cargo community. Operating costs are lower, economies of scale can be achieved, and international goods can be cleared faster and with fewer problems.

- Does the alternative site provide direct airfield access?

  To minimize aircraft taxi distances and delays, the site should have direct access to taxiway(s) that allow aircraft to move efficiently between the cargo facility site and the arrival/departure runways. The airfield access should have minimal taxi times and minimal runway crossings. Flight delays have a substantial impact on delivering packages on time. Based on analysis conducted by the Institute of Transportation Studies (ITS), University of California, Berkley, the cost of flight delay per package is approximately $0.77 for a 15-minute flight delay and approximately $3.92 for a 60-minute flight delay. Because the air cargo service provider's business is time sensitive, it is imperative the site have direct airfield access to minimize taxi distances and potential delays to aircraft operations.

- Does the alternative site provide access to major surface transportation corridors (i.e. Interstates 71/75 and Interstate 275)?

  Sites were evaluated based on their proximity and access to the surrounding interstate roadway system. The air cargo service provider plans to conduct a sort operation at CVG. As a result, delivery trucks would enter and exit the site numerous times a day. Again, because the air cargo service provider's business is driven by time definite delivery, the site needs easy access to Interstates 71/75 and Interstate 275 to eliminate potential delays from traffic on the local roadways.

- Does the alternative site allow for expansion on adjacent land?

  The cargo carrier has identified the need to have additional land in the future as operational needs require expansion of the facility. Sites were evaluated based on the availability of available adjacent land to accommodate future growth.

- Does the alternative site allow for construction and operation of the facility in 2021?

  The cargo service provider's business model requires the ability to construct and become operational in 2021. Sites that would not allow that would be eliminated from consideration.

The following discussion documents the various development sites that were analyzed in the alternatives analysis. The three alternative sites evaluated are shown on Figure 7.

2.3.1 Alternative A: West Site

Alternative A would locate the proposed complex west of Runway 9/27. This site is approximately 320 acres and is located to the west of North Bend Road and outside of the Runway 9/27 Runway Protection Zone (RPZ).

- Does the alternative site provide minimum of 500 acres of contiguous land?
  - No, this site only has 320 acres.
- Does the alternative site provide direct access to the DHL cargo facility?
  - No, this site is the farthest site from DHL of all the alternative sites.
- Does the alternative site provide direct airfield access?
  - No, this site currently has no airfield access and to do so would require tunneling North Bend Road under a new taxiway. While feasible, even if a new taxiway was constructed, aircraft would access the airfield at the westernmost location, which is not efficient from a taxi time perspective.
- Does the alternative site provide access to major surface transportation corridors (i.e., Interstates 71/75 and Interstate 275)?

  - Yes, North Bend Road has access to Interstate 275.
- Does the alternative site allow for expansion on adjacent land?
  - Yes, but through purchase of private land.
- Does the alternative site allow for operation of the facility in 2021?
  - No, the need to construct a tunnel for a section of North Bend Road (a public roadway) to allow the construction of an access taxiway would add substantial complexity to the design, approval, and construction process, which would be an impediment to completion and operation of the cargo facility by 2021.

Conclusion: Alternative A could provide access to Interstate 275, a major surface transportation corridor. Additionally, the land area is prime for development as it is located on Airport-owned property and is adjacent to land that could be acquired for expansion. Conversely, the site lacks access to the DHL cargo facility and does not provide 500 acres of contiguous land. The site also provides limited airfield access as tunneling North Bend Road under a new taxiway would be required and would add complexity and time to construction. In conclusion, this alternative site would not meet criteria representing the purpose and need. Therefore, this alternative site was eliminated from further review.

2.3.2 Alternative B: Midfield Site

Alternative B would locate the proposed complex north of Runway 9/27, between Runway 18R/36L and Runway 18C/36C. This site is approximately 460 acres and divided on the north by Taxiway A.

- Does the alternative site provide minimum of 500 acres of contiguous land?
  - No, this site only has 460 acres.
- Does the alternative site provide direct access to the DHL cargo facility?
  - No, this site would require crossing two runways (18C/36C and 9/27) to access DHL.
- Does the alternative site provide direct airfield access?
  - Yes, this site offers access to Runways 18R/36L, 18C/36C, and 9/27.
- Does the alternative site provide access to major surface transportation corridors (i.e., Interstates 71/75 and Interstate 275)?
  - Yes, Interstate 275 is located directly north of the site and could be accessed via Loomis Road, which is currently two lanes or potentially a new Interstate 275 interchange.
- Does the alternative site allow for expansion on adjacent land?
  - No, the location has no adjacent land for expansion. There is a small parcel north of Taxiway A, but grade changes and the need to expand an existing tunnel make it difficult to access.
- Does the alternative site allow for operation of the facility in 2021?
  - Yes. However, if it is determined that roadway improvements and construction of a new interchange at Interstate 275 is necessary, this would add substantial

complexity to the design, approval, and construction process, which would be an impediment to completion and operation of the cargo facility by 2021.

Conclusion: Alternative B would not provide adequate access to Interstate 275, a major surface transportation corridor, without widening roads and the potential need to construct a new interchange. Additionally, the land area is prime for development as it is located on Airport-owned property and provides direct airfield access. However, the site is not large enough to accommodate existing and potential expansion, it lacks direct access to the DHL cargo facility, and would require aircraft to cross two runways to access the DHL facility. Further, the potential need for a new interchange at Interstate 275 would add substantial complexity to the project, which would affect the ability to begin operating the facility in 2021. In conclusion, this alternative site would not meet the criteria representing the purpose and need. Therefore, this alternative site was eliminated from further review.

2.3.3 Alternative C: Proposed Action

Alternative C (Proposed Action) is approximately 500 acres and is located north of Aero Parkway between Runway 18C/36C and Runway 18L/36R. The Proposed Action is described in Section 1.2 and shown in Exhibit 1-2.

- Does the alternative site provide minimum of 500 acres of contiguous land?
  - Yes, this site is approximately 500 acres.
- Does the alternative site provide direct access to the DHL cargo facility?
  - Yes, this site is located immediately adjacent to DHL.
- Does the alternative site provide direct airfield access?
  - Yes, this site has direct access to Runway 18C/36C and short taxi times to Runways 18L/36R and 9/27.
- Does the alternative site provide access to major surface transportation corridors (i.e., Interstates 71/75 and Interstate 275)?
  - Yes, the site can access Interstate 71/75 via Aero Parkway.
- Does the alternative site allow for expansion on adjacent land?
  - Yes, but through purchase of private land.
- Does the alternative site allow for operation of the facility in 2021?
  - Yes, there are no known impediments to completion by 2021.

Conclusion: Alternative C would provide access to Interstate 71/75 and 275, major surface transportation corridors. The site also provides approximately 500 acres of contiguous land, with the potential for expansion on adjacent land. The site also has direct access to the DHL cargo facility and direct airfield access. In conclusion, this alternative site would meet the purpose and need. Therefore, this alternative site was selected for further review.

Alternative C provides numerous non-environmental benefits. Economically, Alternative C provides the most cost-effective alternative. Fuel and travel expenditures are decreased when expanding to immediately adjacent facilities versus the incurrence of added distance, fuel, and time requirements if expansion activities would occur at a disconnected location or off-site location. Aesthetically, Alternative C allows for a continuation of existing airfield operations.

Table 1 provides a summary of the alternatives analysis conducted. The elements of each alternative are described in the table.

Table 1. Development Alternatives Analysis Summary

Alternative	**Meet the Screening Criteria?**					
	500 acres of contiguous land	***Direct access to DHL facility***	***Direct airfield access***	***Access to major surface transportation corridors***	***Expansion on adjacent land***	***Operation of facility in 2021***
A (West Site)	No	No	No	Yes	**Yes**	No
B (Midfield Site)	No	No	**Yes**	**Yes**	No	**Yes**
C (Proposed Action)	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

3.0 LISTED SPECIES IN THE ACTION AREA

A list of Federally-protected species within the proposed Project area was obtained from the USFWS Information for Planning and Conservation (IPaC) website (IPaC Consultation Code 04EK1000-2017-E-01568). ESA-listed species which occur within the Action area or may be affected by the proposed Action are identified in Table 2. No USFWS-designated critical habitat for ESA-listed species was identified within the proposed Project area.

Table 2. ESA Listed Species in the Action Area

Common Name	**Scientific Name**	**Status**
Mammals		
Gray bat[1, 2]	*Myotis grisescens*	Endangered
Indiana bat	*Myotis sodalis*	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Threatened
Mussels		
Clubshell[2]	*Pleurobema clava*	Endangered
Pink mucket[2]	*Lampsilis abrupta*	Endangered
Orangefoot pimpleback[2]	*Plethobasus cooperianus*	Endangered
Sheepnose[2]	*Plethobasus cyphyus*	Endangered
Rough pigtoe[2]	*Pleurobema plenum*	Endangered
Fanshell[2]	*Cyprogenia stegaria*	Endangered
Ring pink[2]	*Obovaria retusa*	Endangered
Plants		
Running buffalo clover[2]	*Trifolium stoloniferum*	Endangered

[1] No caves or mines providing suitable gray bat habitat are present within or adjacent to the Action area.
[2] Effects to these species will be addressed in a separate correspondence to USFWS.

3.1 Indiana bat (*Myotis sodalis*)

3.1.1 Status of the Species

The Indiana bat was listed as endangered by the Service on March 11, 1967 (Federal Register 32[48]:4001) under the Endangered Species Preservation Act of October 15, 1966 (80 Stat. 926; 16 U.S.C. 668aa[c]). The ESA of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) subsequently extended full legal protection from unauthorized take to the species. Critical habitat was designated for the species on September 24, 1976 (41 FR 14914) and includes eleven (11) caves and two (2) mines located in six (6) states. The Recovery Priority of the Indiana bat is 8, which indicates the species has a moderate degree of threat and high recovery potential. The USFWS defines Recovery Priority as "a number, ranging from a high of 1C to a low of 18, whereby priorities to listed species and recovery tasks are assigned. The criteria on which the Recovery Priority number is based on degree of threat, recovery potential, taxonomic distinctiveness, and presence of an actual or imminent conflict between the species and development activities."

The Recovery Plan for the Indiana Bat (USFWS 1983) was published to outline recovery actions for the species, which generally include: protection of hibernacula; maintenance, protection, and restoration of summer maternity habitat; and monitoring population trends through winter censuses. A revised draft recovery plan was noticed in the Federal Register for public review and comment on April 16, 2007 (USFWS 2007). A five (5)-year review of the Indiana bat was completed by the Bloomington, Indiana Field Office in 2009 (USFWS 2009) and found that required recovery criteria for the Indiana bat had not been achieved, and the species should remain at its current endangered status.

3.1.2 Species Description

The Indiana bat is a temperate, insectivorous, migratory bat that hibernates in mines and caves in winter and summers in wooded areas. The species is a medium-sized bat for the genus *Myotis*, with a forearm length ranging from 35 to 41mm and a head and body length from 41-49mm. Indiana bats have dark-brown fur with lighter facial areas and closely resembles the little brown bat (*Myotis lucifugus*) and northern long-eared bat (*M. septentrionalis*) (USFWS 2007). The Indiana bat can be distinguished from the little brown bat by differences in foot structure, fur color, and skull morphology (Barbour and Davis 1969, Hall 1981). Northern long-eared bats can be separated easily from the other two (2) species by its long, pointed, symmetrical tragus.

3.1.3 Life History

The average life span of the Indiana bat is five (5) to ten (10) years; however, individuals have been noted to live much longer, with the oldest known Indiana bat captured 20 years after it was first banded (LaVal and LaVal 1980).

Male Indiana bats typically do not sexually mature until the summer after their birth, whereas many young females will mate during their first autumn and have offspring in the following year

(Gustafson 1975, Schowalter et al. 1979, Racey and Entwistle 2000). Females give birth to a single pup in June or July once a maternity roost colony has been established (Easterla and Watkins 1969, Humphrey et al. 1977, Kurta and Rice 2002).

Maternity colonies are crucial to the success of raising Indiana bat pups, as they reduce thermoregulatory costs for the adults, which increases the energy available for raising young (Barclay and Harder 2003). There are no documented cases in which a female Indiana bat has successfully given birth and raised a pup alone without the communal benefits of a maternity colony. Maternity colonies are established after the bats have arrived at their summer range, and bats typically utilize ten (10) to twenty (20) trees each year, although only one (1) to three (3) trees are used as primary roosts by the majority of the bats (Callahan 1993, Callahan et al. 1997). On average, Indiana bats switch roosts every two (2) to three (3) days, although frequency is dependent on reproductive condition of the female, roost type, and time of year (Kurta et al. 2002, Kurta 2005).

Indiana bats will leave their summer roost area and migrate to their hibernacula in preparation for mating as early as July. This number continues to increase through August and peaks in September and early October (Cope and Humphrey 1977, Hawkins and Brack 2004, Rodrigue 2004, Hawkins et al. 2005). It is generally accepted that Indiana bats, especially females, return annually to the same hibernacula. However, some Indiana bats move from traditional hibernacula to occupy manmade structures, such as abandoned mines. (LaVal and LaVal 1980). Once arriving at a hibernaculum, bats will swarm for several weeks. During this time, bats will fly in and out of cave entrances at night, but few actually roost in the caves (Cope and Humphrey 1977). During swarming, the bats forage in the vicinity of the hibernaculum to replenish fat supplies in preparation for winter hibernation (Hall 1962). Swarming continues for several weeks, during which time mating occurs. After mating, females store the sperm over the winter and fertilization is delayed until the after the spring emergence the following year (Guthrie 1933). Limited mating activity can occur throughout winter and in spring as bats leave hibernation (Hall 1962).

Following fall swarming activity, Indiana bats will go into hibernation, typically at the same cave or mine at which swarming occurred. The initiation of hibernation may vary by latitude and annual weather conditions; however, most bats are hibernating by the end of November (USFWS 2007). The bats usually hibernate in large, dense clusters of several hundred bats per square foot. Clusters may protect individuals from temperature changes and reduce sensitivity to disturbance. Like other cave bats, the Indiana bat naturally arouses during hibernation. Arousals are more frequent and longer at the beginning and end of the hibernation period (Sealander & Heidt 1990).

Spring emergence occurs when outside temperatures have increased and prey insects are more abundant (Richter et al. 1993), however, the timing of emergence may vary across the range, depending on latitude and weather (Hall 1962). Based on trapping conducted at the entrances of caves in Indiana and Kentucky, Cope and Humphrey (1977) observed that peak spring emergence of female Indiana bats was in mid-April, while most males were still hibernating. Peak emergence of males occurred in early May, and few were left hibernating by mid-May. Shortly after emerging from hibernation, the females become pregnant via delayed fertilization from the sperm that has been stored in their reproductive tracts through the winter (USFWS 2007).

Following Indiana bat spring emergence is the “staging” period, in which the bats forage for several days or weeks near their hibernaculum to renew energy stores before migration to their traditional summer roosting area. Most populations will leave their hibernacula by late April and can migrate hundreds of miles to their summer roosting location. Adult mortality for Indiana bats is the highest in late March and April due to the stress of migration, particularly when their fat reserves have been depleted over the winter and food supplies are still low (USFWS 2007).

3.1.4 Habitat Characteristics and Use

During the summer months, Indiana bats use forested habitat for roosting, foraging, and commuting. Indiana bats are often associated with floodplain or riparian forests with large trees, scattered canopy gaps, and open understories (USFWS 2007). Indiana bats roost in both dead and live trees which exhibit loose bark, appropriate solar exposure, and optimal spatial relationship between other trees, water sources, and foraging areas.

A typical primary roost is located under exfoliating bark of dead ash, elm, hickory, maple, oak, or poplar tree, although any tree that retains large, thick slabs of peeling bark probably is suitable. The average diameter of maternity roost trees is eighteen (18) inches, while males typically roost in smaller trees averaging approximately thirteen (13) inches in diameter. The height of the roost tree relative to the surrounding canopy is crucial for ensuring the optimum amount of solar exposure. Primary roost trees are typically found within canopy gaps in the forest or along a fenceline or wooded edge and receive direct sunlight for more than half the day. Primary roosts are usually trees in early-to-mid stages of decay, with access unimpeded by vines or small branches (USFWS 2007).

Indiana bats tend to exhibit site fidelity to their summer maternity areas, and studies have documented female Indiana bats annually returning to the same home range to establish maternity colonies (Humphrey et al. 1977, Gardner et al. 1991, Callahan et al. 1997). Roost trees may be occupied by the same colony for a number of consecutive years until they are no longer accessible or suitable. Maternity colonies of Indiana bats also appear to be faithful to their foraging areas within and between years (Humphrey et al. 1977, Gardner et al. 1991, Murray and Kurta 2004, Sparks et al. 2005).

While foraging, Indiana bats feed on aquatic and terrestrial insects. Diet varies seasonally and among different ages, sexes, and reproductive status (USFWS 1999). Studies have found that Indiana bats forage in closed to semi-open forested habitats and forest edges located in floodplains, riparian areas, lowlands, and uplands; old fields and agricultural fields are also used (USFWS 2007). At a study site near the Indianapolis International Airport, Sparks et al. (2005) found Indiana bats spending nearly 51% of their time foraging over agricultural fields with movements focused on a riparian corridor. Indiana bats frequently forage along riparian corridors and obtain water from streams, ponds, and water-filled road ruts in upland forests. Light-tagging and radiotracking have revealed that Indiana bats prefer to forage in closed to semi-open forested habitats and forest edges, primarily around, but not within, the canopy.

During winter, Indiana bats are restricted to suitable underground hibernacula. Most Indiana bats hibernate in caves or mines where the ambient temperature remains below 50.0°F but infrequently drops below freezing (Hall 1962, Humphrey 1978), and the temperature is relatively stable (USFWS 2007). Stable, low temperatures allow bats to maintain low metabolic rates and conserve fat reserves to survive the winter (USFWS 2007). The majority of these sites are caves located in karst areas of the east-central United States; however, Indiana bats also hibernate in other cave-like locations, including abandoned mines. It has been documented that Indiana bats find and occupy newly available hibernating sites very quickly (Hall 1962). Other bat species found in Indiana bat hibernacula include little brown bats, tri-colored bats (*Perimyotis subflavus*), northern long-eared bats, gray bats (*Myotis grisescens*), big brown bats (*Eptesicus fuscus*), and silver-haired bats (*Lasionycteris noctivagans*) (Brack et al. 2003).

Staging and swarming habitat is typically located within several miles of the hibernaculum and consists of forested habitat similar to that which is chosen in the summer where bats will roost, forage, and travel (USFWS 2007). The Action Area is identified on the "Known Indiana bat habitat in Kentucky and within 20 miles (January 2018)" appendix map to the *Revised Conservation Strategy for Forest-Dwelling Bats* in Appendix B.

3.2 Northern long-eared bat (*Myotis septentrionalis*)

3.2.1 Status of the Species

On October 2, 2013, USFWS determined that listing the northern long-eared bat was warranted, primarily due to the threat of white-nose syndrome (WNS), and a proposed rule was published to list the northern long-eared bat as an endangered species under the ESA (78 FR 61046). On April 2, 2015, a final rule was published listing the northern long-eared bat as a threatened species under the ESA (80 FR 17974). On January 14, 2016, a final 4(d) rule was established, which provides measures that are tailored to current understanding of the conservation needs of the northern long-eared bat. The 4(d) rule is used to target the take prohibitions to those that provide conservation benefits for the species. This targeted approach can reduce ESA conflicts by allowing some activities that do not harm the species to continue, while focusing efforts on the threats that make a difference to the species' recovery. The 4 (d) rule is discussed further in Section 6.0 Proposed Mitigation.

3.2.2 Species Description

The northern long-eared bat is a medium-sized bat species typically weighing five (5) to eight (8) grams, a forearm length between 34 and 38 mm, and 77 to 95 mm body length USFWS 2018). Fur color is topically medium to dark brown on its back, and tawny to pale brown on the ventral size, with dark brown ears and wing membranes (Whitaker and Mumford 2009). As its common name implies, northern long-eared bats can be distinguished from other *Myotis* species by its relatively long ears. Average ear length is seventeen (17) mm, with a pointed and symmetrical tragus averaging nine (9) mm in length (Whitaker and Mumford 2009). The species' range includes all or portions of 37 States and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia (USFWS 2015).

3.2.3 Life History

Adult female northern long-eared bats also utilize delayed fertilization and give birth to a single pup each year (Barbour and Davis 1969), typically around May or early June, but potentially as late as July (Whitaker and Mumford 2009, p.213). Juvenile volancy (flight) typically occurs around 21 days after birth (Krochmal and Sparks, 2007, Kunz 1971). Like the Indiana bat, female northern long-eared bats take advantage of the energy-saving benefits of utilizing a maternity colony to raise their young, while males typically roost alone (USFWS 2015). The maximum documented lifespan for northern long-eared bats is estimated to be up to 18.5 years (Hall *et al.* 1957). The majority of mortality for northern long-eared bats occurs during the juvenile stage when they are the most vulnerable (Caceres and Pybus 1997).

Northern long-eared bats are nocturnal foragers that use both hawking (catching insects in flight) and gleaning (picking insects from surfaces) techniques to capture prey. The most common insects found in the diets of these bats are lepidopterans (moths) and coleopterans (beetles) (Brack and Whitaker, 2001), with arachnids (spiders) also being a common prey item (Feldhamer *et al.,* 2009). Foraging typically occurs above the understory and under the canopy, approximately three (3) to ten (10) feet above the ground (Nagorsen and Brigham 1993) on forested hillsides and ridges, rather than along riparian areas.

The swarming period for northern long-eared bats generally occurs between July and early October, depending on the latitude within the species range (Fenton 1969, Kurta *et al.* 1997). During this time, both males and females are present at the swarming sites (often with other species of bats), and mating occurs. Swarming also introduces juveniles to potential hibernacula, as northern long-eared bats may investigate several cave or mine openings during the transient portion of the swarming period (Kurta *et al.* 1997).

Following the fall swarming period, northern long-eared bats will enter hibernation to overwinter in hibernacula that typically consists of a cave or abandoned mine. Hibernation allows for the bats to conserve energy from increased thermoregulatory demands and reduced food sources (USFWS 2015). Northern long-eared bats hibernate in smaller clusters than Indiana bats, rarely in concentrations greater than 100 in a single hibernaculum (Barbour and Davis 1969). Hibernacula is typically shared with other species, including little brown bats, big brown bats, eastern small-footed bats (*Myotis leibii*), tri-colored bats, and Indiana bats (USFWS 2015).

Spring staging is the period of time between winter hibernation and spring migration to summer habitat. During this time, bats gradually emerge from hibernation, exit the hibernaculum to feed, and re-enter the same or different hibernaculum to resume daily bouts of torpor. Staging generally occurs from mid-March through early May (Whitaker and Hamilton 1998).

3.2.4 Habitat Characteristics and Use

Northern long-eared bat summer habitat closely resembles Indiana bat habitat; however, the northern long-eared bat appears to be more flexible in roost tree selection. Northern long-eared bats likely do not rely on certain species of trees for roosts, but rather that suitable cavities or bark retention to be present and used by the bats opportunistically (Foster and Kurta 1999). Northern long-eared bats utilize both live trees and snags and have also been documented roosting in human-made structures such as buildings, barns, on utility poles, behind window shutters, and in bat houses (USFWS 2015). Maternity colonies are typically found in more open areas than those the males roost in. This is likely due to increased solar radiation, which aids in pup development, and that having fewer trees surrounding the maternity roost may help the juvenile bats that are learning to fly (Perry and Thill 2007). Roosts are also largely selected below the canopy, which could be due to the species' ability to exploit cluttered environments. This skill is demonstrated by their gleaning behavior, which suggests a high degree of maneuverability around obstacles (Foster and Kurta 1999). Northern long-eared bats also tend to roost in smaller trees than Indiana bats, with around 80 percent of over 400 documented maternity roost trees ranging from four (4) to ten (10) inches in dbh (Lacki *et al*. 2009). Northern long-eared bats typically switch roost trees every few days, however, the trees are often in fairly close proximity to each other within the species' summer home range (USFWS 2015).

Northern long-eared bats typically utilize caves or abandoned mines as their winter hibernacula. Hibernacula exhibit relatively constant, cooler temperatures, approximately thirty-two (32) to forty-eight (48) degrees Fahrenheit, with high humidity and no air currents (USFWS 2015). Sites favored by northern long-eared bats often have such a high degree of humidity that droplets of water are observed on the fur of hibernating bats (Barbour and Davis 1969). The Action Area is identified on the "Known northern long-eared bat in Kentucky and within 20 miles (January 2018)" appendix map to the *Revised Conservation Strategy for Forest-Dwelling Bats* in Appendix B.

3.3 Conservation Threats

Conservation threats to Indiana and northern long-eared bats generally overlap, since both species occupy similar habitat and have comparable life histories.

3.3.1 White-nose Syndrome (WNS)

WNS is an infectious disease caused by the fungus *Psuedogymnoascus destructans* (Pd), which originated in Europe and is the most severe and immediate threat to Indiana bats, northern long-eared bats, and other hibernating North American bat species. WNS was first documented in New York in the winter of 2006-2007 and since then has spread rapidly across the eastern United States and Canada (USFWS 2016). WNS is responsible for unprecedented mortality of insectivorous bats in eastern North America (Blehert et al. 2009; Turner et al. 2011).

The exact processes by which the fungal skin infection leads to death are not known, but depleted fat reserves leading to starvation contribute to mortality (Reeder et al. 2012, Warnecke et al. 2012) and dehydration may also have a role (Willis et al. 2011, Cryan et al. 2013, Ehlman et al. 2013). It is also suspected that some of the affected bats that survive hibernation emerge in such poor condition that they die soon after emergence or during the summer.

As of 2017, WNS or the Pd fungus was confirmed in all the states within the species' range. Further decline in Indiana and northern long-eared bat populations due to this disease is expected in the future. Research on WNS is constantly evolving.

3.3.2 Destruction/Degradation of Hibernacula

Due to the delicate balance of temperature and humidity necessary for a cave to serve as a successful hibernaculum for Indiana bats, changes made by humans to the thermal regime of a cave can affect their ability to support hibernating bats (USFWS 2007). Other human activity resulting in the commercialization of caves, such as cave tours, recreational caving, vandalism, and research activities, can also disturb hibernating bats. Since the species were listed, increased awareness on the importance of maintaining the integrity of a cave's microclimate has led to a reduction of purposeful cave modifications that could disrupt hibernation. However, natural events such as flooding, freezing, and cave collapse still pose a threat to hibernating bats. It has been noted that the northern long-eared bat has likely benefited from the protections given to the winter habitat of the endangered Indiana bat and gray bat where species' ranges overlap (USFWS 2015).

3.3.3 Loss/Degradation of Forested Habitat

Urbanization and development is currently the greatest contributor to loss of forested habitat used by the Indiana bat for roosting, foraging, swarming and staging loss within the species' range (U.S. Forest Service (USFS) 2005). Conversion to agricultural fields has been the largest single cause of forest loss, resulting in the permanent destruction or fragmentation of existing forest cover. The destruction of floodplain and bottomland forests, recognized as high-quality habitats for Indiana bats, has been a particular cause of concern (Humphrey 1978).

Forest cover is not a completely reliable predictor of where Indiana bat maternity colonies will be found on the landscape (Farmer et al. 2002). Indiana bat maternity colonies occupy habitats ranging from completely forested to areas of highly fragmented forest. However, research has demonstrated that densities of tree-roosting bats are generally greater in old growth forests of temperate regions, where structural diversity provides more roosting options and important foraging areas for some species (USFWS 2007). Within the range of the Indiana bat, particularly within the core maternity range in the Midwest, old growth forest has been virtually eliminated, which in turn eliminates the opportunity to evaluate habitat value of old growth versus second-growth forests.

Northern long-eared bats are more flexible in which tree species they select as roosts, and as such, the species can likely tolerate some loss of roosts, provided suitable alternative roosts are available. However, longer flights to find alternative suitable habitat as a result of the removal of roosting/foraging habitat add additional stress to bats emerging from hibernation with their lowest annual fat reserves. This particularly impacts females, who are often pregnant at this time (USFWS 2015).

Throughout the range of the Indiana bat and northern long-eared bat, forest conversion is expected to increase due to commercial and urban development, energy production and transmission, and natural changes. Forest conversion causes loss of potential habitat, fragmentation of remaining habitat, and if occupied at the time of the conversion, direct injury or mortality to individuals.

3.3.4 Environmental Contaminants

With the restrictions on the use of organochlorine pesticides in the 1970s, this significant threat to Indiana and northern long-eared bats was reduced. However, organophosphates (Ops), and carbamates (CA) have now become the most widely used insecticides (Grue et al. 1997), and the full impact of these chemicals on bats is not known.

3.3.5 Climate Change

Climate change is expected to significantly impact both species, due to specific temperature requirements in hibernacula and summer roost trees. Cave temperatures are related to surface temperatures, and as surface temperatures rise, the suitability of a hibernaculum could be degraded. Warmer winters could also result in a shorter hibernation period, increased winter activity, and reduced reliance on stable underground temperatures. An earlier spring could mean a shorter hibernation period, which may have no detrimental effect on populations as long as sufficient food is available (Jones *et al.* 2009). Climate change is also likely to affect the timing of reproductive cycles, as female bats store spermatozoa over winter. If bats experience warmer conditions, they may arouse prematurely and become pregnant earlier in the year (Jones *et al*. 2009), posing a threat if a sufficient supply of insects has not yet available. The effects of climate change on the availability and timing of emergence of insect prey could lead to inadequate fat reserve maintenance and ultimately starvation. In a study by Loeb and Winters (2013), area suitable for Indiana bat summer maternity colonies was modeled to significantly decline in the future.

3.3.6 Collisions

Indiana and northern long-eared bat fatalities have been reported as the result of collisions with aircrafts, vehicles, communication towers, and wind turbines. It was reported in 2005 that since 1997, remains from more than 126 bats that collided with military aircrafts have been processed. This figure probably largely underestimates total strikes as most of these incidents do not result in serious, if any, damage to the aircraft, and therefore are not consistently reported. Indiana bat collisions with human-made objects most often occurs during the fall migration (USFWS 2007).

4.0 ENVIRONMENTAL BASELINE CONDITIONS

4.1 Action Area Species Habitat Distribution

The USFWS Kentucky Field Office (KFO) has delineated specific Recovery and Mitigation Focus Areas (RMFAs) for forest-dwelling bats within the Commonwealth of Kentucky. RMFAs were identified to support conservation priorities and are known to support populations of forest-dwelling bats in areas that support recovery and conservation efforts. A total of eight (8) RFMAs have been identified in the state of Kentucky and represent areas with known summer, winter, and/or swarming habitat for Indiana and northern long-eared bats. No RMFAs for either species are located within Boone County (USFWS 2016).

4.1.1 Summer Roosting (April 1 – August 15)

The project survey area contains approximately 417 acres of forested area (Figures 3a-3b). The Action area currently contains approximately 244 acres of forested habitat suitable for Indiana and northern long-eared bat roosting, commuting, and foraging. There are no existing capture records of Indiana or northern long-eared bats within the Action area, which is currently listed as "Potential" habitat for both species by the USFWS KFO. Known "Summer 1" habitat (maternity habitat) for Indiana bats is present in Boone County to the north and west of the proposed Action area. No known summer habitat for northern long-eared bats is located within the county. In the absence of recent summer surveys, it is unknown if Indiana and northern long-eared bats are present in the Action area during the summer. Due to the presence of forested areas representing potential summer habitat, it is assumed that Indiana bats and northern long-eared bats occur in the project area.

4.1.2 Winter Hibernation (November 15 – March 31)

The expansive karst within much of Kentucky's limestone geology results in numerous caves that historically and currently provide winter habitat for Indiana and/or northern long-eared bats. Over 100 caves in Kentucky, including five (5) Priority 1 and 16 Priority 2 hibernacula, have historic Indiana bat records, and 96 of these caves have extant winter populations. Currently, there are over 100 caves and cave-like structures that serve as known hibernacula for the northern long-eared bat. There is a total of 23 Indiana Bat Priority 1 hibernacula identified in the Recovery Plan. The five (5) Priority 1 hibernacula that lie within Kentucky's borders are located at the Mammoth Cave System and in Kentucky's Eastern Coalfields (USFWS 2016). There are no Priority 1 or Priority 2 Indiana bat hibernacula located within Boone or its surrounding counties.

No priority hibernacula have been identified for northern long-eared bats. Since these bats do not typically hibernate in large groups, and often move between hibernacula throughout the winter, population size is difficult to estimate based on hibernacula counts. Northern long-eared bats are also more flexible than Indiana bats in their selection of hibernacula, which often includes human-made structures such as mines and railroad tunnels in addition to caves. To date, no known northern long-eared bat hibernacula have been discovered in Boone County.

No caves, mines, or railroad tunnels that could provide suitable hibernacula habitat for either species are present within the Action area.

4.1.3 Fall Swarming (August 16 – October 14)

"Swarming habitat" refers to suitable roosting, foraging and travel habitat for Indiana bats or northern long-eared bats that is within a determined distance of a known hibernaculum. For Indiana bats this distance is 10 miles from a Priority 1 or Priority 2 hibernaculum and five (5) miles from a Priority 3 or Priority 4 hibernaculum. For northern long-eared bats, this distance is five (5) miles from a known hibernaculum (USFWS 2016). No known Indiana or northern long-eared bat hibernacula are present in relation to the Action area within identified buffers outlined by the

USFWS. Based on mapping provided by the USFWS KFO, no known Indiana or northern long-eared bat swarming habitat is currently present within Boone or any of the surrounding counties (USFWS 2018) and therefore does not occur within the Action area.

4.1.4 Spring Staging (April 1 – May 14)

The USFWS uses a one (1) mile buffer around Priority 1 and Priority 2 hibernacula to identify spring staging areas. No known hibernacula for Indiana or northern long-eared bats has been identified within Boone County, therefore suitable spring staging habitat is not present within the Action area.

4.2 Action Area Conservation Threats

4.2.1 Forest Loss and Fragmentation

Indiana and northern long-eared bat forested summer habitat is susceptible to frequent changes in its quality and quantity due to changes in land use, management, and forest structure, both by natural or anthropogenic influences. Degradation of summer habitat can result in the loss of foraging and roosting habitat and can be particularly detrimental to bat maternity colonies when non-volant pups are present. The increase in conversion of forested land to developed land can be expected to further fragment and eliminate forested blocks of habitat that could be used by the species in the Action area.

4.2.2 White-Nose Syndrome

In Kentucky, WNS was first documented during the spring of 2011 in Trigg County. As of April 2016, WNS has been confirmed or is likely to be present within 94 hibernacula in 24 Kentucky counties. WNS is considered to occur throughout Kentucky and, over time, is expected to expand to and be documented in additional sites (USFWS 2016). Due to lack of suitable hibernacula, WNS has not yet been detected in Boone County.

Because Indiana and northern long-eared bats can migrate hundreds of miles from their hibernacula and WNS has been documented in Kentucky and all of the adjacent states, we assume that all bats presumed to occupy habitat within the Action area have been exposed to WNS. Therefore, Indiana and northern long-eared bats in the Action area are expected to potentially be experiencing stress and reduced body weights from their exposure to WNS.

5.0 EFFECTS OF THE ACTION

This section analyzes the direct and indirect effects of the Action on Indiana and northern long-eared bats, which includes the direct and indirect effects of interrelated and interdependent actions. Direct effects are caused by the Action and occur at the same time and place. Indirect effects are caused by the Action but are later in time and reasonably certain to occur.

Table 3. Action Components and Associated Stressors of the CVG Air Cargo Hub Development Project

Action Component	Noise and Vibration	Night Lighting	Collision	Water Quality	Removal / Loss of Forested Habitat
Construction	X	X	X	X	X
Operation	X	X	X	X	

5.1 Noise and Vibration

Noise and vibration are stressors that may disrupt bats causing individuals to flush from roost trees during the day and/or night timeframe, and/or alter travel corridors and foraging behaviors. Bats may be exposed to this stressor during both the construction and operation components of the Action, within the Action Area and extending into the 1-km Buffer Area. Significant changes in noise levels in the area may result in temporary to permanent alteration of bat behaviors.

Bats have evolved highly specialized auditory sensory systems to maximize their ability to detect, locate, track, and capture aerial prey. The behavioral, morphological, and physiological mechanisms that have evolved to achieve this dramatically increase their hearing sensitivity to all sounds, particularly the low amplitude echoes of their echolocation calls (West 2016). Echolocation calls are generally in the ultrasonic frequency range (>20kHz). Foraging bats must be able to detect, classify, and localize their prey while discriminating between the background "clutter" echoes. Bats will use different call types in different habitats depending on where and how they forage and the cluttered conditions of their use areas. "Signal masking" occurs when the bat's ability to evaluate the target echoes is hampered by clutter echoes. Bats also produce sound for communication in addition to echolocation, typically at a lower frequency range.

Anthropogenic noise not only has an effect on the echolocation and communication calls of bats, but also on the passive listening used by bats that hunt using gleaning techniques, such as northern long-eared bats. While Indiana bats generally prefer aerial hawking, which primarily relies on echolocation calls to locate prey, gleaning requires bats to listen for prey-produced sounds (passive listening). This strategy is utilized by bat species that glean arthropods from vegetation or the ground where prey echoes are masked by overlapping, strong background echoes. Data collected by Schaub et al. (2008) on the greater mouse-eared bat (*Myotis myotis*) suggests that foraging areas very close to highways, and presumably also other sources of intense broadband noise, are degraded in their suitability of foraging areas. The Schaub et al. study also points out that the reluctance of bats to forage in very noisy environments potentially also brings about conservation benefits. If bats allocate little foraging time surrounding noisy highways, the number of collision casualties could be reduced.

It is reasonable to assume that the noise and vibration disturbance as a result of the construction and operation components of the Action is expected to result in some changes to bat behaviors. However, with the close proximity of the Action area to existing CVG facilities, bats in the area are already likely exposed to the constant noise and vibration stressors caused by vehicle and aircraft traffic and may have become habituated to the disturbance. The Buffer area also contains existing CVG facilities, interstate and major highways, and existing urban residential and commercial land use, therefore, bats within the majority of the Buffer area are also already likely exposed to noise and vibration stressors – approximately 57 percent (2,326 acres) of the buffer area is comprised of developed areas of commercial or residential use (Figure 9), with only approximately 20 percent (1,100 acres) forest cover (Figure 10). Additionally, the reluctance of gleaning bat species such as the northern long-eared bat to utilize foraging areas with a high level of anthropogenic noise disturbance could result in fewer casualties from other threats in the area.

5.2 Night Lighting

An increase in night lighting is expected during both the construction and operation components of the Action. Construction activities will typically occur during daylight hours, however artificial lighting will be necessary for any activities occurring during the early morning and late evening hours, and rarely at night. No lighting of forested areas within the Action area will occur, as tree removal will occur during daytime hours, and clearing, grubbing, and grading will occur prior to construction of facilities. Once construction is complete, the safe operation of the air cargo hub facilities will require artificial lighting to be used to illuminate all roadways and parking areas, in addition to the newly constructed aircraft apron and its Appendix to existing CVG runways.

The natural light dark cycle (LDC) is a critical factor in the biological “circadian” rhythms of organisms exposed to daily fluctuations in sunlight. Daily patterns in the activity and behavior of bats are strongly influenced by the LDC. The timing of the sunset determines nightly emergence times from roosts (Erkert 1982), and moonlight affects foraging activity (Morrison 1978). Artificial lighting can damage bat foraging habitat directly by making an area unsuitable for foraging, or indirectly by disrupting commuting routes through light spillage onto hedgerows and watercourses (Rasey 2006). Studies have shown that Myotid bat species avoid commuting routes illuminated with LEDs (Stone et al. 2015) and forced to use alternative routes to reach foraging grounds. Depending on the quality and quantity of alternative routes, it may become necessary for bats to utilize suboptimal routes causing them to fly further to reach foraging grounds. This can result in an increase in energetic costs and potential exposure to predation if alternate routes do not provide sufficient forest cover. Where alternate routes are not available, bat colonies may be isolated from their foraging areas, potentially forcing them to abandon their roost (Stone et al. 2015). Illumination of the foraging areas themselves, i.e. within the Buffer area, can potentially prevent or reduce foraging activity, since artificial lighting can disrupt the composition and abundance of insect prey (Davis et al. 2012).

An increase in artificial lighting can also disrupt the timing of nightly bat emergence from roost trees since it can cause the appearance of daylight. Delayed emergence results in reduced foraging time and increases the risk that bats will miss the peak abundance of insects that occurs at dusk (Stone et al. 2015). It is possible the continuous delays in nightly emergence could negatively affect the fitness of individuals and the roost as a whole.

The Action area is located directly adjacent to existing well-illuminated runways and aircraft aprons which will attach directly to the new facilities. It is likely that the majority of the Action Area is already exposed to a high degree of night lighting as a result of its close proximity to CVG. Likewise, the majority of the Buffer area contains existing artificial illumination within the CVG facilities, adjacent major roadways, and commercial and residential areas. However, it can be expected that the increase in night lighting as a result of the Action could cause bats utilizing the forested habitat of the Buffer area to alter their behavior.

5.3 Collision

The U.S. Department of Agriculture, through an interagency agreement with the FAA, compiles a database of all reported wildlife strikes to U.S. civil aircraft and to foreign carriers experiencing strikes in the USA. They have compiled 82,057 strike reports from 1,418 USA airports and 207 foreign airports from 1990 through 2007. It is estimated that this total represents only about 20 percent of the strikes that have occurred during that timeframe.

Bat strikes represented 0.3 percent of total strikes, with 253 individuals from eight (8) identified species reported, although many bats were not identified to species. Seven (7) bat collisions were reported in Ohio and four (4) in Kentucky. The majority of strikes with bats (53 percent) occurred during the July to September timeframe in which the majority of North American bat species are most active. Bat strikes were most often occurred during the night, with few occurring during dawn, dusk, and daylight hours (Dolbeer and Wright 2008).

Collisions with vehicle traffic is also a potential threat to Indiana and northern long-eared bats in the Action area, however, the Indiana bat recovery plan indicates that bats do not seem particularly susceptible to vehicle collisions (USFWS 2007).

Potential for collisions will pose a threat to Indiana and northern long-eared bats during both the construction and operation phases of the Action. However, the construction component of the Action will take place primarily during daylight hours, reducing the risk of potential bat collisions with construction equipment. Construction activities that may occur during the night, such as pouring concrete, are generally stationary and localized and will not pose a threat of collision.

Due to the close proximity to existing CVG facilities, it is likely that Indiana and northern long-eared bats present in the Action area are already exposed to the threat of collision with vehicles and aircrafts. Since no suitable hibernacula or swarming habitat for either species is located in the vicinity of the Action area, the threat of collision is highest during the summer months when forest-dwelling bats may be commuting, migrating and/or foraging in the area after dark. Once the construction of the air cargo hub is complete, the Action will not contain any forested areas that would provide habitat for Indiana and northern long-eared bats, potentially reducing the species' presence in the area and decreasing overall risk of collision.

5.4 Water Quality

The Action area is located within the Middle Ohio-Laughery watershed (HUC 8: 05090203) and the immediate receiving watershed of Gunpowder Creek. Gunpowder Creek is defined as a warm-water aquatic habitat by the Kentucky Division of Water (KDOW) and is not identified as a Special Resource Water. Wetland and stream delineations were completed for all waterbodies present within the Action area, including Rapid Bioassessment Protocol (RBP) Habitat Scores for each stream. All of the ephemeral and intermittent stream channels, and approximately 62 percent of the perennial stream linear footage within the Action area scored within the “poor” rating, indicating that the biological integrity of the streams is low. Streams with low ratings provide poor habitat for aquatic organisms and exhibit degraded riparian habitat. Indiana and northern long-eared bats both utilize forested stream corridors for traveling and foraging, often preferring streams with canopy cover along both banks and a high biodiversity of potential insect prey. Approximately 1,569 linear feet of perennial stream scored within the “fair” rating, and approximately 1,781 linear feet of perennial stream scored within the lower end of the “good” rating, indicating a higher biological integrity of these stream segments for aquatic organisms and riparian habitat. Indiana and northern long-eared bats also often forage above and around wetlands and ponds, both of which are currently present within the Action area.

Construction activities associated with the Action will result in permanent impacts to all wetlands and streams present within the Action area. Activities that reduce the quantity or that alter the quality of water sources and foraging habitat may impact bats, even if conducted while individuals are not present. All water quality degradation has the potential to negatively affect foraging bats by reducing aquatic insect populations.

Based upon Section 404/401 permitting conditions, compensatory mitigation will be required for the proposed project’s wetland and stream impacts. KCAB has initiated securing the anticipated compensatory mitigation requirement through the purchase of credits from the Northern Kentucky Mitigation Bank (NKMB), the Northern Kentucky University (NKU) In-Lieu Fee Payment Program, and/or the Kentucky Department of Fish and Wildlife Resources (KDFWR). Formal, final USACE decision regarding compensatory mitigation amount has not yet been issued. Upon USACE/KYDEP approval of the proposed mitigation, KCAB will finalize negotiations with NKMB, NKU, and KDFWR.

The introduction of environmental contaminants to waterways also has the potential to negatively affect foraging bats by exposing them to toxic substances. Aquatic insects make up part of the diet of Indiana and northern long-eared bats and, thus, impacts to water quality may result in temporary or short-term indirect effects on foraging bats during the occupied time frames. The primary hazardous materials used in conjunction with construction activities include: diesel fuel, gasoline, hydraulic fluids, oils, lubricants, solvents, adhesives, and battery chemicals. Spills and/or leakage of these materials into the environment could affect water quality resulting in reduced densities of aquatic insects that bats consume.

Operation activities associated with snow and ice control include the application of chemicals directly to paved surfaces. Deicing agents used for snow and ice control would eventually be carried from the roadways, parking lots, aircraft apron, and runways by surface water and may enter adjacent waterways. It is likely that some of these agents would be filtered by vegetated shoulders, swales, and storm water treatment areas. Only the required amount of deicing agents would be used, and these agents have been documented as having short-term effects on aquatic macroinvertebrates depending on the concentration at which the macroinvertebrates are exposed.

Once construction is completed, there will be no suitable streams or wetlands present in the Action area which would provide commuting and foraging habitat for Indiana and northern long-eared bats. Although the loss of habitat may have a negative impact on bat species, it could also deter bats from utilizing the Action area and reduce the risk of potential collisions.

5.5 Removal of Forested Habitat

There is currently 417 acres of forest within the project's survey area. Approximately 244 acres of forested habitat is present within the Action area, all of which will be removed prior to the construction of the air cargo hub. The forested areas contain multiple stream channels, which could provide flight corridors for bats, and are surrounded by open fields which could be suitable for foraging. However, the fragmentation of surrounding forested habitat in Boone County, along with the close proximity to existing and functional airport facilities degrades the existing quality of the forested habitat present in the Action area. The forested areas are also comprised of a very dense shrub layer of invasive honeysuckle which also inhibits flyway potential for the bats.

A tri-county study of Boone and the adjacent Kenton and Campbell Counties was conducted by the Northern Kentucky Urban and Community Forest Council (NKUCFC) to determine the total canopy cover of the area. For this study, tree canopy was defined as "the layer of leaves, branches, and stems of trees that cover the ground when viewed from above." It was determined that Boone County is comprised of 156,565 total acres of land, of which 73,357 acres (47% canopy cover) is currently forested (NKUCFC 2014). The study included a breakdown of the ownership of tree canopy specifically within the Gunpowder watershed, which determined that majority of canopy cover is owned by agricultural (54%) and residential (22%) areas. The CVG Airport currently owns 4% if the canopy cover in the Gunpowder watershed (NKUCFC 2014) (Figure 6).

The Action area is located within "Potential" habitat for both species. The timeframe in which Potential habitat is considered to be "occupied" by Indiana and northern long-eared bats is from April 1 – October 14. The removal of forested habitat in the Action area will likely have a negative impact on Indiana and northern long-eared bats commuting, roosting, and foraging habitat which will be mitigated via a contribution to the Imperiled Bat Conservation Fund (IBCF) (Section 6.1).

6.0 PROPOSED MITIGATION

6.1 Imperiled Bat Conservation Fund (IBCF)

The Project Area is located outside of known forest-dwelling bat habitat; however, the area is designated as Potential Habitat by the USFWS KFO. Impacts to potential habitat requires mitigation per guidelines of the KFO *Revised Conservation Strategy for Forest-Dwelling Bats*.

Project plans will require tree removal from February to March, 2019 (122 acres) and from April to May, 2019 (remaining 122 acres). The project proponent will commit to contributing to the IBCF in the amount $608,007.60 to meet the mitigation recommendations in the *Revised Conservation Strategy for Forest-Dwelling Bats* and per coordination with USFWS. The current rate for mitigation for the February to March timeframe is $1,710/acre, and the current mitigation rate for April to May is $3,420.00/acre. The IBCF mitigation rate/acre is updated in August of each year. Total tree removal will be 244 acres (Appendix A, Figures 5a-5b). Payment of $16,965.00 was previously contributed for 5.22 acres within the Action area for KFO Project

Number 2016-B-0293 (Appendix C). Tree clearing has not yet occurred for the 5.22 acres under KFO Project Number 2016-B-0293, and the 5.22 acres has been included in the proposed 244-acre tree clearing schedule. Payment into the IBCF will be made prior to tree clearing per the mitigation multipliers by habitat type and season in the *Revised Conservation Strategy for Forest-Dwelling Bats*, as summarized below for the Action area.

- $208,620.00 – February to March clearing of 122 acres
- $399,387.60 – April to May clearing of 122 acres minus 5.22 acres previously mitigated
- Total mitigation costs: **$608,007.60**

The clearing, grading, and site preparation for the project is set to last approximately 18 months. All effort will be made to not remove trees in June and July.

This contribution to the IBCF is expected to promote the survival and recovery of Indiana and northern long-eared bats through the protection and management of existing forested habitat to support potential maternity populations, particularly those that would expand existing conservation ownerships.

6.2 4(d) Rule for Northern Long-Eared Bats

Section 4(d) of the Endangered Species Act directs the USFWS to issue regulations deemed "necessary and advisable to provide for the conservation of threatened species." It allows promulgation of special rules for species listed as threatened (not endangered) that provide flexibility in implementing the ESA. The 4(d) rule is used to target the take prohibitions to those that provide conservation benefits for the species. This targeted approach can reduce ESA conflicts by allowing some activities that do not harm the species to continue, while focusing our efforts on the threats that make a difference to the species' recovery.

For the northern long-eared bat, the 4(d) rule tailors protections to areas affected by white-nose syndrome during the bat's most sensitive life stages. The rule is designed to protect the bat while minimizing regulatory requirements for landowners, land managers, government agencies and others within the species' range. The final 4(d) rule for northern long-eared bats prohibits purposeful take throughout the species' range, except in instances of removal of northern long-eared bats from human structures, defense of human life (including public health monitoring), removal of hazardous trees for protection of human life and property, and authorized capture and handling of northern long- eared bats by individuals permitted under section 10(a)(1)(A) of the ESA.

"Take" is defined by the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any endangered species. "Purposeful take" occurs when the reason for the activity or action is conduct some form of take. This includes conducting research projects and presence/absence surveys in addition to intentionally killing or harming a bat. "Incidental take" is defined by the ESA as take that is "incidental to, and not the purpose of, they carrying out of an otherwise lawful activity." For example, harvesting trees can kill roosting bats, but the purpose of the activity is not to kill bats. Incidental take resulting from otherwise lawful activities will not be prohibited in areas not yet affected by white-nose syndrome (WNS) under the 4(d) rule.

Take of northern long-eared bats in their hibernacula (see Section 3.2.4) is prohibited in areas affected by WNS, unless permitted under section 10(a)(1)(A) of the ESA. Take of northern long-eared bats inside of hibernacula may include disturbing or disrupting hibernating individuals when they are present as well as the physical or other alteration of the hibernaculum's entrance or environment when bats are not present if the result of the activity will impair essential behavioral patterns, including sheltering northern long-eared bats. Incidental take resulting from tree removal is prohibited if it: Occurs within a 0.25-mile radius of known northern long-eared bat hibernacula; or cuts or destroys known occupied maternity roost trees, or any other trees within a 150-foot radius from the known maternity tree during the pup season (June 1 through July 31). Incidental take of northern long-eared bats as a result of the removal of hazardous trees for the protection of human life and property is not prohibited.

There are no known northern long-eared bat hibernacula within the 0.25-mile radius outlined in the 4(d) rule that would be impacted as a result of the proposed Action.

7.0 CUMULATIVE EFFECTS

For purposes of consultation under ESA §7, cumulative effects are the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the proposed action are not considered, because they require separate consultation under §7 of the ESA.

The Proposed Action involves removing all existing trees within the Action Area (244 acres). There will be no remaining "Potential" habitat upon development of the Proposed Action, therefore, there are no cumulative effects to the Indiana bat and northern long-eared bat that will occur.

8.0 CONCLUSIONS

The CVG Air Cargo Hub Development Project consists of a 900-acre Action area located in Boone County, Kentucky. Once construction of the new facilities is complete, the new air cargo hub will continue to operate indefinitely. National Environmental Policy Act of 1969 (NEPA) requires federal authorization from the Federal Aviation Administration (FAA) for potential environmental effects of the proposed Action in compliance with Section 7(c) of the Endangered Species Act (ESA) of 1973. The Action area contains "Potential" habitat for the endangered Indiana bat and threatened northern long-eared bat. No known hibernacula, swarming, or summer habitat is present in Boone County for either species.

Tree clearing in the amount of 244 acres will occur for the proposed Action. Mitigation will occur in the form of a contribution to the IBCF to offset potential negative impacts to ESA-listed bat habitat. The payment will be made prior to tree clearing in the amount of $608,007.60. The payment will follow the seasonal timelines and mitigation multipliers outlined in the *Revised Conservation Strategy for Forest-Dwelling Bats*. Payment adjustments will occur if the USFWS make adjustments to the current calculated per/acre calculation. All effort will be made to not remove trees in June and July. This contribution is expected to promote the survival and recovery of both bat species through protecting and managing existing forested habitat to support potential maternity populations, particularly those that would expand existing conservation ownerships. In conclusion, the proposed action appears to result in a likely to adversely affect Indiana bats and likely to adversely affect northern long-eared bats determination for the proposed CVG Air Cargo Hub Development Project. The Action will not affect any known hibernacula, known swarming, or known summer habitat in Boone County. Adherence to USFWS-approved clearing time frames and contribution to the IBCF will off-set impacts to these federally listed bat species.

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Appendix A
Figures

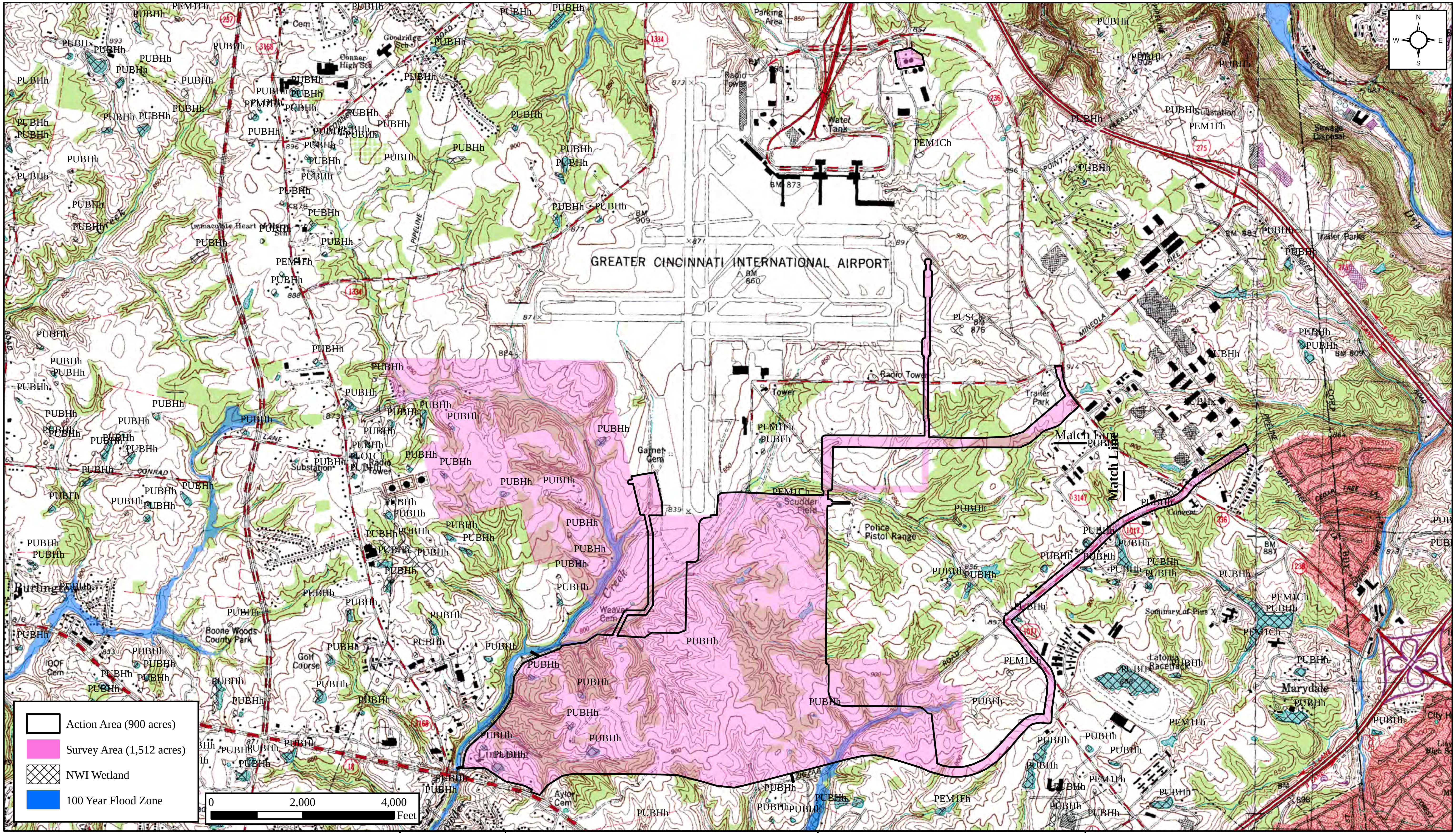


Figure 1

Kenton County Airport Board
Cincinnati/Northern Kentucky International Airport
Air Cargo Hub Development
Boone County, Kentucky

USGS 7.5' Topographic Map with NWI
and FEMA Overlay
Burlington, KY Quadrangle

Environment & Archaeology LLC

Figure 2a	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Development Boone County, Kentucky	Aerial Map with USDA Soil Overlay Aerial Provided by ESRI Map Services Environment & Archaeology LLC	

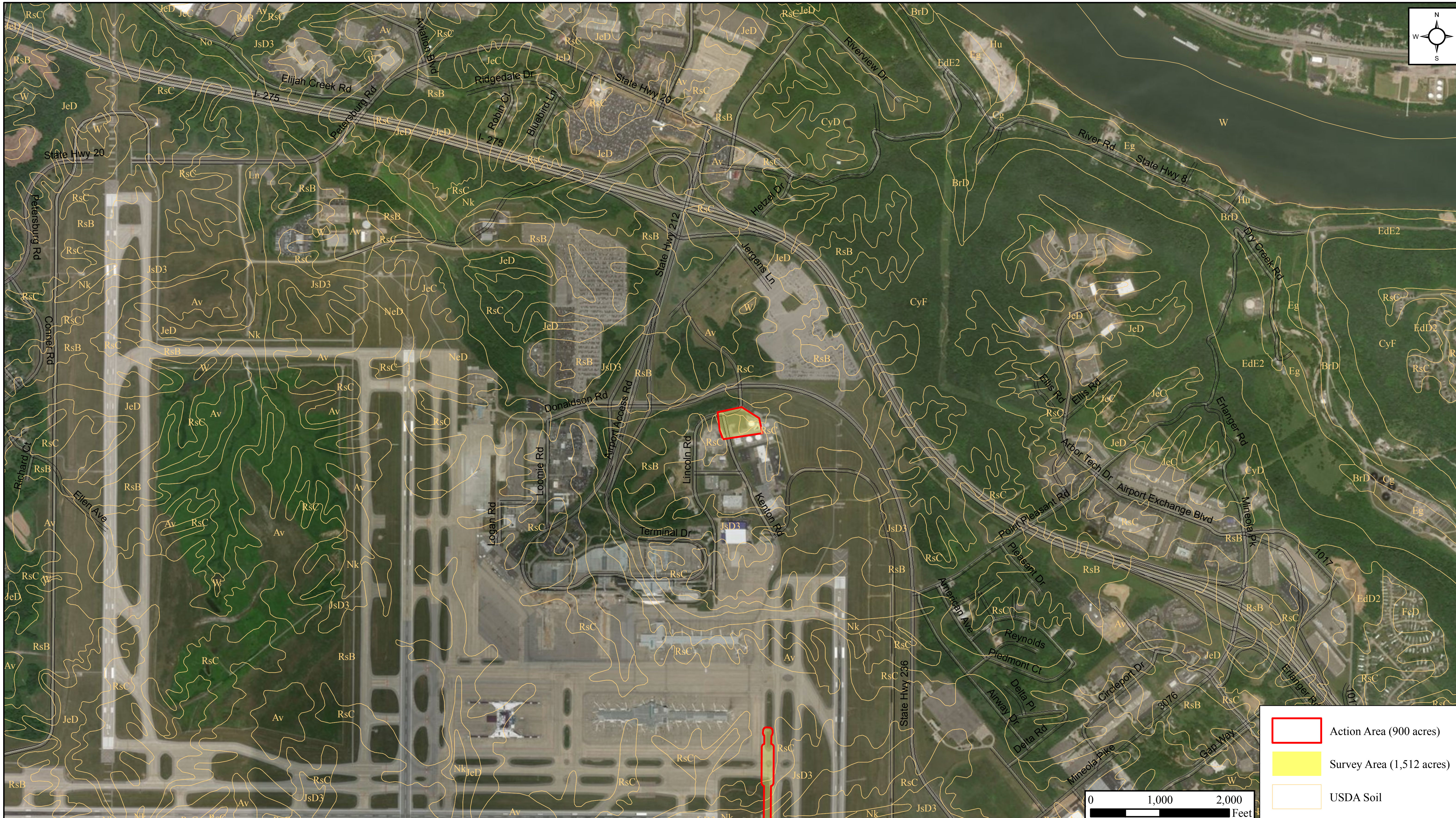


Figure 2b

Kenton County Airport Board
Cincinnati/Northern Kentucky International Airport
Air Cargo Hub Development
Boone County, Kentucky

Aerial Map with USDA Soil Overlay
Aerial Provided by ESRI Map Services
Environment & Archaeology LLC

Figure 3a	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Development Boone County, Kentucky	Aerial Map Aerial Provided by ESRI Map Services Environment & Archaeology LLC

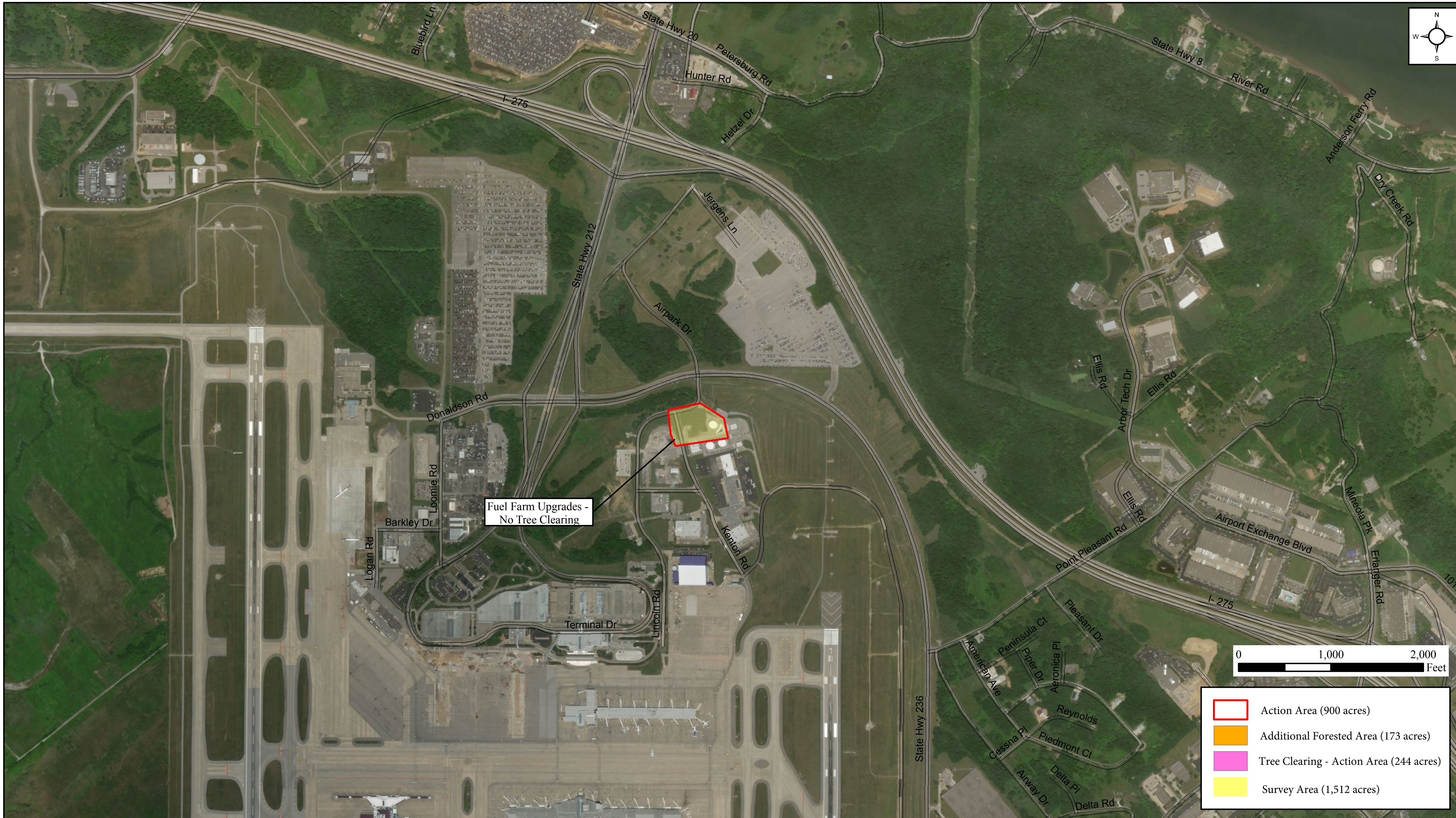


Figure 3b

Kenton County Airport Board
Cincinnati/Northern Kentucky International Airport
Air Cargo Hub Development
Boone County, Kentucky

Aerial Map
Aerial Provided by ESRI Map Services
Environment & Archaeology LLC

Figure 4a	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Development Boone County, Kentucky	Aerial Map Aerial Provided by ESRI Map Services Environment & Archaeology LLC

Figure 4b	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Development Boone County, Kentucky	Aerial Map Aerial Provided by ESRI Map Services Environment & Archaeology LLC

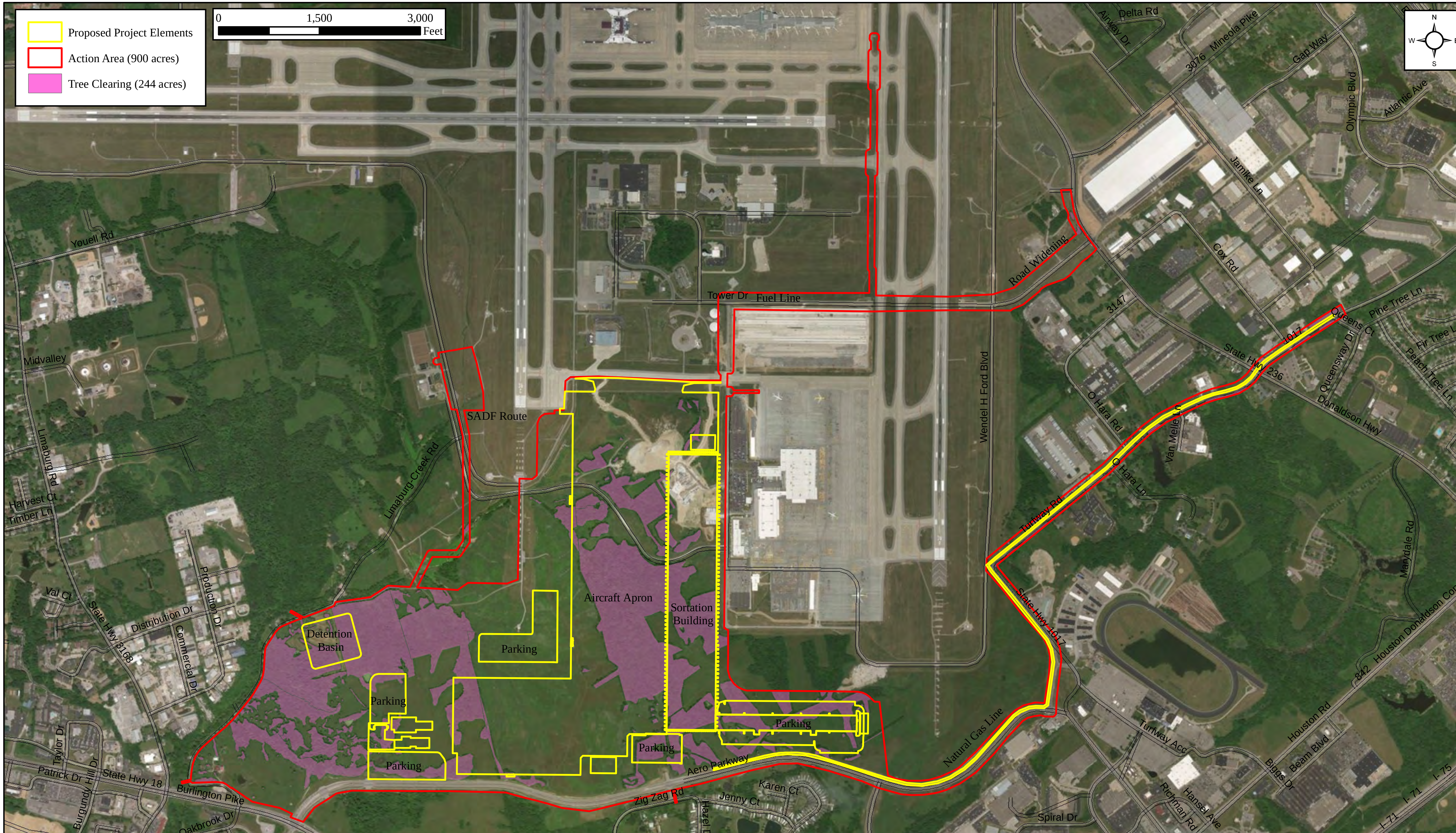


Figure 5a	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Development Boone County, Kentucky	Aerial Map Aerial Provided by ESRI Map Services Environment & Archaeology LLC

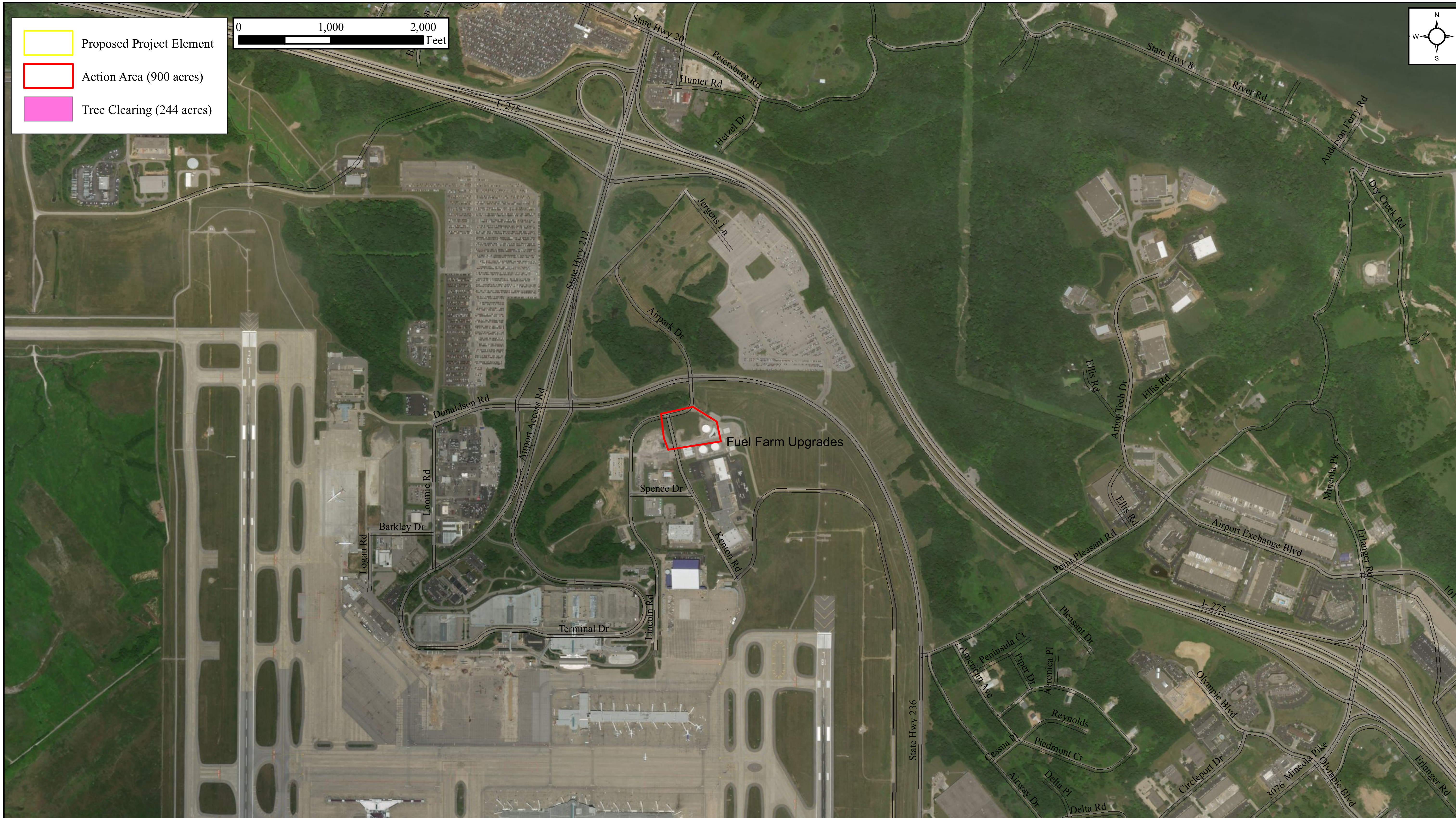


Figure 5b	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Development Boone County, Kentucky	Aerial Map Aerial Provided by ESRI Map Services Environment & Archaeology LLC

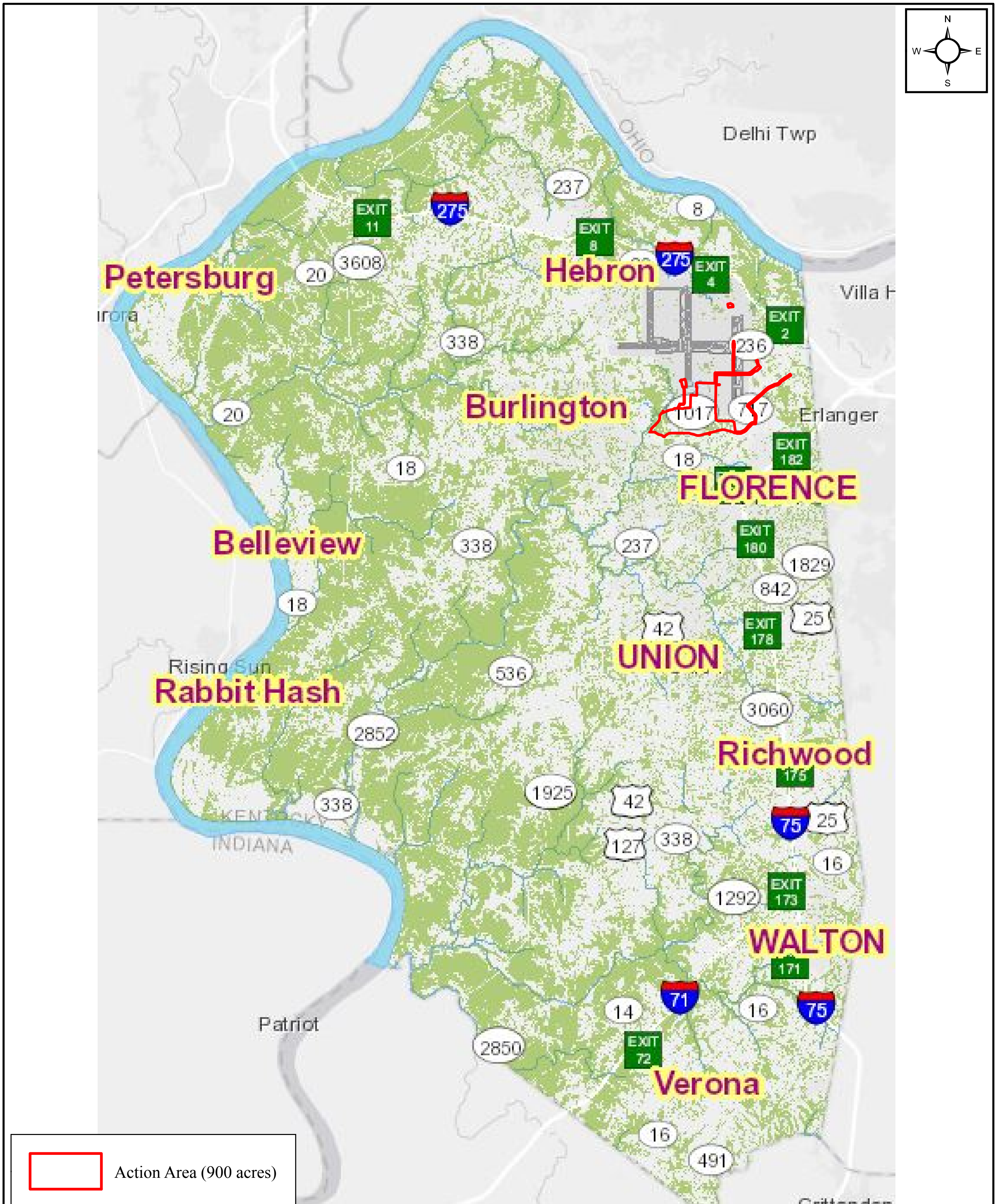


Figure 6	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Development Boone County, Kentucky	Boone County Tree Canopy Cover Source: GIS Services Division, Boone County Planning Commission Environment & Archaeology LLC

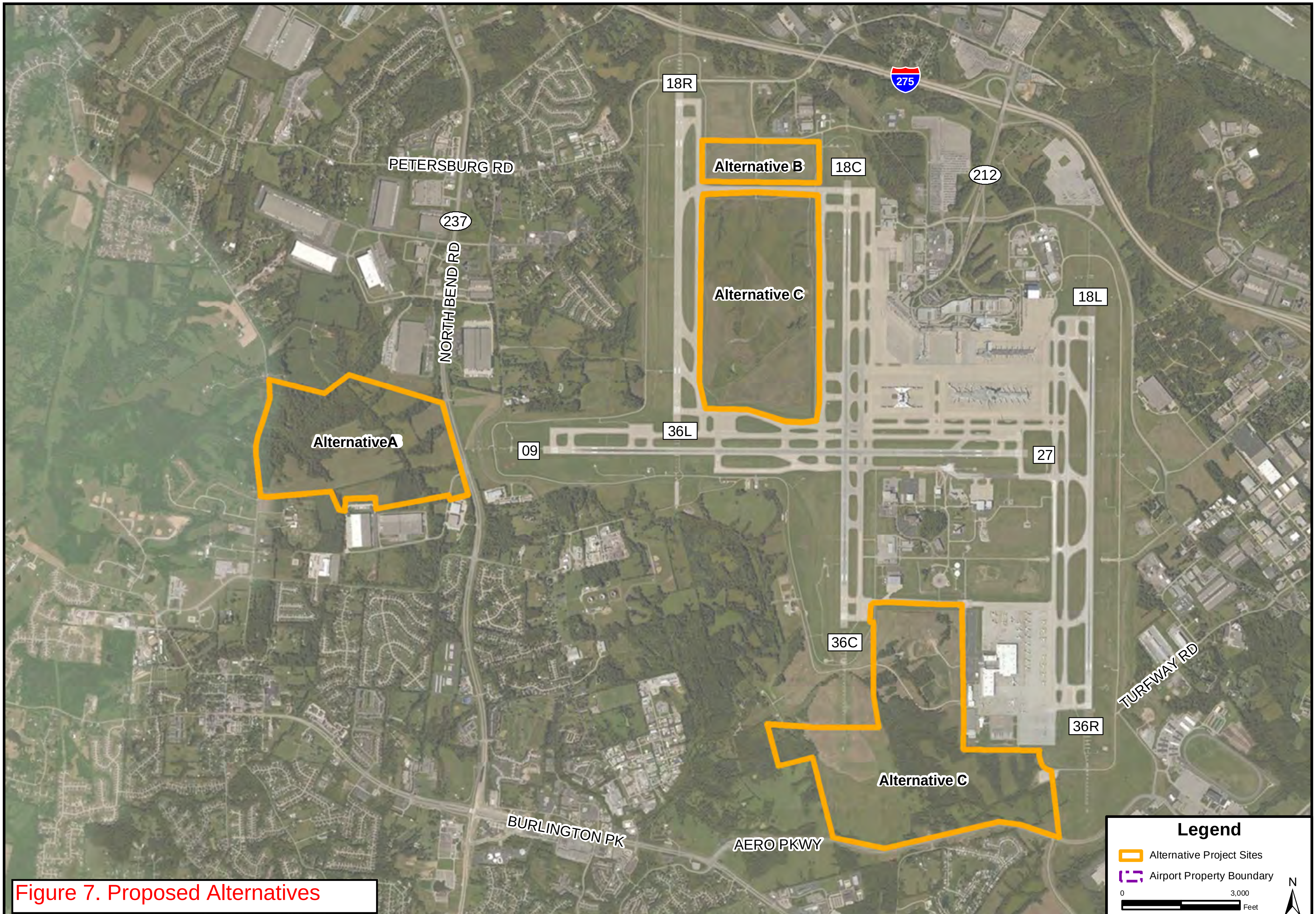


Figure 7. Proposed Alternatives

Air Cargo Hub Development Environmental Assessment

Alternative Sites

EXHIBIT: 3-1

4/4/2018 Y:\CVG\Amazon EA\E-L&B Work Product\2-GIS\MXD\1_DRAFT\ 3-1_Alternative Sites.mxd

Figure 8	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Development Boone County, Kentucky Action Area 1-km Buffer	Aerial Map Aerial Provided by ESRI Map Services Environment & Archaeology LLC

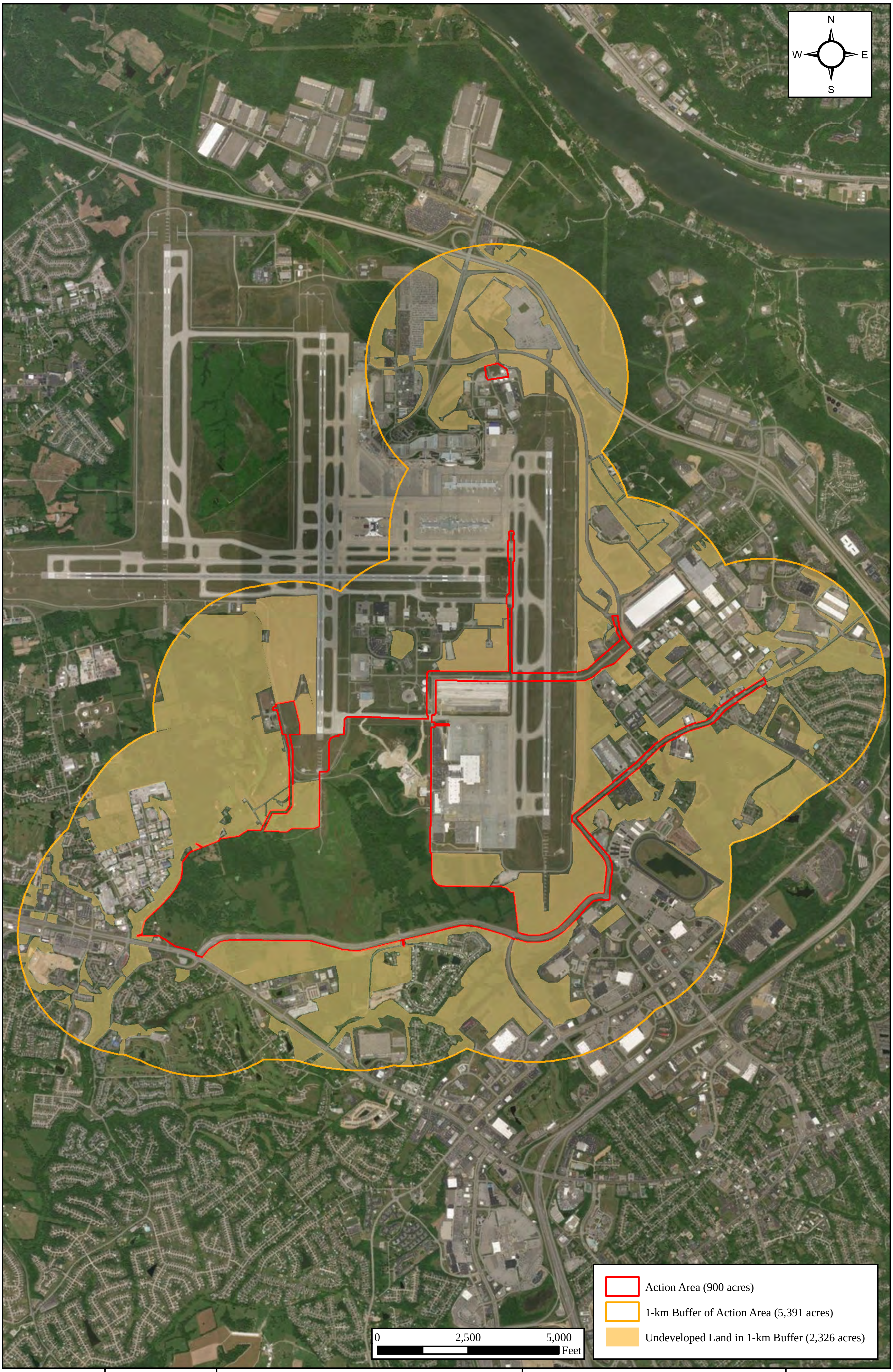


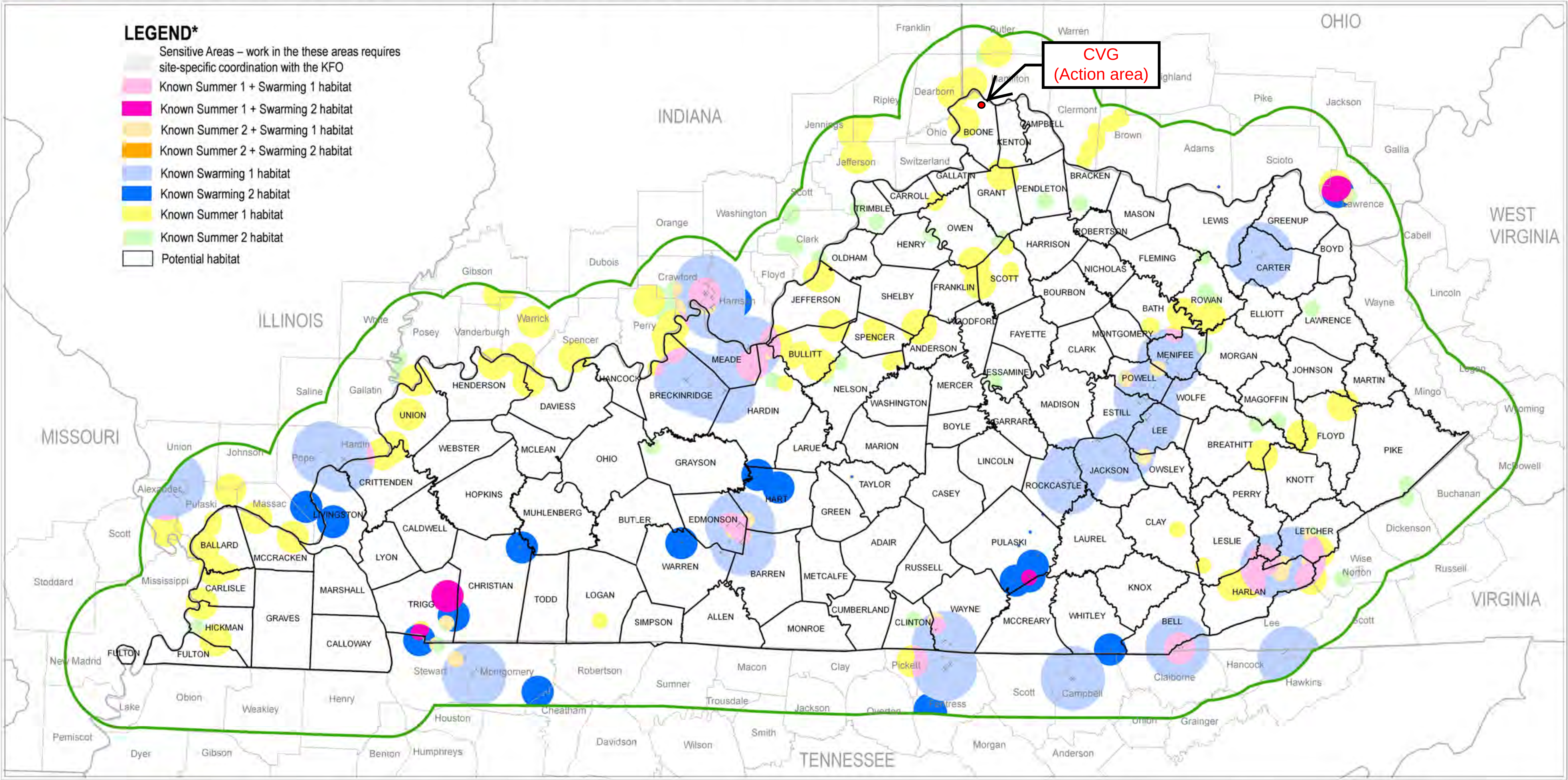
Figure 9	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Development Boone County, Kentucky Action Area 1-km Buffer	Aerial Map Aerial Provided by ESRI Map Services Environment & Archaeology LLC

Figure 10	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Development Boone County, Kentucky Action Area 1-km Buffer	Aerial Map Aerial Provided by ESRI Map Services Environment & Archaeology LLC

Attachment B
Known Indiana and Northern Long-eared Bat Habitat Maps

U.S. Fish & Wildlife Service

Known Indiana bat habitat in Kentucky and within 20 miles (January 2018)



0 10 20 40 60 80 100 Miles

NOTE: This map is based on species occurence information and is subject to change as new data become available. Please contact our office at 502/695-0468 to ensure you are working with the most current version.

*For an explanation of terms, please see the Conservation Strategy for Forest-Dwelling Bats in the Commonweath of Kentucky.

The USFWS makes no warranty for use of this map and cannot be held liable for actions or decisions based on map content. This map was produced as an appendix to the Conservation Strategy for Forest-Dwelling Bats in the Commonwealth of Kentucky and should only be used in the context of this Strategy.

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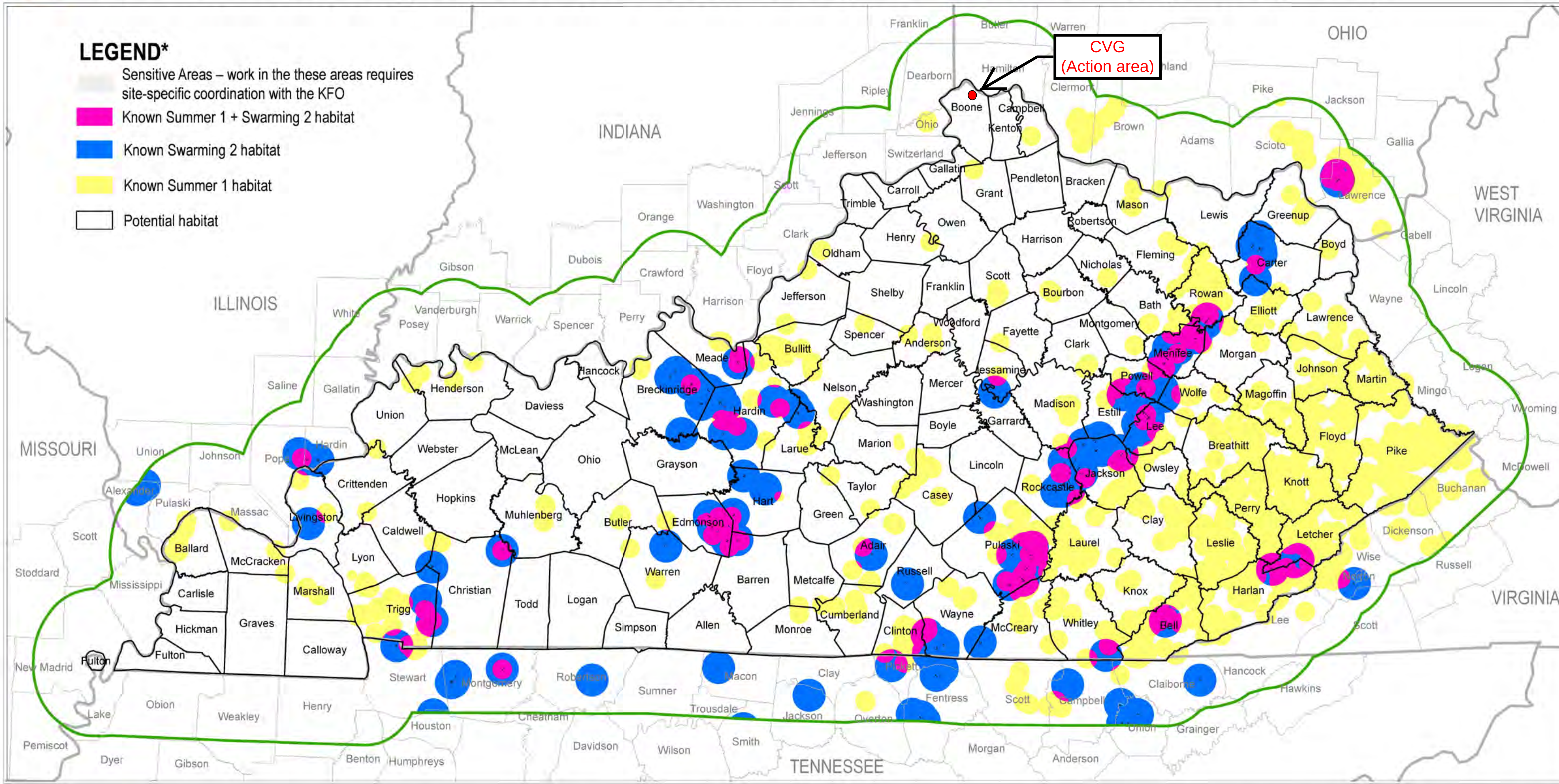
U.S. Fish & Wildlife Service

Known northern long-eared bat habitat in Kentucky and within 20 miles (January 2018)



NOTE: This map is based on species occurence information and is subject to change as new data become available. Please contact our office at 502/695-0468 to ensure you are working with the most current version.
*For an explanation of terms, please see the Conservation Strategy for Forest-Dwelling Bats in the Commonweath of Kentucky.

0 10 20 40 60 80 100 Miles

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N

Attachment C
Previous IBCF Contribution Documentation

CINCINNATI/NORTHERN KENTUCKY
INTERNATIONAL AIRPORT

P.O. Box 752000
Cincinnati, OH 45275-2000
Phone: 859-767-3151
Fax: 859-767-3080
cvgairport.com

May 20, 2016

Kentucky Natural Lands Trust
c/o Hugh Archer, Executive Director
433 Chestnut Street
Berea, KY 40403

Re: IBCF Contribution
KFO Project Number 2016-B-0293

Dear Mr. Archer:

Enclosed is a check made payable to the Kentucky Natural Lands Trust in the amount of $16,965.00 as a contribution to the Imperiled Bat Conservation Fund (IBCF) for the removal of 5.22 acres of "potential" Indiana bat and northern long-eared bat habitat for the Wendell Ford Boulevard Extension Project. The Kentucky Field Office (KFO) Project Number is 2016-B-0293.

Please issue a letter of receipt for this payment to the following address. Also, please notify the KFO that this contribution has been received at your earliest convenience.

Kenton County Airport Board
Attn: Debbie Conrad
P.O. Box 752000
Cincinnati, OH 45275-2000

If you have any questions or concerns, please feel free to contact me at 859-767-7021.

Sincerely,

Debbie Conrad

Debbie Conrad
Senior Project Manager

Cc: Phil DeGarmo, USFWS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
330 West Broadway, Suite 265
Frankfort, Kentucky 40601
(502) 695-0468

June 29, 2016

Ms. Debbie Conrad
Senior Project Manager
Kenton County Airport Board
Cincinnati/Northern Kentucky International Airport
P.O. Box 752000
Cincinnati, Ohio 45275

Re: FWS 2016-B-0293; Kenton County Airport Board; located in Kenton County, Kentucky

Dear Ms. Conrad:

The U.S. Fish and Wildlife Service (Service) has reviewed recent correspondence regarding this proposed project and offers the following comments in accordance with the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*).

Indiana Bat (*Myotis sodalis*)
Northern Long-eared Bat (*Myotis septentrionalis*)
The correspondence from AECOM states that the project area does not contain caves, caverns, mine adits, or other underground voids that could potentially provide winter habitat for these species. The project area does contain suitable summer roosting habitat. We have received a copy of a May 23, 2016 receipt acknowledging the $16,443.00 contribution Kenton County Airport Board made to Kentucky Natural Lands Trust for the Imperiled Bat Conservation Fund. Your project adheres to the conservation measures associated with the Kentucky Field Office's 2015 *Conservation Strategy for Forest-Dwelling Bats* (Conservation Strategy) and the 2015 Biological Opinion: *Kentucky Field Office's Participation in Conservation Memoranda of Agreement for the Indiana Bat and/or Northern Long-eared Bat* (BO). The contribution made is the appropriate amount, following the process in the Conservation Strategy, to mitigate for the removal of the "potential" Indiana bat habitat and "potential" northern long-eared bat habitat for this project as described in the original correspondence and attachments from AECOM. Specifically, 5.22 acres of forested habitat removal will occur anytime of the year, except June and July. Through the adherence to the Conservation Strategy, the Service has already analyzed the effects of your action under the BO and has concluded that the project is not likely to jeopardize the continued existence of the Indiana bat or the northern long-eared bat or result in the destruction or adverse modification of designated critical habitat for this species. Any incidental take of Indiana bats and/or northern long-eared bats that will or could result from the

forest habitat removal associated with your project is authorized under the KFO BO. If additional forested areas not previously considered are to be removed, then Kenton County Airport Board should coordinate with the Service to determine if additional compensation is necessary to be in ESA compliance.

In view of these findings we believe that the requirements of section 7 of the Endangered Species Act have been fulfilled for this project. Your obligations under section 7 must be reconsidered, however, if: (1) new information reveals that the proposed action may affect listed species in a manner or to an extent not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated.

Thank you again for your request. Your concern for the protection of endangered and threatened species is greatly appreciated. If you have any questions regarding the information that we have provided, please contact Phil DeGarmo at (502) 695-0468 extension 110 or phil_degarmo@fws.gov.

Sincerely,

Michael A. Floyd

for Virgil Lee Andrews, Jr.
Field Supervisor

June 4, 2018

United States Fish and Wildlife Service
Attn: Lee Andrews, Field Supervisor
330 West Broadway, Suite 265
Frankfort, Kentucky 40601

Re: Section 7 Threatened and Endangered Species Consultation
Consultation Code: 04EK1000-2017-SLI-0481
CVG Air Cargo Hub Development Project
Cincinnati/Northern Kentucky International Airport in Boone County, Kentucky

Dear Mr. Andrews:

The Kenton County Airport Board (KCAB) is proposing new development activities at property within and adjacent the Cincinnati/Northern Kentucky International Airport (CVG). The new development is referred to as the CVG Air Cargo Hub Development Project (Action). The Action will require federal authorization from the Federal Aviation Administration (FAA). As such, Section 7 consultation is required. *Environment & Archaeology, LLC* submits this consultation on behalf of KCAB and we provide to you the project information below and attached so that you can provide a determination of effect/no effect. A Biological Assessment has been prepared regarding the Indiana bat and northern long-eared bat for submittal to your office by the FAA. The two bat species will not be addressed in this letter.

1.0 PROJECT DESCRIPTION

The proposed Action Area is located on undeveloped land north of Aero Parkway within the existing CVG facilities. The CVG Airport is situated in the northeast section of Boone County, Kentucky, approximately one (1) mile south of the Ohio River and eight (8) miles southwest of downtown Cincinnati, Ohio. The proposed Action Area for the CVG Air Cargo Hub Development Project consists of a total of 889 acres, which will be used to construct package sortation and support buildings, an aircraft parking apron and apron taxilane, and a paved vehicle parking garage and lots. Approximately 1,512 acres were surveyed for the proposed Action (Enclosure 1).

Primary development activities associated with the proposed Action include the following components.

- **Construction of a primary package sortation building, ground package sortation building, and support buildings, with a total building footprint of approximately 70.95 acres.** The primary sorting building would be located on the south side of the airfield with access from Aero Parkway and Wendell Ford Boulevard. The support buildings will include space for equipment storage and maintenance, as well as pilot services.
- **Construction of an approximate 255-acre concrete aircraft parking apron and apron taxilanes.** These features will provide circulation and parking for up to seventy-seven (77)

cargo aircrafts. Ground support equipment, unit load devices, staging areas, and fuel and de-icing pads will also be implemented.

- **Construction of a paved employee and visitor vehicle parking garage and parking lots totaling approximately 17.93 acres in size.** This portion of the proposed Action will include space for employee vehicle parking, truck courts, and vehicle circulation areas for additional trucks and cars moving throughout the cargo facility. These areas would additionally include space for employee parking service areas, and trailer staging.

The following are supporting or enabling elements to the proposed Action major elements:

- Preparation (clearing, grubbing, excavation, embankment, and grading) of approximately 889 acres of land.
- Improvement and widening of a section of Wendell H. Ford Boulevard, as well as construction of new on-airport access roads that provide vehicle and truck access between Wendell H. Ford Boulevard and the new air cargo facility.
- Improvement of sections of Aero Parkway, an existing four-lane divided highway located south of the Proposed Site, to install new entrances, turn lanes, traffic lights, and lighting.
- Extension of utilities to the project site, including electric service, natural gas, water, sanitary sewer, data/communications, and other related infrastructure.
- Modification and/or installation of new taxiway edge lights and airfield directional signs.
- Installation of exterior pole-mounted and building-mounted lighting at package sorting buildings, access roads, vehicle parking lots, truck courts, and portions of the aircraft parking aprons.
- Construction of new drainage conveyances and detention ponds and/or modification the existing airfield stormwater management system.
- Installation of security fence and controlled-access vehicle gates and pedestrian gates.
- Expansion of existing Airport fueling facilities.

Land disturbance for the Action measures approximately 889-acres and includes area for access and soil stockpiling. The site is shown on the Burlington USGS 7.5-minute topographic quadrangle map (Figure 1). The surrounding land consists of urban/industrial turf and upland deciduous forest, and the Action Area is currently undeveloped airport property. The Action Area occurs within the watershed of Upper Gunpowder Creek (HUC 12: 050902030806) of the Ohio River basin within Boone County, Kentucky.

Environment & Archaeology, LLC conducted a formal wetland and stream delineation and threatened and endangered species habitat survey on August 21, October 29 and 30, 2015, September 21, 22, and 23, 2016, March 14 and 15, 2017, September 5, 6, 7, 8, 11, and 12, 2017, and May 22, 23, 24, and 25, 2018.

This letter includes the results of the gray bat and mussel species habitat assessment, and running buffalo clover (RBC) habitat and flowering period surveys (Section 3). A photolog providing representative photographs of the Survey Area is provided with this letter.

2.0 THREATENED AND ENDANGERED SPECIES IN BOONE COUNTY, KENTUCKY

A review of the U.S. Fish and Wildlife Service's Information, Planning, and Conservation System (IPAC) and Boone county list determined that eleven (11) threatened, endangered or proposed endangered species have ranges within the Survey Area. The species have been identified below in Table 1. The IPAC Consultation was dated May 17, 2017 and the code is 04EK1000-2017-SLI-0481.

Table 1. Threatened/Endangered Species Known to Have Ranges in the Survey Area.

Common Name	Scientific Name	Status
Mammals		
Gray bat	*Myotis grisescens*	Endangered
Indiana bat	*Myotis sodalis*	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Threatened
Mussels		
Clubshell	*Pleurobema clava*	Endangered
Fanshell	*Cyprogenia stegaria*	Endangered
Orangefoot pimpleback	*Plethobasus cooperianus*	Endangered
Pink mucket	*Lampsilis abrupta*	Endangered
Ring pink	*Obovaria retusa*	Endangered
Rough pigtoe	*Pleurobema plenum*	Endangered
Sheepnose	*Plethobasus cyphyus*	Endangered
Plants		
Running buffalo clover	*Trifolium stoloniferum*	Endangered

Indiana Bat and Northern long-eared bat are not discussed in this letter, as they have been included in the project's Biological Assessment. The following sections summarize the gray bat, mussel species, and running buffalo clover.

3.0 POTENTIAL THREATENED/ENDANGERED SPECIES HABITAT IN THE SURVEY AREA

3.1 Gray Bat

Gray bats inhabit caves year-round. In the winter, the gray bat hibernates in deep vertical caves. In the summer, they roost in caves scattered along rivers. No karst topography occurs within the Survey Area and no caves were identified within or adjacent to the Survey Area during the habitat surveys on February 16, 2017, September 5 through 8, 2017, and May 22 through 25, 2018. The Action Area does not contain the required habitat for the gray bat.

3.2 Mussels

According to the USFWS IPaC and county list, there are seven mussel species with the potential to be located within the proposed Survey Area. A review of the required habitat for each of the mussel species and threat status via NatureServe was performed (http://explorer.natureserve.org/servlet/NatureServe?init=Species). The habitat requirements for the seven (7) mussel species are outlined in Table 3. One of the threats to all of the seven (7) listed mussel species are impoundments.

The Survey Area contains four (4) perennial streams. The remaining streams are intermittent and ephemeral. Each of the four (4) perennial streams, Gunpowder Creek, and three unnamed tributaries to Gunpowder Creek, contained impoundments. High accumulations of silt were present immediately upstream of the impoundments, creating unsuitable mussel habitat. In addition, the northern reach of one unnamed tributary to Gunpowder Creek has also been channelized by concrete and is likewise not suitable mussel habitat. Per correspondence with the USFWS in February 2018, the mussel species are listed on the IPaC due to the close proximity of the Ohio River to the Action Area. With the use of best management practices, it is the opinion of *Environment & Archaeology, LLC* that the Action will have no effect on the listed mussel species.

Photographs of the substrates within these reaches are included in Enclosure 2. The remaining intermittent and ephemeral streams lack the morphology and flow regime necessary to support the listed mussel species. Datasheets and additional photographs for identified streams and wetlands within the Survey Area are available upon request.

Table 3. Federally Listed Endangered Mussel Species to Have Ranges in Survey Area.

Common Name	Scientific Name	Habitat Requirements	Potential for Action to Impact Species
Clubshell	*Pleurobema clava*	Clean, loose sand and gravel in medium to small rivers and streams	No effect
Fanshell	*Cyprogenia stegaria*	Medium to large rivers; requires sand or gravel substrate in a moderate current	
Orangefoot pimpleback	*Plethobasus cooperianus*	Clean, fast-flowing water in silt-free rubble, gravel or sand of medium to large rivers	
Pink Mucket	*Lampsilis orbiculata*	Requires silt-free shallow riffles and shoals in a mud and sand substrate	
Ring pink	*Obovaria retusa*	Shallow water over silt-free sand and gravel bottoms of large rivers	
Rough pigtoe	*Pleurobema plenum*	Wide variety of streams from large to small with firmly packed sand or gravel	
Sheepnose	*Plethobasus cyphyus*	Shallow areas of large rivers and streams of moderate to swift current; variable substrates ranging from coarse sand to gravel to mud, cobble, boulders	

3.3 Running Buffalo Clover

Surveys for running buffalo clover (RBC) included habitat assessments followed by flowering-period presence-absence surveys. Suitable habitat for RBC is typified by mesic woodlands in partial to filtered sunlight, where there is a pattern of moderate periodic disturbance for a prolonged period, such as mowing, trampling, or grazing. It is most often found in regions underlain with limestone or other calcareous bedrock, but not exclusively. It has been reported from a variety of disturbed woodland habitats, including blue-ash savannahs, floodplains, streambanks, shoals (especially where old trails cross or parallel intermittent streams), grazed woodlots, mowed paths (e.g. cemeteries and lawns), old logging roads, jeep trails, skidder trails, mowed wildlife openings within mature forests, and steep, weedy ravines.

3.3.3 <u>Habitat Survey Summary</u>

Habitat assessments were performed on the following dates by the following USFWS-Qualified Running Buffalo Clover Surveyors. A summary of RBC-surveyor qualifications is provided in Enclosure 3.

- Parcel 1 – February 16, 2017 –approximately 37 acres (Doug Whitlatch and Audrey Hanner)
  - The 14-acre portion of the Survey Area is not likely to result in significant adverse impacts to RBC, according to an April 25, 2017 FWS clearance letter (FWS 2017-B-0288).
- Parcel 2 – March 14 and 15, 2017 – approximately 500 acres (Laura Heikkinen)
- Parcel 3 – September 5 to 8, 2017 – approximately 663 acres (Laura Heikkinen)
- Parcel 4 – January 22, 2018 (OBG) and May 22, 23 and 24, 2018 (Jack Stenger) – approximately 335 acres

Parcels 1, 2, and 3:
Parcel 1-3 was dominated by open land cover of old field growth subjected to full sun and upland mixed deciduous forest occupied by a dense understory of honeysuckle. A description of the dominant forest species and shade regime is provided below. Portions of Parcel 1-3 have been previously disturbed by roadway construction and graveled staging areas. As a result, the majority of Parcel 1-3 does not appear suitable for RBC habitat.

Parcel 1-3 contained occasional areas of low quality potential RBC habitat characterized by filtered sunlight with moderate disturbance from mowing, vehicle travel, and scouring. These potential habitat areas consisted of ATV trails, two-track roads, floodplains, forest openings, and mown corridors through mixed deciduous forest. Several ATV trails crossed intermittent streams. However, the amount of filtered sunlight that reached the ground was limited along both ATV trails and floodplains due to the overreaching canopy. Suitable floodplain habitat was also extremely limited due to the dense honeysuckle growth that was typical along the majority of stream channels within Parcel 1-3. The locations ATV trails and few areas of moderately open floodplain habitat are illustrated on Figure 3.

<u>Species Summary:</u> The species present within the areas identified as potential RBC habitat is summarized below, which was dominated by non-native species and indicative of disturbed areas. The vegetative cover along the ATV trails, mown corridors, and forest openings was dominated by tall fescue (*Schedonorus arundinaceus)*, Japanese stiltgrass (*Microstegium vimineum*), white clover (*Trifolium repens*), field garlic (*Allium vineale*), chickweed (*Stellaria media*), jewelweed (*Impatiens capensis*), Indian tobacco (*Lobelia inflata*), clearweed (*Pilea pumila*) sweet woodruff (*Galium odoratum*), Indian strawberry (*Duchesnea indica*), spotted ladysthumb (*Polygonum persicaria*), white snakeroot (*Ageratina altissima*), and purple deadnettle (*Lamium purpureum*). Typical species within floodplains included wingstem (*Verbesina alternifolia*), Japanese stiltgrass, white clover, hog peanut (*Amphicarpaea bracteata*), deertongue grass (*Dichanthelium clandestinum*), mistflower (*Conoclinium coelestinum*), great lobelia (*Lobelia siphilitica*), aster (*Symphyotrichum* spp.), spotted ladysthumb, violet (*Viola* spp.), creeping jenny (*Lysimachia nummularia*), bugleweed (*Lycopus* spp.), white snakeroot, and harvestlice (*Agrimonia parviflora*). Representative photographs of potential habitat are provided in Enclosure 2.

Upland mixed deciduous forest was identified primarily along stream and drainage corridors, although several larger sections of contiguous forest were identified. It is the professional opinion of *Enviornment & Archaeology, LLC* that the mixed deciduous forest, with the exceptions of the forest openings/trails discussed above, does not support RBC habitat due to the density of the non-native forest understory. Although periodic areas of lesser-density understory was identified, these areas had limited sunlight due to density of the canopy and lacked a disturbance regime. Dominant canopy vegetation included: sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), black cherry (*Prunus serotina*), black walnut (*Juglans nigra*), green ash (*Fraxinus pennsylvanica),* hackberry (*Celtis occidentalis*), black locust (*Robina pseudoacacia*), honey locust (*Gleditsia triacanthos*), red oak (*Quercus rubra*), chinquapin oak (*Quercus muehlenbergii*), American elm (*Ulmus americana*), box elder (*Acer negundo*), American sycamore (*Platanus occidentalis*), and yellow buckeye (*Aesculus flava*). The understory vegetation was relatively dense across much of the forested areas, however, periodic areas of lesser shrub growth and a moderately open understory were identified. The understory was dominated by Amur honeysuckle (*Lonicera maackii*), multiflora rose (*Rosa multiflora*), brambles (*Rubus* spp.), spicebush (*Lindera benzoin*), pawpaw (*Asimina triloba*), and saplings of the canopy species. The herbaceous layer was dominated by white snakeroot, wild rye (*Elymus* spp.), jumpseed (*Polygonum virginianum*), garlic mustard (*Alliaria petiolata*), aster, Japanese honeysuckle (*Lonicera japonica*), clearweed, white avens (*Geum canadense*), and hog peanut. Poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia),* and summer grape (*Vitis aestivalis*) were identified within both the understory and vine strata.

Parcel 4:
Much of Parcel 4 Area does not exhibit suitable habitat for running buffalo clover due to past disturbance of the land. For example, the hayfield (H) areas contain no potential habitat since this habitat is open and this species cannot tolerate full sun exposure. Moreover, these areas have either been plowed in the past or heavily grazed. Although the Hickory Woodland (HW) area presently contains potential habitat where RBC could grow and survive, an examination of the historic aerials from the 1950s shows that this area was comprised of mostly open hayfield at that time – since then, the hickory trees have volunteered and occupied this area within the past 50 to 60 years. Consequently, the HW is not considered suitable RBC habitat.

Potential RBC habitat is present in the Mixed Deciduous Forest (MDF) and Beech Forest (BF) areas. Based on the habitat characteristics observed, both areas represent relatively mature forest and undisturbed soils. The two habitat areas comprise approximately 11.9 acres of the overall Site. The forest was predominately closed-canopied with a heavy sugar maple subcanopy and Amur honeysuckle shrub layer, causing a light regime unfit for RBC. However, there was a light and disturbance regime suitable for RBC along some stream corridors and old roadbeds. The woodland between Stream 1 and Stream 23 appeared to have been selectively logged both recently and historically, so there were old logging roadbeds with filtered light and periodic disturbance. These areas were dominated by Japanese honeysuckle, ground ivy (*Glechoma hederacea*), orchard grass (*Dactylis glomerata*), Japanese stiltgrass, multiflora rose, brambles, white clover, hairy vetch (*Vicia villosa*), poison ivy, and Amur honeysuckle. The dominance of non-native species, especially the abundant Japanese honeysuckle, diminishes the probability that RBC is present. There is also marginal floodplain habitat along the unnamed tributary to Gunpowder Creek. The vegetational community and disturbance regime were similar to the mixed deciduous forest described in Parcel 3.

The Post-agricultural Disturbed Forest held some potential RBC habitat. Based on the old barbed-wire fencing and the presence of sporadic large trees (>2' DBH) the area had a history as an open canopy cattle pasture. Currently, the canopy is dominated by black walnut, black locust, hackberry, American elm, and sassafras (*Sassafras albidum*). Most of the herbaceous layer is shaded out by Amur honeysuckle, but there were walnut glades where honeysuckle was absent and a thick herbaceous layer grew. The herbaceous layer is dominated by chickweed, striped violet (*Viola striata*), Japanese honeysuckle, and vegetative grass and sedge. The area was intersected by a high density of deer trails providing corridors of regular soil disturbance.

Due to the suitable forested areas present, there is moderate probability that RBC could occur within Parcel 4.

3.3.4 <u>RBC Flowering-Period Survey</u>

Flowering-period RBC surveys were performed on the following dates by the following USFWS-Qualified Running Buffalo Clover Surveyors:

- Parcel 2 – May 5, 2017 –approximately 500 acres (Laura Heikkinen)
  - On April 28, 2017, Jennifer Finfera of the USFWS Columbus Field office confirmed that running buffalo clover was in bloom in the region (southern Ohio).
- Parcels 3 and 4 – May 22, 23, 24, and 25, 2018 – approximately 998 acres (Jack Stenger)
- A flowering period survey was not conducted within Parcel 1, as clearance has already been received by USFWS for the parcel, as noted in section 3.3.3.

Survey Methodology: The flowering period surveys were conducted within each area identified as potential habitat during the habitat assessments. A pedestrian meander survey was conducted within each potential habitat area. Since the majority of potential suitable habitat within the Survey Area area was linear, a single transect along narrow ATV trails or mown corridors was conducted. Within wider corridors, open woods, or suitable floodplains, meandering was done so the entire suitable area could be investigated.

3.3.5 RBC Survey Results

No running buffalo clover was identified. Based on the results of the species-specific survey conducted during the flowering period for approximately 1,512-acres of the Survey Area, the project is not anticipated to affect running buffalo clover. The survey result is supported by the limited, low quality habitat within the Survey Area.

4.0 SUMMARY

The Survey Area for the proposed CVG Air Cargo Hub Development Project encompassed approximately 1,095-acres area of open, old field growth and urban/industrial turf; the remaining 417 acres consisted of woodland. It is the professional opinion of *Environment & Archaeology, LLC*, that the Action will have no effect to the listed species due to the following:

- Habitat for the listed mussel may occur within the perennial stream reaches located within the Survey Area, however, low potential is likely along the perennial reach due to impoundments located along the channels and areas of stream channelization. Per the USFWS in February 2018, the mussel species are listed due to the close proximity to the Ohio River;
- Cave habitat is lacking for the gray bat; and
- No running buffalo clover was identified on site during May 5, 2017 and May 22-25, 2018 species-specific surveys.

We appreciate your assistance with the Project and look forward to the USFWS determination of no effect to federally-protected species. Please contact me at (865) 560-1601 for any additional information.

Sincerely,

Christina M. Lovins

Christina Lovins
Vice President

Enclosures (3):

1- Location Maps – USGS Topographic Map, Aerial Imagery Maps
2- Habitat Photographs
3- RBC-Surveyor Qualifications

Enclosure 1
Location Maps –

USGS Topographic Map, Aerial Imagery Map

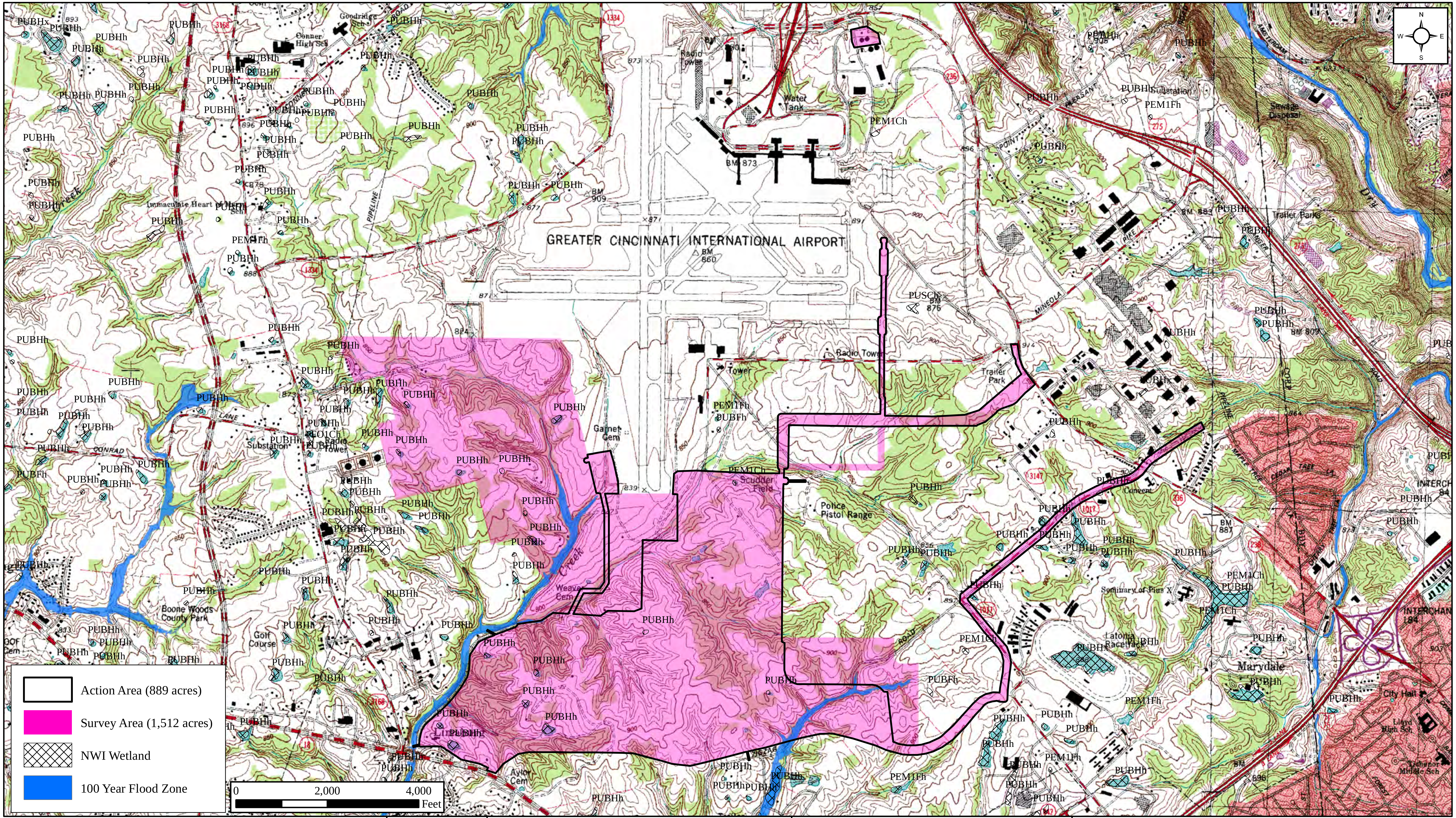

Figure 1

Kenton County Airport Board
Cincinnati/Northern Kentucky International Airport
Air Cargo Hub Development
Boone County, Kentucky

USGS 7.5' Topographic Map with NWI
and FEMA Overlay
Burlington, KY Quadrangle

Environment & Archaeology LLC

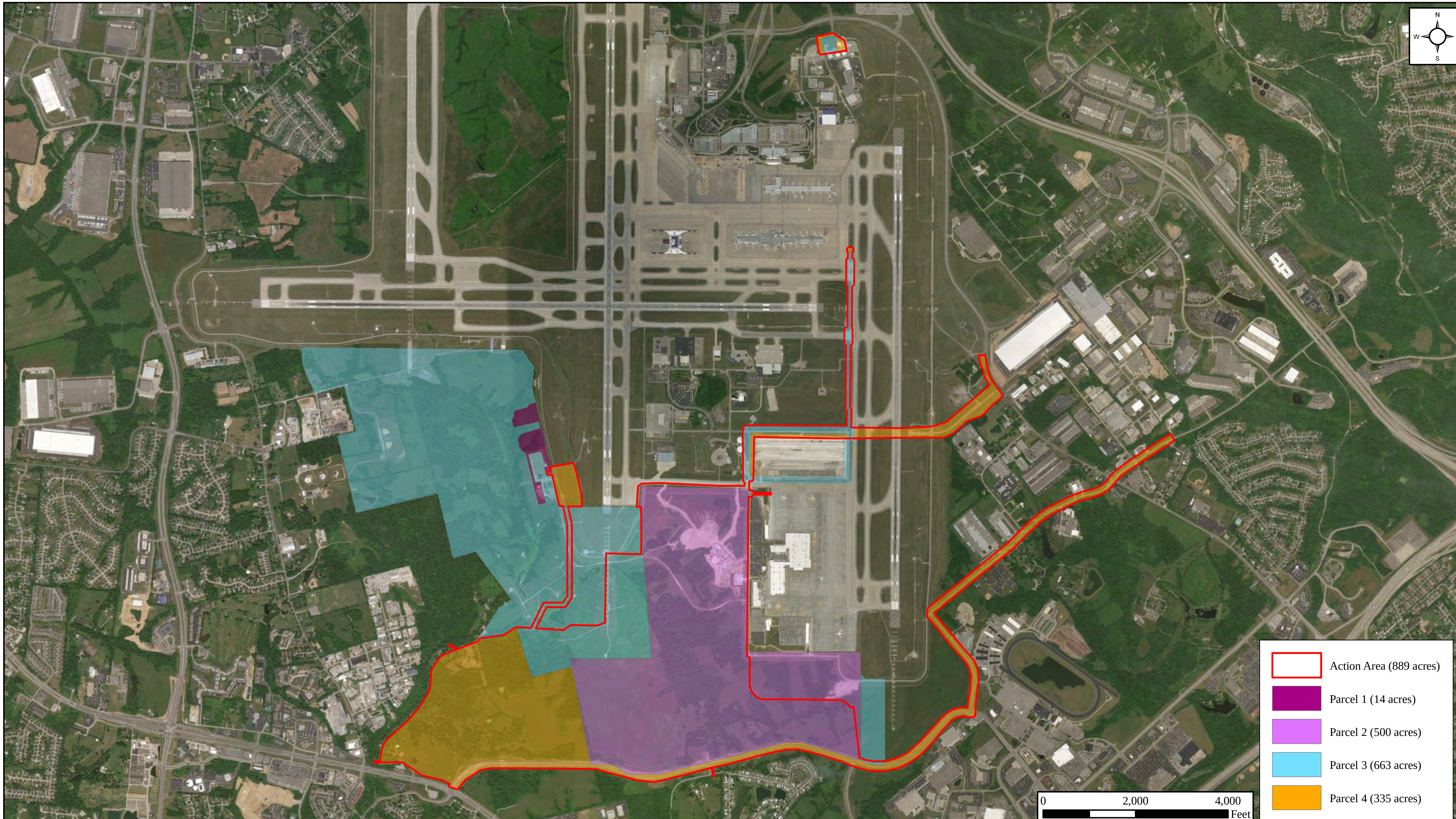

Figure 2	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Development Boone County, Kentucky	Aerial Map Aerial Provided by ESRI Map Services Environment & Archaeology LLC

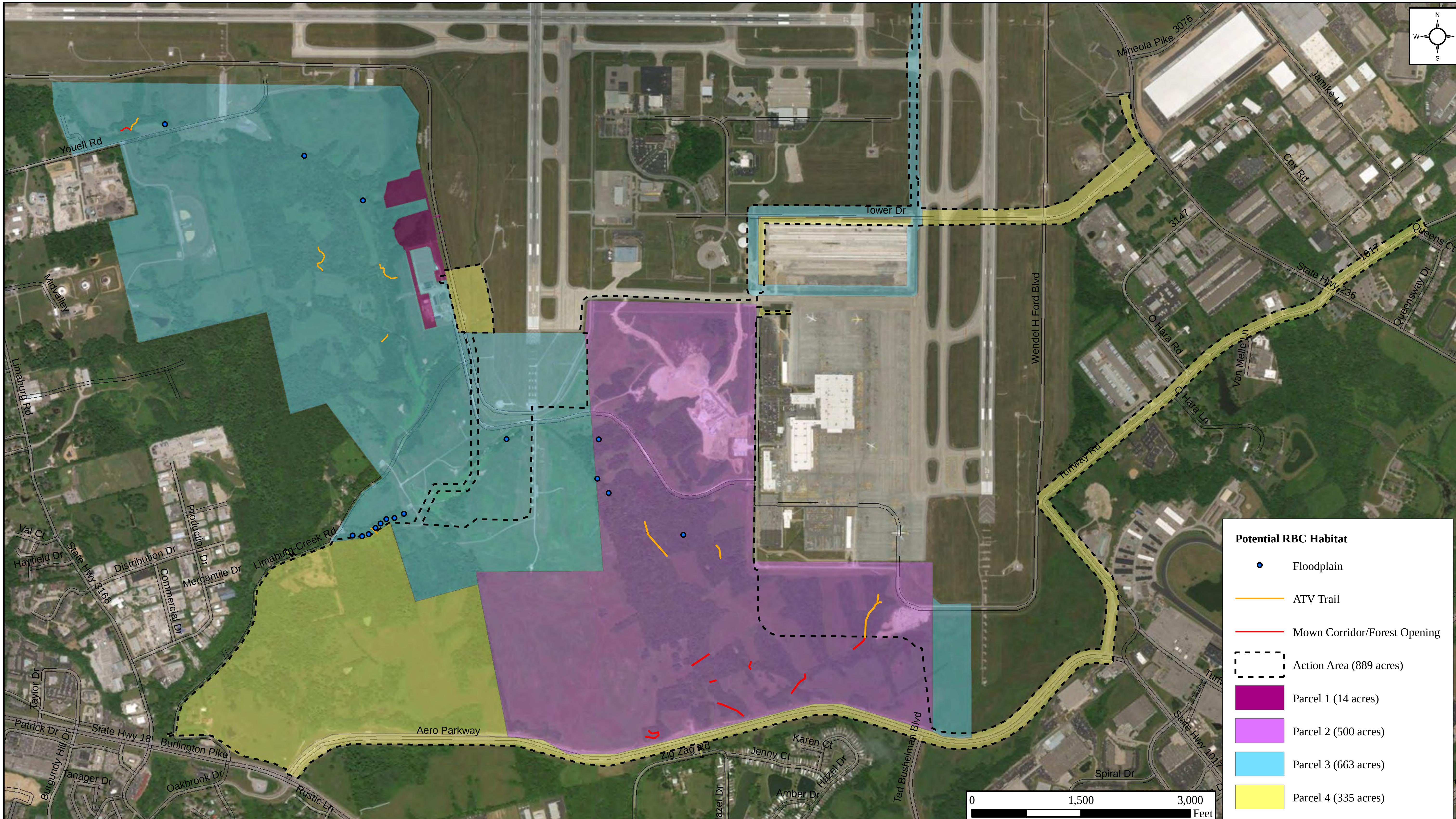

Figure 3	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Development Boone County, Kentucky	Aerial Map Aerial Provided by ESRI Map Services Environment & Archaeology LLC

Enclosure 2

Habitat Photographs

Photo:	1	Direction:	SSE	Date:	2/16/2017

Comments: Overview of the existing Stormwater Treatment Plant, as seen from its NE corner and facing southward along its easterly fencing.

Photo:	2	Direction:	SW	Date:	2/16/2017

Comments: Overview of the existing Stormwater Treatment Plant, as seen from its NE corner and facing towards its interior to the southwest.

Photo:	3	Direction:	WSW	Date:	2/16/2017

Comments: Overview of the northern portion of the existing Stormwater Treatment Plant, as seen from its NE corner and along its northern fencing.

Photo:	4	Direction:	SSE	Date:	2/16/2017

Comments: Overview of the open land to the immediate west side of the existing Stormwater Treatment Plant facility.

Photo:	5	Direction:	S	Date:	2/16/2017

Comments: Overview of the proposed SADF and Stormwater Treatment Plant expansion area, as seen from its NE corner.

Photo:	6	Direction:	SW	Date:	2/16/2017

Comments: Overview of the proposed SADF and Stormwater Treatment Plant expansion area, as seen from its NE corner.

Photo:	7	Direction:	NNW	Date:	2/16/2017

Comments: General dense scrub-shrub vegetation.

Photo:	8	Direction:	SSE	Date:	2/16/2017

Comments: Typical upland forested vegetation within Parcel .

Photo:	1	Direction:	S	Date:	3/14/2017

Comments: Representative view of old field vegetation, typical to the non-forested portions of the survey area.

Photo:	2	Direction:	E	Date:	3/14/2017

Comments: Representative view of typical mixed deciduous forest conditions with a dense shrub layer.

Photo:	3	Direction:	S	Date:	3/14/2017

Comments: Representative view of mixed deciduous forest with a relatively open understory. Forest with open understory was present only in a minor component of the survey area.

Photo:	4	Direction:	NW	Date:	3/14/2017

Comments: Representative overview of ATV trail within mixed deciduous forest. Filtered light to the ground layer is limited due to adjacent forest.

Photo:	5	Direction:	NE	Date:	3/14/2017

Comments: Representative overview of vegetated two-track road with filtered sunlight though adjacent mixed deciduous forest.

Photo:	6	Direction:	W	Date:	3/14/2017

Comments: Representative overview of periodically-mown old field opening within mixed deciduous forest.

Photo:	7	Direction:	S	Date:	3/14/2017

Comments: Representative overview of periodically-mown old field corridor through mixed deciduous forest.

Photo:	8	Direction:	S	Date:	3/15/2017

Comments: Overview of floodplain habitat along Stream 17. Filtered light to the ground layer is limited due to moderately dense forest canopy.

Photo:	1	Direction:	NE	Date:	9/6/2017

Comments: Overview of 2-acre parcel, comprised of urban/industrial turf.

Photo:	2	Direction:	N	Date:	9/6/2017

Comments: Overview of northern portion of 36-acre parcel, comprised primarily of urban/industrial turf.

Photo:	3	Direction:	E	Date:	9/6/2017

Comments: Overview of southern portion of 36-acre parcel, comprised primarily of urban/industrial turf.

Photo:	4	Direction:	S	Date:	9/8/2017

Comments: Overview of 22-acre parcel, comprised of urban/industrial turf, old field, PEM wetland and limited forest cover.

Photo:	5	Direction:	W	Date:	9/5/2017

Comments: Representative overview of urban/industrial turf within the 618-acre parcel.

Photo:	6	Direction:	SSW	Date:	9/5/2017

Comments: Representative overview of old field within the 618-acre parcel.

Photo:	7	Direction:	W	Date:	9/6/2017

Comments: Representative overview of relatively dense mixed deciduous forest within the 618-acre parcel.

Photo:	8	Direction:	E	Date:	9/6/2017

Comments: Representative overview of moderately open mixed deciduous forest within the 618-acre parcel.

Photo:	9	Direction:	E	Date:	9/6/2017

Comments: Representative overview of floodplain habitat, as seen along unnamed tributary to Gunpowder Creek.

Photo:	10	Direction:	SE	Date:	9/6/2017

Comments: Representative overview of ATV trail within mixed deciduous forest, as seen looking toward/crossing Gunpowder Creek.

Photo:	11	Direction:	NW	Date:	9/6/2017

Comments: Representative overview of ATV trail within mixed deciduous forest.

Photo:	12	Direction:	NW	Date:	9/6/2017

Comments: Representative overview of periodically-mown old field corridor through mixed deciduous forest.

Photo:	13	Direction:	NW	Date:	9/5/2017

Comments: Upstream overview of Gunpowder Creek.

Photo:	14	Direction:	NE	Date:	9/5/201

Comments: Representative overview of substrate within Gunpowder Creek.

Photo:	15	Direction:	N	Date:	9/5/2017

Comments: Representative overview of substrate within Gunpowder Creek.

Photo:	16	Direction:	N	Date:	9/5/2017

Comments: Representative overview of substrate within Gunpowder Creek.

Photo:	17	Direction:	SW	Date:	9/5/2017

Comments: Downstream overview of unnamed tributary to Gunpowder Creek.

Photo:	18	Direction:	NE	Date:	9/5/2017

Comments: Representative overview of substrate within unnamed tributary to Gunpowder Creek.

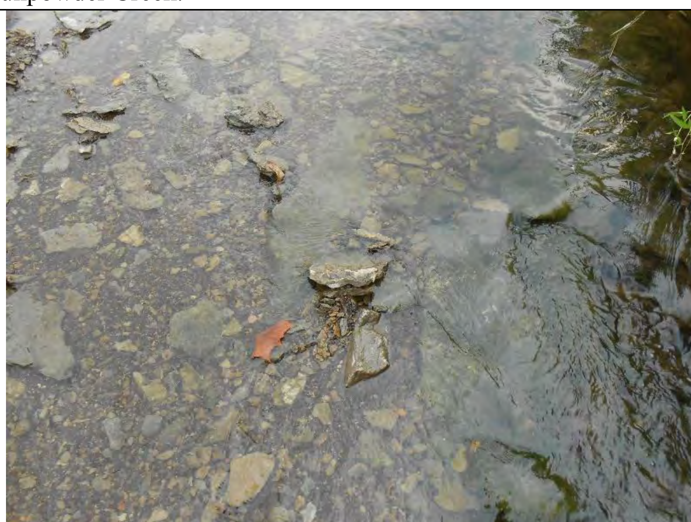

Photo:	19	Direction:	NE	Date:	9/5/2017

Comments: Representative overview of substrate within unnamed tributary to Gunpowder Creek.

Photo:	20	Direction:	NE	Date:	9/5/2017

Comments: Representative overview of substrate within unnamed tributary to Gunpowder Creek.

Photo:	1	Direction:	W	Date:	5/24/2018

Comments: Representative overview of potential RBC floodplain habitat. Note filtered light and disturbance from stream scouring.

Photo:	2	Direction:	N	Date:	5/24/2018

Comments: Representative overview of potential RBC habitat in Black Walnut glade within post-agricultural disturbed forest.

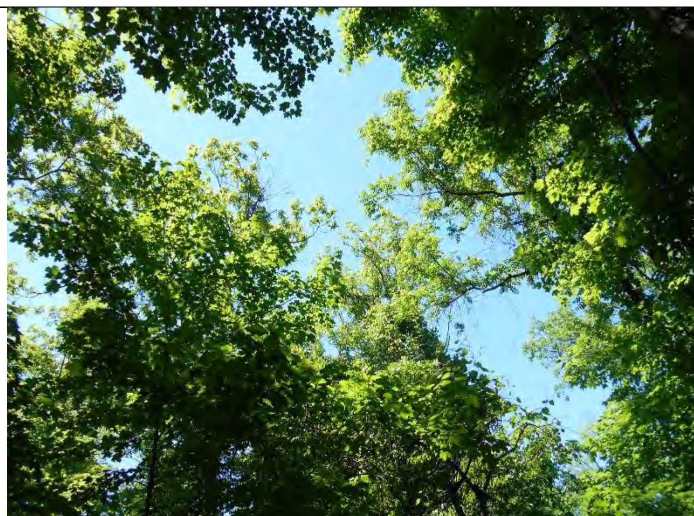

Photo:	3	Direction:	N	Date:	5/24/2018

Comments: Representative overview of open Black Walnut canopy and Sugar Maple subcanopy in post-agricultural disturbed forest, taken from same location as Photo 2.

Photo:	4	Direction:	N	Date:	5/24/2018

Comments: One of the numerous deer-trails through the post-agricultural disturbed forest.

Photo:	5	Direction:	NW	Date:	5/24/2018

Comments: Representative overview of periodically mown corridor within relatively dense mixed deciduous forest.

Photo:	6	Direction:	S	Date:	5/24/2018

Comments: Representative overview of ATV trail crossing perennial stream within mixed deciduous forest.

Photo:	7	Direction:	n/a	Date:	5/24/2018

Comments: Representative photo of red clover (*Trifolium pratense*).

Photo:	8	Direction:	n/a	Date:	5/24/2018

Comments: Representative photo of white clover (*Trifolium repens*).

Photo:	9	Direction:	n/a	Date:	5/24/2018

Comments: Representative photo of alsike clover (*Trifolium hybridum*).

Enclosure 3

RBC Surveyor Qualifications

RBC Surveyor Qualifications

Laura (Kangas) Heikkinen has eight (8) years of professional botany experience and has been a USFWS-qualified RBC surveyor since May 17, 2016. Ms. Heikkinen successfully identified three (3) populations of RBC in Hamilton County, Ohio within a 488-acre survey area in May, 2016. The USFWS Ohio Field Office, represented by Ms. Jennifer Finfera, visited the one (1) of the locations on May 17, 2016 and verified the population. Ms. Heikkinen has also conducted five (5) rare, threatened, and endangered species surveys in Pennsylvania since 2014, in which the target species was identified in four (4) of the five (5) surveys.

Jack Stenger has five (5) years of professional botany experience and has been a USFWS-qualified RBC surveyor since May 10, 2018. Mr. Stenger has a background in plant identification and taught field botany labs at University of Cincinnati for two (2) years. Mr. Stenger has seen and studied four (4) representative populations of RBC in Hamilton County, Ohio and Boone County, Kentucky.

Species Information

State Threatened, Endangered, and Special Concern Species observations for selected counties

Linked life history provided courtesy of NatureServe Explorer .
Records may include both recent and historical observations.
US Status Definitions Kentucky Status Definitions

List State Threatened, Endangered, and Special Concern Species observations in 1 selected county.
Selected county is: Boone.

Scientific Name and Life History	Common Name and Pictures	Class	County	US Status	KY Status	WAP	Reference
Accipiter striatus	Sharp-shinned Hawk	Aves	Boone	N	S	Yes	Reference
Actitis macularius	Spotted Sandpiper	Aves	Boone	N	E	Yes	Reference
Ammodramus henslowii	Henslow's Sparrow	Aves	Boone	N	S	Yes	Reference
Anas clypeata	Northern Shoveler	Aves	Boone	N	E		Reference
Anas discors	Blue-winged Teal	Aves	Boone	N	T		Reference
Ardea alba	Great Egret	Aves	Boone	N	T	Yes	Reference
Asio flammeus	Short-eared Owl	Aves	Boone	N	E	Yes	Reference
Atractosteus spatula	Alligator Gar	Actinopterygii	Boone	N	E	Yes	Reference
Bartramia longicauda	Upland Sandpiper	Aves	Boone	N	H	Yes	Reference
Bubulcus ibis	Cattle Egret	Aves	Boone	N	S		Reference
Calephelis borealis	Northern Metalmark	Insecta	Boone	N	T		Reference
Cardellina canadensis	Canada Warbler	Aves	Boone	N	S	Yes	Reference
Certhia americana	Brown Creeper	Aves	Boone	N	E	Yes	Reference
Circus cyaneus	Northern Harrier	Aves	Boone	N	T	Yes	Reference

Cistothorus platensis	Sedge Wren	Aves	Boone	N	S	Yes	Reference
Corvus ossifragus	Fish Crow	Aves	Boone	N	S		Reference
Cryptobranchus alleganiensis alleganiensis	Eastern Hellbender	Amphibia	Boone	N	E	Yes	Reference
Cumberlandia monodonta	Spectaclecase	Bivalvia	Boone	E	E	Yes	Reference
Dolichonyx oryzivorus	Bobolink	Aves	Boone	N	S	Yes	Reference
Egretta caerulea	Little Blue Heron	Aves	Boone	N	E	Yes	Reference
Esox niger	Chain Pickerel	Actinopterygii	Boone	N	S		Reference
Falco peregrinus	Peregrine Falcon	Aves	Boone	N	E	Yes	Reference
Fulica americana	American Coot	Aves	Boone	N	E		Reference
Gallinula galeata	Common Gallinule	Aves	Boone	N	T	Yes	Reference
Haliaeetus leucocephalus	Bald Eagle	Aves	Boone	N	T	Yes	Reference
Ictiobus niger	Black Buffalo	Actinopterygii	Boone	N	S	Yes	Reference
Junco hyemalis	Dark-eyed Junco	Aves	Boone	N	S		Reference
Lampsilis abrupta	Pink Mucket	Bivalvia	Boone	E	E	Yes	Reference
Lampsilis ovata	Pocketbook	Bivalvia	Boone	N	E	Yes	Reference
Leptoxis praerosa	Onyx Rocksnail	Gastropoda	Boone	N	S		Reference
Lioplax sulculosa	Furrowed Lioplax	Gastropoda	Boone	N	S		Reference
Lithasia verrucosa	Varicose Rocksnail	Gastropoda	Boone	N	S		Reference
Lophodytes cucullatus	Hooded Merganser	Aves	Boone	N	T	Yes	Reference
Lota lota	Burbot	Actinopterygii	Boone	N	S	Yes	Reference
Myotis sodalis	Indiana Bat	Mammalia	Boone	E	E	Yes	Reference
Notropis hudsonius	Spottail Shiner	Actinopterygii	Boone	N	S		Reference
Nycticorax nycticorax	Black-crowned Night-heron	Aves	Boone	N	T	Yes	Reference

Obovaria retusa	Ring Pink	Bivalvia	Boone	E	E	Yes	Reference
Passerculus sandwichensis	Savannah Sparrow	Aves	Boone	N	S	Yes	Reference
Phalacrocorax auritus	Double-crested Cormorant	Aves	Boone	N	T		Reference
Pheucticus ludovicianus	Rose-breasted Grosbeak	Aves	Boone	N	S	Yes	Reference
Plethobasus cyphyus	Sheepnose	Bivalvia	Boone	E	E	Yes	Reference
Plethodon cinereus	Redback Salamander	Amphibia	Boone	N	S	Yes	Reference
Pleurobema rubrum	Pyramid Pigtoe	Bivalvia	Boone	N	E	Yes	Reference
Podilymbus podiceps	Pied-billed Grebe	Aves	Boone	N	E	Yes	Reference
Pooecetes gramineus	Vesper Sparrow	Aves	Boone	N	E	Yes	Reference
Rana pipiens	Northern Leopard Frog	Amphibia	Boone	N	S	Yes	Reference
Riparia riparia	Bank Swallow	Aves	Boone	N	S	Yes	Reference
Sitta canadensis	Red-breasted Nuthatch	Aves	Boone	N	E	Yes	Reference
Tyto alba	Barn Owl	Aves	Boone	N	S	Yes	Reference
Vermivora chrysoptera	Golden-winged Warbler	Aves	Boone	N	T	Yes	Reference
Vireo bellii	Bell's Vireo	Aves	Boone	N	S	Yes	Reference

52 species are listed

Report of
Endangered, Threatened, and Special Concern Plants, Animals, and Natural Communities for Boone County, Kentucky

Kentucky State Nature Preserves Commission
801 Schenkel Lane
Frankfort, KY 40601
(502) 573-2886 (phone)
(502) 573-2355 (fax)

www.naturepreserves.ky.gov

Kentucky State Nature Preserves Commission
Key for County List Report

Within a county, elements are arranged first by taxonomic complexity (plants first, natural communities last), and second by scientific name. A key to status, ranks, and count data fields follows.

STATUS

KSNPC: Kentucky State Nature Preserves Commission status:

N or blank = none   E = endangered   T = threatened   S = special concern   H = historic   X = extirpated

USESA: U.S. Fish and Wildlife Service status:

blank = none   C = candidate   LT = listed as threatened   LE = listed as endangered

PT = proposed threatened   PE = proposed endangered

SOMC = Species of Management Concern

RANKS

GRANK: Estimate of element abundance on a global scale:

G1 = Critically imperiled	GU = Unrankable
G2 = Imperiled	G#? = Inexact rank (e.g. G2?)
G3 = Vulnerable	G#Q = Questionable taxonomy
G4 = Apparently secure	G#T# = Infraspecific taxa (Subspecies and variety abundances are coded with a 'T' suffix; the 'G' portion of the rank then refers to the entire species)
G5 = Secure	
GH = Historic, possibly extinct	GNR = Unranked
GX = Presumed extinct	GNA = Not applicable

SRANK: Estimate of element abundance in Kentucky:

S1 = Critically imperiled	SU = Unrankable	Migratory species may have separate ranks for different
S2 = Imperiled	S#? = Inexact rank (e.g. G2?)	population segments (e.g. S1B, S2N, S4M):
S3 = Vulnerable	S#Q = Questionable taxonomy	S#B = Rank of breeding population
S4 = Apparently secure	S#T# = Infraspecific taxa	S#N = Rank of non-breeding population
S5 = Secure	SNR = Unranked	S#M = Rank of transient population
SH = Historic, possibly extirpated	SNA = Not applicable	
SX = Presumed extirpated		

COUNT DATA FIELDS

OF OCCURRENCES: Number of occurrences of a particular element from a county. Column headings are as follows:

E - currently reported from the county

H - reported from the county but not seen for at least 20 years

F - reported from county & cannot be relocated but for which further inventory is needed

X - known to have extirpated from the county

U - reported from a county but cannot be mapped to a quadrangle or exact location.

The data from which the county report is generated is continually updated. The date on which the report was created is in the report footer. Contact KSNPC for a current copy of the report.

Please note that the quantity and quality of data collected by the Kentucky Natural Heritage Program are dependent on the research and observations of many individuals and organizations. In most cases, this information is not the result of comprehensive or site-specific field surveys; many natural areas in Kentucky have never been thoroughly surveyed, and new species of plants and animals are still being discovered. For these reasons, the Kentucky Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of Kentucky. Heritage reports summarize the existing information known to the Kentucky Natural Heritage Program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments.

KSNPC appreciates the submission of any endangered species data for Kentucky from field observations. For information on data reporting or other data services provided by KSNPC, please contact the Data Manager at:

Kentucky State Nature Preserves Commission
801 Schenkel Lane
Frankfort, KY 40601
(502) 573-2886 (phone)
(502) 573-2355 (fax)
email: naturepreserves@ky.gov
internet: www.naturepreserves.ky.gov

County	Taxonomic Group	Scientific name	Common name	Statuses	Ranks	# of Occurrences E	H	F	X	U
Boone	Vascular Plants	*Bouteloua curtipendula*	Side-oats Grama	S /	G5 / S3?	0	1	0	0	0
Boone	Vascular Plants	*Carex buxbaumii*	Brown Bog Sedge	E /	G5 / S1	0	0	0	1	0
Boone	Vascular Plants	*Onosmodium hispidissimum*	Hairy False Gromwell	E /	G4G5T4 / S1	0	1	0	0	0
Boone	Vascular Plants	*Prenanthes crepidinea*	Nodding Rattlesnake-root	S /	G4 / S3	1	0	0	0	0
Boone	Vascular Plants	*Ranunculus ambigens*	Waterplantain Spearwort	S /	G4 / S3	0	1	0	0	0
Boone	Vascular Plants	*Trifolium stoloniferum*	Running Buffalo Clover	T / LE	G3 / S2S3	10	0	1	1	0
Boone	Aquatic Snails	*Leptoxis praerosa*	Onyx Rocksnail	S / SOMC	G5 / S3S4	0	1	0	0	0
Boone	Aquatic Snails	*Lioplax sulculosa*	Furrowed Lioplax	S /	G5 / S3S4	1	0	0	0	0
Boone	Aquatic Snails	*Lithasia verrucosa*	Varicose Rocksnail	S / SOMC	G4Q / S3S4	0	1	0	0	0
Boone	Freshwater Mussels	*Cumberlandia monodonta*	Spectaclecase	E / LE	G3 / S1	0	0	0	1	0
Boone	Freshwater Mussels	*Cyprogenia stegaria*	Fanshell	E / LE	G1Q / S1	0	0	0	1	0
Boone	Freshwater Mussels	*Epioblasma obliquata obliquata*	Catspaw	E / LE	G1T1 / S1	0	0	0	1	0
Boone	Freshwater Mussels	*Epioblasma torulosa rangiana*	Northern Riffleshell	E / LE	G2T2 / S1	0	0	0	1	0
Boone	Freshwater Mussels	*Fusconaia subrotunda*	Longsolid	S /	G3 / S3S4	0	0	0	1	0
Boone	Freshwater Mussels	*Lampsilis abrupta*	Pink Mucket	E / LE	G2 / S1	0	0	0	2	0
Boone	Freshwater Mussels	*Lampsilis ovata*	Pocketbook	E /	G5 / S1	0	0	0	1	0
Boone	Freshwater Mussels	*Leptodea leptodon*	Scaleshell	X / LE	G1G2 / SX	0	0	0	1	0
Boone	Freshwater Mussels	*Obovaria retusa*	Ring Pink	E / LE	G1 / S1	0	0	0	2	0
Boone	Freshwater Mussels	*Plethobasus cooperianus*	Orangefoot Pimpleback	E / LE	G1 / S1	0	0	0	1	0
Boone	Freshwater Mussels	*Plethobasus cyphyus*	Sheepnose	E / LE	G3 / S1	0	0	0	1	0
Boone	Freshwater Mussels	*Pleurobema clava*	Clubshell	E / LE	G1G2 / S1	0	0	0	1	0
Boone	Freshwater Mussels	*Pleurobema plenum*	Rough Pigtoe	E / LE	G1 / S1	0	0	0	1	0
Boone	Freshwater Mussels	*Pleurobema rubrum*	Pyramid Pigtoe	E / SOMC	G2G3 / S1	0	0	0	2	0
Boone	Freshwater Mussels	*Villosa fabalis*	Rayed Bean	X / LE	G2 / SX	0	0	0	1	0
Boone	Insects	*Calephelis borealis*	Northern Metalmark	T /	G3G4 / S2	0	0	0	1	0
Boone	Insects	*Dryobius sexnotatus*	Six-banded Longhorn Beetle	T / SOMC	GNR / S2	2	0	0	0	0
Boone	Fishes	*Atractosteus spatula*	Alligator Gar	E / SOMC	G3G4 / S1	0	2	0	0	0
Boone	Fishes	*Crystallaria cincotta*	Diamond Darter	X / LE	G1 / SX	0	0	0	1	0
Boone	Fishes	*Ictiobus niger*	Black Buffalo	S /	G5 / S3	1	0	0	0	0
Boone	Fishes	*Lota lota*	Burbot	S /	G5 / S2	0	1	0	0	0

County	Taxonomic Group	Scientific name	Common name	Statuses	Ranks	# of Occurrences E	H	F	X	U
Boone	Amphibians	*Cryptobranchus alleganiensis alleganiensis*	Eastern Hellbender	E / SOMC	G3G4T3T4 / S1	1	1	0	0	0
Boone	Amphibians	*Plethodon cinereus*	Redback Salamander	S /	G5 / S3	16	1	0	0	0
Boone	Amphibians	*Rana pipiens*	Northern Leopard Frog	S /	G5 / S3	1	3	0	0	0
Boone	Breeding Birds	*Aimophila aestivalis*	Bachman's Sparrow	E / SOMC	G3 / S1B	0	0	0	1	0
Boone	Breeding Birds	*Ammodramus henslowii*	Henslow's Sparrow	S / SOMC	G4 / S3B	1	0	0	2	0
Boone	Breeding Birds	*Bartramia longicauda*	Upland Sandpiper	H /	G5 / SHB	0	1	0	0	0
Boone	Breeding Birds	*Falco peregrinus*	Peregrine Falcon	E / SOMC	G4 / S1B	1	0	0	0	0
Boone	Breeding Birds	*Haliaeetus leucocephalus*	Bald Eagle	T / Delisted	G5 / S2B,S2S3N	2	0	0	0	0
Boone	Breeding Birds	*Passerculus sandwichensis*	Savannah Sparrow	S /	G5 / S2S3B,S2S3N	1	0	0	0	0
Boone	Breeding Birds	*Pooecetes gramineus*	Vesper Sparrow	E /	G5 / S1B	0	0	0	0	1
Boone	Breeding Birds	*Riparia riparia*	Bank Swallow	S /	G5 / S3B	2	0	0	0	0
Boone	Breeding Birds	*Tyto alba*	Barn Owl	S /	G5 / S3	3	0	0	0	0
Boone	Mammals	*Myotis sodalis*	Indiana Bat	E / LE	G2 / S1S2	1	0	0	0	0
Boone	Communities	*Calcareous sub-xeric forest*		N /	GNR / S5	4	0	0	0	0
Boone	Communities	*Riparian forest*		N /	GNR / S5	1	0	0	0	0
Boone County Total:						**49**	**14**	**1**	**25**	**1**

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kentucky Ecological Services Field Office
330 West Broadway, Suite 265
Frankfort, Kentucky 40601
(502) 695-0468

November 28, 2018

Mr. Phillip J. Braden
U.S. Department of Transportation
Federal Aviation Administration
Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Subject: FWS 04EK1000-2017-F-0421; 2017-B-0389; Federal Avian Administration; Biological Opinion on the Kenton County Airport Board's (KCAB) proposed air cargo hub and its effects on the federally endangered Indiana bat and the federally threatened northern long-eared bat; Boone County, Kentucky

Dear Mr. Braden:

The attached document is the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) based on our review of the proposed air cargo hub at the Cincinnati Northern Kentucky International Airport (CVG) and its effects on the federally endangered Indiana bat (*Myotis sodalis*) and the federally threatened northern long-eared bat (*Myotis septentrionalis*) under section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). This BO is based on information provided in the Biological Assessment (BA) prepared by Environment & Archaeology, LLC, peer-reviewed scientific literature, other available literature, personal communications with species experts, and other sources of information available to us and/or in our files. A complete administrative record of this consultation is on file at the Kentucky Ecological Services Field Office (KFO) in Frankfort, Kentucky.

In our August 6, 2018 letter to you, we addressed your effects determinations for other federally listed species that may potentially occur in the Action Area of the proposed project.

In view of our findings we believe that the requirements of section 7 of the Endangered Species Act have been fulfilled for this project. Your obligations under section 7 must be reconsidered, however, if: (1) new information reveals that the proposed action may affect listed species in a manner or to an extent not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation (e.g., additional forested habitat removal, forested habitat removal occurring anytime other than that which is specified above), or (3) new species are listed or critical habitat designated.

Thank you for your request. Your concern for the protection of endangered and threatened species is greatly appreciated. If you have any questions regarding the information that we have provided, please contact Jessica Blackwood Miller at (502) 695-0468 extension 104 or jessica_miller@fws.gov.

Sincerely,

Virgil Lee Andrews, Jr.
Field Supervisor

Biological Opinion

Impacts to the Indiana Bat and the Northern Long-eared Bat from the Air Cargo Hub at the Cincinnati/Northern Kentucky International Airport in Boone County, Kentucky

FWS Log #: 04EK1000-2017-F-0412

Prepared by:

U.S. Fish and Wildlife Service
Kentucky Field Office
330 W. Broadway Street, Room 265
Frankfort, KY 40601

November 28, 2018

Virgil Lee Andrews, Jr., Field Supervisor

Date

Table of Contents

CONSULTATION HISTORY

This section lists key events and correspondence during the course of this consultation. A complete administrative record of this consultation is on file in the Service's Kentucky Field Office.

February 4, 2016	The Service received correspondence from AECOM Technical Services, Inc., consultant on behalf of Kenton County Airport Board (KCAB) and the Kentucky Transportation Cabinet, requesting consultation for a proposed extension of Wendell Ford Boulevard to Aero Parkway. This project is interrelated to the proposed Action evaluated in this Biological Opinion (BO).
June 29, 2016	The Service provided a letter to KCAB concluding consultation on the proposed extension of Wendell Ford Boulevard to Aero Parkway (04EK1000-2016-I-0908).
February 9, 2018	The Service met with KCAB; Landrum & Brown, consultant on behalf of KCAB; and the Kentucky Heritage Council for early coordination on the proposed Action.
June 18, 2018	Landrum & Brown provided the Service with a draft Biological Assessment (BA) to review.
June 29, 2018	The Service provided Landrum & Brown comments on the draft BA.
July 23, 2018	The Service received the final BA, dated July 17, 2018, attached to a letter from the Federal Aviation Administration (FAA) requesting initiation of formal consultation on the Indiana bat (*Myotis sodalis*) and the northern long-eared bat (*Myotis septentrionalis*) as a result of the proposed Action.
August 6, 2018	The Service sent a letter to the FAA stating that the BA contains sufficient information to initiate formal consultation on impacts to the Indiana bat and the northern long-eared bat, and formal consultation was initiated.
November 9, 2018	The Service submitted a draft BO to the FAA for review.
November 27, 2018	The Service received comments from FAA on the draft BO.

BIOLOGICAL OPINION

1. INTRODUCTION

A biological opinion (BO) is the document that states the opinion of the U.S. Fish and Wildlife Service (Service) under the Endangered Species Act of 1973, as amended (ESA), as to whether a Federal action is likely to:

a) jeopardize the continued existence of species listed as endangered or threatened, or
b) result in the destruction or adverse modification of designated critical habitat.

The Federal Aviation Administration (FAA) is evaluating its potential approval of the Kenton County Airport Board's (KCAB) proposed change to the Airport Layout Plan (ALP) for the Cincinnati/Northern Kentucky International Airport (CVG). The change consists of the development and operation of a new air cargo hub in Boone County, Kentucky. Under Title 49, United States Code § 47101, the FAA must ensure that the proposed air cargo hub would not derogate the safety of aircraft and airport operations at CVG. In addition to the FAA's approval, KCAB is applying to the U.S. Army Corps of Engineers for a permit under section 404 of the Clean Water Act to authorize impacts to streams and wetlands associated with the development of the new air cargo hub. FAA is the lead Federal Action Agency for this consultation. This BO considers the effects of the Action on the Indiana bat and the northern long-eared bat.

The Service has designated critical habitat for the Indiana bat in Edmonson and Carter counties, Kentucky. However, these critical habitat units are in different counties than the Action Area. The Service has not designated critical habitat for the northern long-eared bat. The Action will not affect designated critical habitat; therefore, this BO does not further address critical habitat.

A BO evaluates the effects of a Federal Action, along with those effects resulting from interrelated and interdependent actions and effects from non-Federal actions unrelated to the Action (cumulative effects), relative to the status of listed species and the status of designated critical habitat. A Service BO that concludes a proposed Federal action is *not* likely to jeopardize species and is *not* likely to destroy or adversely modify critical habitat fulfills the Federal agency's responsibilities under §7(a)(2) of the ESA of 1973, as amended.

"*Jeopardize the continued existence*" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02). "*Destruction or adverse modification*" means a direct or indirect alteration that appreciably diminishes the value of designated critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features (50 CFR §402.02).

2. PROPOSED ACTION

The Federal Action evaluated in this BO is the FAA's potential approval of a proposed change to the Airport Layout Plan at CVG proposed by the KCAB. The change consists of the addition of a new air cargo hub. If approved, the KCAB, the operator of the publically-owned airport, intends to enter into a long-term lease with an air cargo service provider to develop and operate the new facility. The new air cargo hub would meet the air cargo service provider's needs for package delivery and sorting. The FAA is evaluating the development and operation of the air cargo hub under Title 49, United States Code § 47101 to ensure that the new facility would not derogate the safety of aircraft and airport operations at CVG. The development of the air cargo hub and associated infrastructure and the operation of the facilities are interrelated and/or interdependent actions and, together with the FAA's potential approval, will be collectively referred to in this BO as the "Action."

2.1. ACTION AREA

For purposes of consultation under ESA §7, the Action Area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR §402.02).

The BA defines the action area as the 889-acre construction limits of the project. The Service is defining the Action Area as all the areas within a 1-km buffer of the footprint of the construction footprint of the project (Figure 1). The 1-km buffer is the area where the effects of noise and vibration are considered in section 5.1 of the BA.

2.2. CONSTRUCTION COMPONENT

The construction of the air cargo hub is composed of the following major elements:

- A primary package sortation building, ground package sortation building, and support buildings (70.95 acres),
- A concrete aircraft parking apron and apron taxi lanes (255 acres), and
- A paved employee and visitor vehicle parking garage and parking lots (17.93 acres).

The construction would also include the following ancillary elements:

- Improvement and widening of a section of Wendell H. Ford Boulevard, as well as construction of new on-airport access roads that provide vehicle and truck access between Wendell H. Ford Boulevard and the new air cargo facility.
- Improvement of sections of Aero Parkway, an existing four-lane divided highway located south of the site, to install new entrances, turn lanes, traffic lights, and lighting
- Extension of utilities to the project site, including electric service, natural gas, water, sanitary sewer, data/communications, and other related infrastructure
- Modification and/or installation of new taxiway edge lights and airfield directional signs
- Installation of exterior pole-mounted and building-mounted lighting at package sorting buildings, access roads, vehicle parking lots, truck courts, and portions of the aircraft parking aprons

- Construction of new drainage conveyances and detention ponds and/or modification the existing airfield stormwater management system
- Installation of security fence and controlled-access vehicle gates and pedestrian gates
- Expansion of existing Airport fueling facilities

The construction component can be divided into different activities. Site preparation is the component most relevant to this consultation and is projected to begin in 2019 and last approximately 18 months. Site preparation will occur within the construction limits of the project and includes the removal of 238.78 acres of forested habitat suitable for use by Indiana bats and northern long-eared bats (Figure 2). These forested habitat areas will be removed during the following timeframes:

- 122 acres in February – March
- 116.78 acres from April – May[1]

The other activities will involve grading and the actual construction of the above-listed infrastructure on the cleared site. The BA does not provide details about these activities, but habitat suitable for federally listed species would not be present at the locations for these activities at that point.

We expect the construction component of the Action to generate the following stressors that may affect Indiana and northern long-eared bats: noise and vibration, night lighting, aquatic resource loss, aquatic resource degradation, and tree removal. We discuss these stressors in detail in section 3.3 of this BO.

2.3. OPERATION COMPONENT

After the new air cargo hub is constructed, it would continue in operation indefinitely. Operation will include constant air traffic, vehicle traffic, and illumination of roadways and buildings. Operation is estimated to begin in 2021. We expect the following stressors to result from activities associated with the operation component: noise and vibration, night lighting, water quality degradation, and collision. We discuss these stressors in detail in section 3.3 of this BO.

[1] The effects from an additional 5.22 acres were addressed in a previous consultation (04EK1000-2016-I-0908) referenced in the BA. This was for the original alignment of the extension of Wendell H. Ford Boulevard. That alignment has since been modified to that which is proposed in the BA. The footprint of the original alignment is now within the footprint of the air cargo hub facility. The 5.22 acres proposed to be removed for the original alignment will still be removed to construct the air cargo hub facility.

Figure 1: The Action Area. Note that the construction limits of the project are defined as the "action area" in this figure from the BA. (From BA prepared by Environment & Archaeology, LLC).

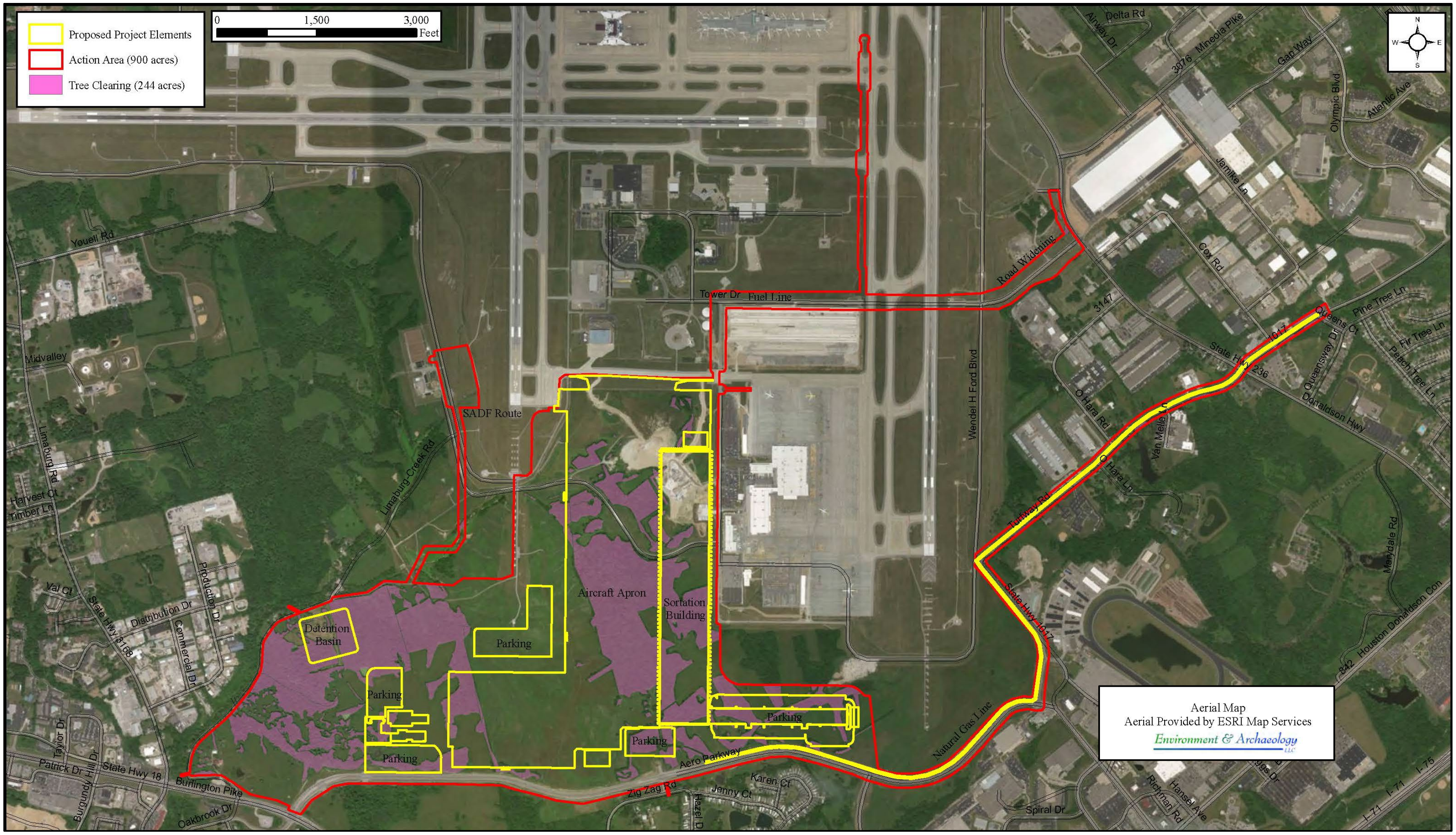

Figure 2. The tree clearing limits. Note that the construction limits of the project are defined as the "action area" in this figure from the BA. (From BA prepared by Environment & Archaeology, LLC).

2.4. CONSERVATION MEASURES

Conservation measures are those proposed actions taken to benefit or promote the recovery of the species. These are actions taken by the Federal agency or the applicant to minimize or offset effects on the species under review and are included as an integral portion of the Action. The FAA has committed to implement the following conservation measures as part of the Action:

- Best management practices and sediment and erosion control measures will be utilized to control water runoff and minimize non-point source pollution and sediment damage. Temporary measures include silt fences, hay bales, berms, dikes, silt/sediment traps, brush barriers, mulching, sweeping, and dust control. Permanent measures include seeding and/or sodding, and sedimentation basins. A KPDES permit will be obtained for the project. A grading plan and site-specific Erosion Control Plan is required as a part of the KPDES permit. The site-specific plan will be submitted to Sanitation District #1 prior to the start of construction.
- Half of the tree removal would occur during the timeframe that they would not be occupied by the species (October 15 – March 31). No tree removal is planned for June or July when non-volant pups would be present.
- A contribution of $608,007.60 will be made to the Imperiled Bat Conservation Fund (IBCF) to offset adverse effects to Indiana bat and northern long-eared bats as the result of permanent loss and modification of suitable foraging, commuting, and roosting habitat. The contribution will be made prior to tree clearing. The contribution amount was determined according to the process described in the Service's 2016 Conservation Strategy for Forest-Dwelling Bats in the Commonwealth of Kentucky (USFWS 2016).

2.5. INTERRELATED AND INTERDEPENDENT ACTIONS

A BO evaluates the effects of a proposed Federal action. For purposes of consultation under ESA §7, the effects of a Federal action on listed species or critical habitat include the direct and indirect effects caused by the Action, plus the direct and indirect effects caused by interrelated or interdependent actions. "Indirect effects are those that are caused by the proposed Action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the Action under consideration" (50 CFR §402.02).

The construction and operation of the air cargo hub are interrelated and/or interdependent actions to the Action, FAA's approval of the proposed Airport Layout Plan at CVG depicting the new facility. These actions are already described in the above sections. The BA did not describe, and the Service is not aware of, any additional relevant interrelated or interdependent actions not already described in sections 2.2 and 2.3.

3. Indiana Bat

3.1. STATUS OF THE SPECIES – INDIANA BAT

This section summarizes the best available data about the biology and current condition of the Indiana bat (*Myotis sodalis*) throughout its range that are relevant to formulating an opinion about the Action. The Service published its decision to list the Indiana bat as endangered on March 11, 1967 (Federal Register 32[48]:4001) under the Endangered Species Preservation Act of October 15, 1966 (80 Stat. 926; 16 U.S.C. 668aa[c]). The Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) subsequently extended full legal protection from unauthorized take to the species. Critical habitat was designated for the species on September 24, 1976 (41 FR 14914). Thirteen hibernacula, including 11 caves and two mines in six states, were listed as critical habitat.

The Service has published a recovery plan that outlines recovery actions (U.S. Fish and Wildlife Service (USFWS) 1983). Briefly, the objectives of the plan are to: (1) protect hibernacula; (2) maintain, protect, and restore summer maternity habitat; and (3) monitor population trends through winter censuses. An agency draft of a revised recovery plan was provided for public review and comment in the Federal Register on April 9, 1999, but has not yet been finalized. A revised draft recovery plan was noticed in the Federal Register for public review and comment on April 16, 2007 (USFWS 2007).

The Service's Bloomington, Indiana Field Office completed a 5-Year Review of the Indiana bat (USFWS 2009), which summarizes the current status of the species, its progress toward recovery, and the remaining threats to the species. The draft recovery plan and 5-Year Review are available at http://www.fws.gov/midwest/Endangered/mammals/inba/index.html and are hereby incorporated by reference. The 5-Year Review found that all of the required recovery criteria for the Indiana bat had not been achieved, so the species should remain at its current endangered status.

3.1.1. Species Description

The Indiana bat is a temperate, insectivorous, migratory bat that hibernates in caves and mines in the winter and summers in forested areas. It is a medium-sized bat, having a wing span of 9 to 11 inches and weighing only one-quarter of an ounce. It has brown to dark-brown fur and the facial area often has a pinkish appearance. The Indiana bat closely resembles the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*Myotis septentrionalis*). It is distinguished from these species by its foot structure and fur color. The Indiana Bat Draft Recovery Plan (USFWS 2007) provides a comprehensive summary of the description of the species and is incorporated by reference.

3.1.2. Life History

The life cycle of the Indiana bat is summarized in Figure 3. The species hibernates in caves and mines in the winter (typically October through April) and migrates to forested summer habitat. When arriving at their traditional hibernacula in August-October, Indiana bats "swarm" for several weeks prior to hibernation. Some male bats may begin to arrive at hibernacula as early as July, but females typically arrive later. The time of highest swarming activity in Indiana and Kentucky has been documented as early September (Cope and Humphrey 1977). Swarming is a critical part of the life cycle when Indiana bats converge at hibernacula, mate, and forage until sufficient fat reserves have been deposited to sustain them through the winter (USFWS 1983). Swarming behavior typically involves large numbers of bats flying in and out of cave entrances throughout the night, while most of the bats continue to roost in trees during the day (Cope and

Humphrey 1977). Body weight may increase by 2 grams within a short time, mostly in the form of fat. Copulation occurs on cave ceilings near the cave entrance during the latter part of the swarming period (USFWS 2007). Females may mate their first autumn, whereas males may not mature until the second year (USFWS 2007). By late September, many females have entered hibernation, but males may continue swarming well into October in what is believed to be an attempt to breed with late arriving females.

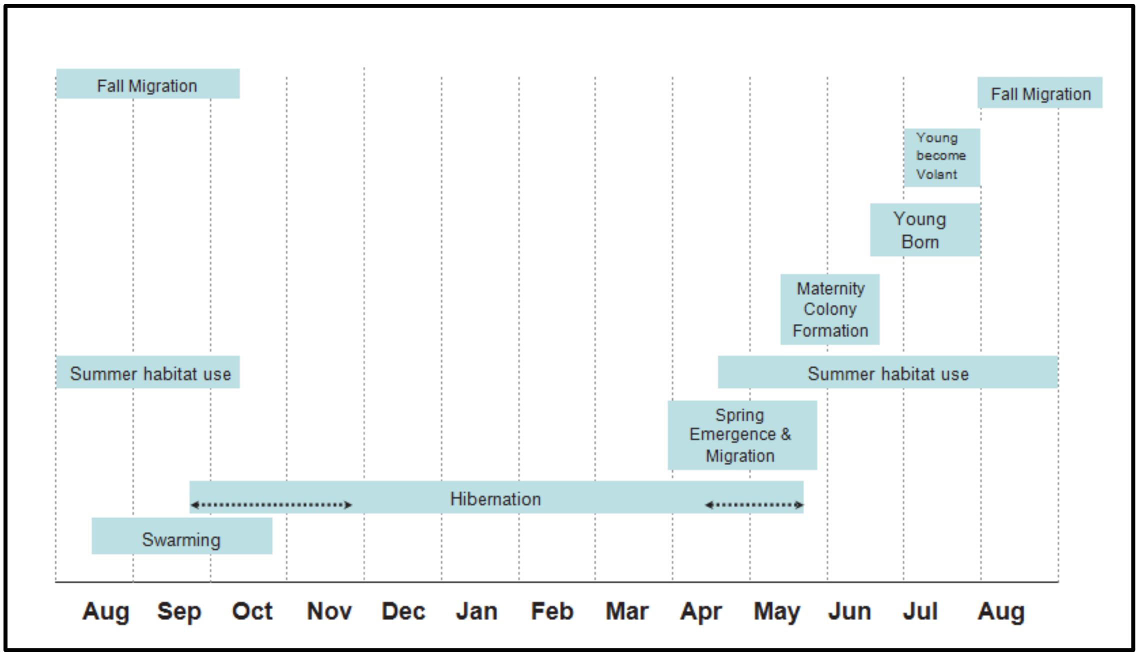

Figure 3. Indiana bat annual chronology (USFWS 2007).

The initiation of hibernation may vary by latitude and annual weather conditions; however, most bats are hibernating by the end of November (USFWS 2007). Hibernation facilitates survival during winter when insect prey is unavailable. Hibernating Indiana bats cluster on cave ceilings from approximately October through April. Limited mating occurs throughout the winter and in early April as bats emerge (USFWS 2007).

Spring emergence occurs when outside temperatures have increased and insects (forage) are more abundant (Richter et al. 1993). Most Indiana bats emerge in late March or early April; the timing of annual emergence may vary across the range depending on latitude and annual weather conditions. Females emerge before males. Shortly after emerging from hibernation, the females become pregnant via delayed fertilization from the sperm that has been stored in their reproductive tracts through the winter (USFWS 2007). During the "staging" period, the bats forage for a few days or weeks near their hibernaculum before migrating to their traditional summer roosting areas.

Most populations leave their hibernacula to migrate to summer habitat by late April. Some reproductive females have been documented to migrate up to 357 miles (Winhold and Kurta 2006) to form maternity colonies; others have been found to form maternity colonies within only a few miles of their hibernacula (U.S. Army Garrison Fort Drum 2011). Males are commonly found roosting near the hibernacula and have also been documented to migrate long distances to their summer habitat (Kurta and Rice 2002). Migration is stressful for the Indiana bat, particularly in the spring when their fat reserves and food supplies are low. As a result, adult mortality may be the highest in late March and April.

Female Indiana bats, like most temperate members of the family Vespertilionidae, give birth to one young each year (Mumford and Calvert 1960, Humphrey et al. 1977, Thomson 1982). The proportion of female Indiana bats that produce young is not well documented. At a colony in Indiana, 23 of 25 female Indiana bats produced volant young during one year and 23 of 28 females the following year (Humphrey et al. 1977). Based on cumulative mist-netting captures over multiple years, Kurta and Rice (2002) estimated that 89% of adult females in Michigan maternity colonies were in reproductive condition (pregnant, lactating, or post-lactating).

Racey (1982) notes that a particular ratio of fat to lean mass is normally necessary for puberty and the maintenance of female reproductive activity in mammals. He suggests further that the variation in the age of puberty in bats is due to nutritional factors, possibly resulting from the late birth of young and their failure to achieve threshold body weight in their first autumn. Once puberty is achieved, reproductive rates frequently reach 100% among healthy bats of the family Vespertilionidae and young, healthy female bats can mate in their first autumn as long as their prey base is sufficient to allow them to reach a particular fat to lean mass ratio.

Studies by Belwood (2002) show asynchronous births among members of a colony. This results in great variation in size of juveniles (newborn to almost adult size young) in the same colony. Young Indiana bats are capable of flight within a month of birth. Young born in early June may be flying as early as the first week of July (Clark et al. 1987), with others flying from mid- to late July. Mortality between birth and weaning was found to be about 8% (Humphrey et al. 1977).

The average life span of the Indiana bat is 5 to 10 years, but banded individuals have been documented living as long as 14 and 15 years (Humphrey and Cope 1977). Using winter sampling of unknown-age bats over a 23-year period, Humphrey and Cope (1977) estimated annual survival. Female survivorship in an Indiana population was 76% for ages 1 to 6 years and 66% for ages 6 to 10 years. Male survivorship was 70% for ages 1 to 6 years and 36% for ages 6 to 10 years. Following 10 years, the survival rate for females dropped to only 4% (Humphrey and Cope 1977).

3.1.3. Habitat Characteristics and Use

Winter Habitat

Indiana bats roost in caves or mines with configurations that provide a suitable temperature and humidity microclimate (Brack et al. 2003, USFWS 2007). Requirements for hibernacula are discussed in the draft Recovery Plan for the species (USFWS 2007).

Summer Habitat

Summering Indiana bats (males and females) use forested habitat for roosting, foraging, and commuting. Indiana bats are often associated with floodplain or riparian forests with large trees, scattered canopy gaps, and open understories (USFWS 2007). Research has showed adaptability in habitats used, including upland forests, forests altered by grazing, swine feedlots, row-crops, hay fields, residences, clear-cut harvests, and shelterwood cuts (Garner and Gardner 1992, USFWS 1999).

Suitability of a roost tree is determined by its condition (dead or alive), suitability of loose bark, solar exposure, spatial relationship to other trees, and tree's spatial relationship to water sources and foraging areas. Potentially suitable roost trees can be trees of any species with bark separating from the tree after the tree dies, senesces, or is injured and living species of hickories (*Carya* spp.) and large white oaks (*Quercus alba*) with shaggy bark. Many maternity colonies have been associated with oak-hickory and elm-ash-cottonwood forest types. Tree cavities, hollow portions of tree boles or limbs, and crevice and splits from broken tops occasionally have been used as roosts, usually by individual bats. Roost longevity is variable due to many factors, such as the rate at which bark sloughs off or the tree falls down. Some roosts may only be habitable for 1-2 years, but species with good bark retention, such as slippery elm (*Ulmus rubra*), cottonwood (*Populus deltoides*), green ash (*Fraxinus pennsylvanica*), and various oaks (*Quercus* spp.) and hickories (*Carya* spp.) may provide habitat for 4-8 years (USFWS 1999).

Trees in excess of 40 cm (15.7 in) diameter-at-breast-height (dbh) are considered optimal for maternity colonies, but trees in excess of 22 cm (8.6 in) dbh are used as alternate roosts (USFWS 2002). Females have been documented using roost trees as small as 14 cm (5.5 in) dbh (Kurta 2005). The average size of roost trees used by males tends to be smaller than the roost trees used by female maternity colonies; in one instance, a male was observed in a roost tree 6.4 cm (2.5 in) dbh (Gumbert et al. 2002).

Maternity colonies have been documented to use 8 to 25 roost trees per season (Callahan et al. 1997, Kurta et al. 2002). The extent and configuration of the roosting area is probably determined by availability of suitable roost trees. Distances between roosts can be a few meters to a few kilometers (Kurta et al. 1996, 2002). Primary roosts are generally larger in diameter and located in openings or at the edge of forest stands, while alternate roosts can either be in openings or the interior of the forest stand. Maternity colony movements among multiple roosts seem to depend on climatic changes, particularly solar radiation (Humphrey et al. 1977). Cool temperatures can delay fetal development and growth of juvenile young; selection of maternity roost sites may be critical to reproductive success. Kurta et al. (1993) suggest movement between roosts may be the way that bats deal with the ephemeral nature of roost trees. It is not known how many alternate roosts must be available to assure retention of a colony within a particular area, but large, nearby forest tracts would improve the potential for an area to provide adequate roosting habitat (Callahan 1993, Callahan et al. 1997).

Indiana bats feed on aquatic and terrestrial insects. Diet varies seasonally and among different ages, sexes, and reproductive status (USFWS 1999). Numerous foraging habitat studies have found that Indiana bats forage in closed to semi-open forested habitats and forest edges located in floodplains, riparian areas, lowlands, and uplands; old fields and agricultural fields are also used (USFWS 2007; Sparks et al. 2005). Indiana bats frequently forage along riparian corridors and obtain water from streams; ponds and water-filled road ruts in the forest uplands are also serve as water sources.

General observations and data collected incidentally in studies indicate that Indiana bats select forested corridors when commuting to avoid flying over open areas (Environmental Solutions and Innovations, Inc. 2006; Murray and Kurta 2014). Very little research has focused on the use of travel corridors by Indiana bats. Apparently suitable, but distant, forest patches may not be available to Indiana bats unless they are connected by a wooded corridor; however, the maximum size of an opening Indiana bats may cross is not known.

Home range size may vary between seasons, sexes, and reproductive status of the females (Lacki et al. 2007). Menzel et al. (2005) tracked seven female and four male Indiana bats from May to August in Illinois. No significant differences in home ranges between males and females were observed, and home range estimates were subsequently grouped to obtain a mean summer home range of 144.4 hectares (357 acres). Watrous et al. (2006) calculated a mean home range of 83 hectares (205 acres) for 14 female Indiana bats in Vermont. Without site-specific data, the Service generally considers the potential home range for an Indiana bat to include all suitable habitat within 4 km (2.5 mi) of documented roost(s) (USFWS 2011), recognizing the area of actual use may be just a portion of that area.

Indiana bats show a high degree of fidelity to roost trees, roosting areas, and foraging areas (Gardner et al. 1991; Humphrey et al. 1977; Kurta et al. 1996, 2002; Kurta and Murray 2002; Gumbert et al. 2002). Bats using familiar foraging and roosting areas are thought to benefit from decreased susceptibility to predators, increased foraging efficiency, and the ability to switch roosts in case of emergencies or alterations surrounding the original roost (Gumbert et al. 2002).

Spring and Fall Habitat
In the spring, Indiana bats usually roost, forage, and commute in habitat similar to those selected during the summer. These areas are most typically within 10 miles of a P1/P2 hibernaculum and 5 miles of a P3/P4 hibernacula[2]; however, use of habitat areas that are farther than 10 miles from a P1/P2 hibernaculum or farther than 5 miles from a P3/P4 hibernaculum have been documented (Kiser and Elliot 1996; MacGregor et al. 1999; Rommé et al. 2002; Hawkins et al. 2005).

3.1.4. Numbers, Reproduction, and Distribution

Indiana bats are found over most of the eastern half of the United States. Winter surveys in 2016-2017 found hibernating Indiana bats dispersed across 17 states. However, over 95% of the estimated range-wide population hibernated in four states – Indiana (34%), Missouri (41.1%), Kentucky (11%), and Illinois (9.9%) (USFWS 2017). Summer distribution of the Indiana bat occurs throughout a wider geographic area than its winter distribution. Most summer occurrences are from the upper Midwest including southern Iowa, northern Missouri, much of Illinois and Indiana, southern Michigan, Wisconsin, western Ohio, and Kentucky. In the past decade, many summer maternity colonies have been found in the northeastern states of Pennsylvania, Vermont, New Jersey, New York, West Virginia, and Maryland. Maternity

[2] Priority 1 (P1) hibernacula have a current or historical winter population of ≥ 10,000 Indiana bats; priority 2 (P2) have 1,000 -9.999 bats; priority 3 (P3) have 50-999 bats; and priority 4 (P4) have < 50 bats (USFWS 2007).

colonies have also been found in northern Arkansas, Georgia, Alabama, Mississippi (Copperhead 2017, Copperhead pers. comm. 2014), and southwestern North Carolina (Britzke et al. 2003, USFWS 2007). Non-reproductive summer records for the Indiana bat have also been documented in eastern Oklahoma, northern Mississippi, Alabama, and Georgia.

The data regarding Indiana bat abundance prior to Federal listing are limited, but available information, summarized in the draft Recovery Plan (USFWS 2007), suggests that Indiana bats were once far more abundant than they were in the 1960s. When the Indiana bat was originally listed as endangered in 1967, there were approximately 883,300 bats, and most of these hibernated in a small number of hibernacula (Clawson 2002). Since the species was listed, its population numbers have apparently continued to decline through approximately 2001. Since being listed, large population declines have been observed, especially at hibernacula in Kentucky and Missouri. The range wide population estimate dropped approximately 57% from 1965 to 2001 (USFWS 2007). The range-wide, biennial population estimates had been increasing from 2001 to 2007, indicating that the species' long-term decline had been arrested and likely reversed (USFWS 2017). However, the arrival of White-Nose Syndrome (or "WNS"; see discussion below) is the probable cause of the observed range-wide decline since 2007. The Service has preliminarily determined that the Indiana bat's 2017 range-wide population stands at approximately 530,705 bats, which is a 3.5% decrease over the 2015 range-wide population estimate of 550,224 bats (Figure 4).

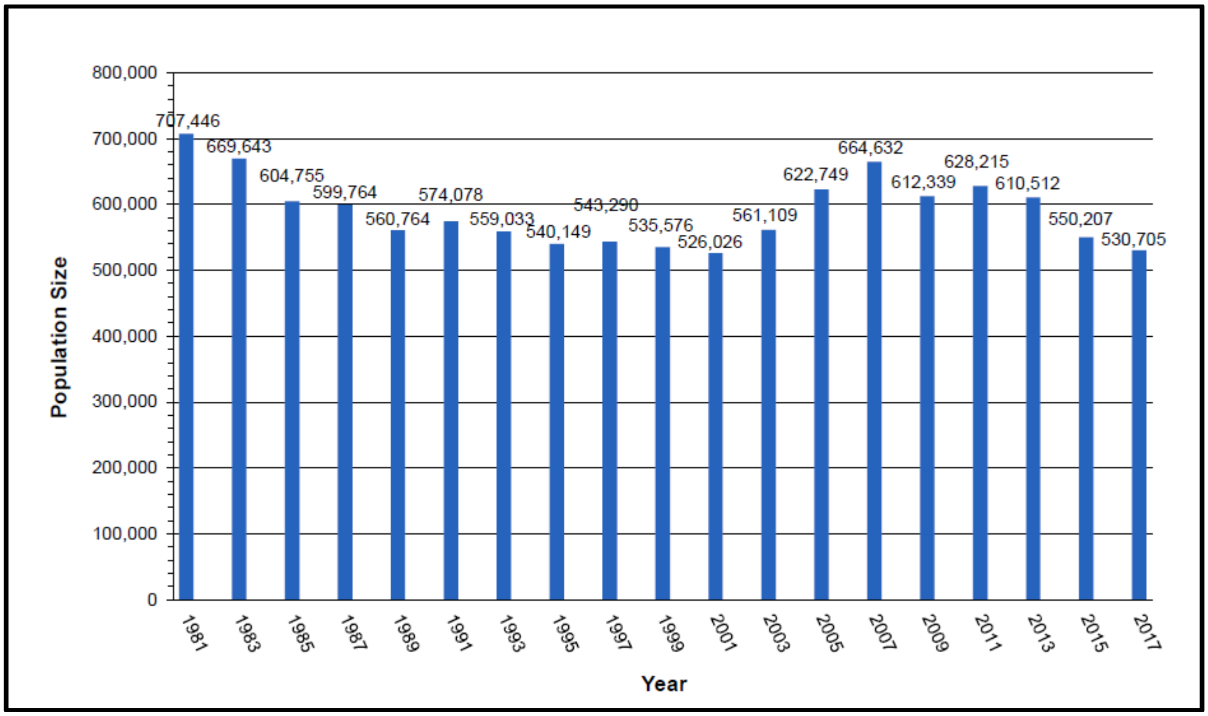

Figure 4. Indiana bat rangewide population estimates from 1981-2017.

3.1.5. Conservation Needs and Threats

Destruction and Degradation of Hibernacula

There are well-documented examples of modifications to Indiana bat hibernacula that affected the thermal regime of the cave and, thus, the ability of the cave to support hibernating Indiana bats, as summarized in the draft revised Recovery Plan (USFWS 2007). Generally, threats to the integrity of hibernacula have decreased since the time that Indiana bats were listed as endangered under the ESA. Increasing awareness of the importance of cave microclimates to hibernating bats and regulatory authorities under the ESA have reduced, but not eliminated, this threat. In addition to purposeful modifications, there are threats from stochastic events (*e.g.,* collapse in mines, flooding).

Forested Loss and Fragmentation

Loss of forest cover and degradation of forested habitats have been cited as contributing to the decline of Indiana bats (USFWS 1983, Garner and Gardner 1992, Drobney and Clawson 1995, Whitaker and Brack 2002). Throughout the range of the Indiana bat, there is less forest now than there was prior to European settlement (Smith et al. 2003), particularly within the core of the species' range in the Midwest. Conversion to agriculture has been the largest single cause of forest loss. The conversion of floodplain and bottomland forests, recognized as high quality habitats for Indiana bats, has been a particular cause of concern (Humphrey 1978). More recently, since the 1950s, some marginal farmlands have been abandoned and allowed to revert to forest and there has been a net increase in forest within the range of the Indiana bat, particularly in the Northeast (Smith et al. 2003). Forest cover has also increased within the Midwest Recovery Unit (Smith et al. 2003). Not only has the amount of forest cover increased since the 1950s, but also the average diameter of trees has increased (Smith et al. 2003), which may equate to an increased supply of suitable roost trees for Indiana bats.

Urbanization and development is currently the greatest contributor to forested habitat loss within the range of the Indiana bat (Wear and Greis 2002; U.S. Forest Service (USFS) 2005, 2006), which results in permanent conversion to land uses generally unsuitable for Indiana bats. At a study site in central Indiana, Indiana bats avoided foraging in a high-density residential area (Sparks et al. 2005), although maternity roosts have been found in low-density residential areas (Belwood 2002). Duchamp (2006) found that greater amounts of urban land use was negatively related to bat species diversity in north-central Indiana; several bat species, including the Indiana bat, were less likely to occur in landscapes with greater amounts of urban and suburban development. Development directly destroys habitat and fragments remaining habitat.

Forest cover is not a completely reliable predictor of where Indiana bat maternity colonies will be found on the landscape (Farmer et al. 2002). Indiana bat maternity colonies occupy habitats ranging from completely forested to areas of highly fragmented forest. Nonetheless, trends in forest cover are of interest relative to Indiana bats, with increasing forest cover suggesting at least the potential for improved habitat conditions. Conversely, in areas where almost all forest land has been lost, the absence of woodlands on the landscape certainly equates to less habitat than in prehistoric and early historic periods.

Throughout the range of the Indiana bat, forest conversion is expected to increase due to commercial and urban development, energy production and transmission, and natural changes. The 2010 Resources Planning Act Assessment projects forest losses of 6.5-13.8 million hectares (16–34 million acres) (or 4–8% of 2007 forest area) across the conterminous United States, and forest loss is expected to be concentrated in the southern United States, with losses of 3.6-8.5 million hectares (9–21 million acres) (USFS 2012). Forest conversion causes loss of potential habitat, fragmentation of remaining habitat, and if occupied at the time of the conversion, direct injury or mortality to individuals.

Disturbance of Hibernating Bats

The original recovery plan for the species stated that human disturbance of hibernating Indiana bats was one of the primary threats to the species (USFWS 1983). The primary forms of human disturbance to hibernating bats result from cave commercialization (cave tours and other commercial uses of caves), recreational caving, vandalism, and research-related activities. Progress has been made in reducing the number of caves in which disturbance threatens hibernating Indiana bats, but the threat has not been eliminated. Biologists throughout the range of the Indiana bat were asked to identify the primary threat at specific hibernacula, and "Human disturbance" was identified as the primary threat at 41% of Priority 1, 2 and 3 hibernacula combined.

White-nose Syndrome

WNS is an infectious wildlife disease caused by a fungus of European origin *Pseudogymnoascus destructans* (Pd), which poses a considerable threat to hibernating bat species throughout North America, including the Indiana bat. White-nose syndrome is responsible for unprecedented mortality of insectivorous bats in eastern North America (Blehert et al. 2009; Turner et al. 2011). No other threat is as severe and immediate for the Indiana bat as the disease WNS. Since the disease was first observed in New York in 2007 (later biologists found evidence from 2006 photographs), WNS has spread rapidly in bat populations from the East to the Midwest and the South.

WNS may affect behavioral changes in infected individuals. For example, at some WNS-affected sites, a shift of hibernating bats from traditional winter roosts to roosts unusually close to hibernacula entrances has been observed. Bats have also been observed flying outside of hibernacula during winter (often during the day) at some affected sites. At some sites, bat carcasses (particularly of the little brown bat) have been found outside affected hibernacula. Many infected bats do not survive the winter. The exact processes by which the fungal skin infection leads to death are not known, but depleted fat reserves (i.e., starvation) contribute to mortality (Reeder et al. 2012, Warnecke et al. 2012) and dehydration may also have a role (Willis et al. 2011, Cryan et al. 2013, Ehlman et al. 2013). It is also suspected that some of the affected bats that survive hibernation emerge in such poor condition that they die soon after emergence or during the summer. Among those bats that do survive, it appears that productivity of female survivors may be negatively affected (Francl et al. 2012; Pettit and O'Keefe 2017).

The Northeast Recovery Unit, where WNS was first observed in the winter of 2006-2007, lost over 70% of its Indiana bats between 2007 and 2015. At the time dead bats were first observed in the winter of 2006-2007, it is not known how long the (previously unidentified) fungus, Pd, had been present in affected sites. Based on subsequent observations as WNS spread, it appears that the arrival of the fungus in an area may precede large-scale fatality of bats by several years. Between 2011 and 2015 the Appalachian Recovery Unit, where WNS was confirmed in the winter of 2008-2009, declined by 84%. The Midwest Recovery Unit, where WNS was confirmed in the winter of 2010-2011, declined by 16% between 2011 and 2015. The Ozark-Central Recovery Unit, where WNS was confirmed in the winter of 2011-2012, declined by less than 1% between 2013 and 2015. As of 2016, WNS or Pd was confirmed in all the states within the species' range. We expect further declines in Indiana bat populations from the disease in the future. Additional information on WNS, which is constantly evolving, can be found online at http://whitenosesyndrome.org/.

Environmental Contaminants
With the restrictions on the use of organochlorine pesticides in the 1970s, this significant threat to Indiana bats was reduced. However, cholinesterase-inhibiting insecticides, organophosphates, and carbamates have now become the most widely used insecticides (Grue et al. 1997), and the impact of these chemicals on Indiana bats is not known. Because of the unique physiology of bats in relation to reproduction, high energy demands and sophisticated thermoregulatory abilities, much more research needs to be done with these pesticides and their effects on bats. These and other contaminants likely remain a significant and poorly understood threat to Indiana bats. USFWS (2007) summarizes known and suspected contaminant threats to bats.

Climate Change
The capacity of climate change to result in changes in the range and distribution of wildlife species is recognized, but detailed assessments of how climate change may affect specific species, including Indiana bats, are limited. During winter, only a small proportion of caves provide the right conditions for hibernating Indiana bats because of the species' very specific temperature requirements. Surface temperature is directly related to cave temperature, so climate change that involves increased surface temperatures will inevitably affect the suitability of hibernacula. Impacts on the availability or timing of emergence of insect prey are also likely. Loeb and Winters (2013) modeled potential changes in Indiana bat summer maternity range within the United States; in their model, the area suitable for summer maternity colonies of Indiana bats was forecasted to decline significantly.

Wind Turbines
There is growing concern that Indiana bats (and other bat species) may be threatened by the recent surge in construction and operation of wind turbines across the species' range. Eight Indiana bat mortalities have been documented at wind turbines; five of those were during the fall migration period (USFWS 2014). Not all facilities conduct fatality monitoring and, even when monitoring is conducted, only a small proportion of dead bats are likely to be found. Based on this information, it is likely that additional Indiana bat mortality has occurred at these facilities and at other wind facilities throughout the range of the species.

3.2. ENVIRONMENTAL BASELINE – INDIANA BAT

The Environmental Baseline analyzes the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and the ecosystem within the Action Area. The environmental baseline is a "snapshot" of the species' health in the Action Area at the time of the consultation, and does not include the effects of the Action under review.

3.2.1. Action Area Numbers, Reproduction, and Distribution

The Service is using the best available data to estimate the status of the species within the Action Area. These estimations are specific to the timeframes listed below. The timeframes represent when the Service considers the species in specific periods of its life cycle in Kentucky (USFWS 2016). In the absence of data (i.e., recent survey results) for the species in the Action Area of the project, we must make some assumptions based on the habitat in and around the Action Area, available past survey data, and our knowledge of the biology of the species.

Winter Hibernation (November 15 – March 31)
There are no previously documented Indiana bat hibernacula in the Action Area. The June 4, 2018 habitat assessment report describes that no caves or karst topography were found during field investigations in the survey area. Based on this assessment, it is unlikely that Indiana bats use the Action Area during the winter hibernation period.

Spring Staging (April 1 – May 14)
The Service's Kentucky Field Office uses a 1.6 km (1 mile) buffer around P1 and P2 hibernacula entrances to identify spring staging areas (USFWS 2016). The project area is more than 32.2 km (20-miles) from the nearest hibernaculum. Therefore, the Action Area does not contain spring staging habitat. The Service considers it unlikely that unknown Indiana bat spring staging habitat is present within the Action Area due to the lack of potentially suitable winter habitat discussed above. Further, Indiana bat winter hibernacula are well-documented in Kentucky, and winter surveys of these hibernacula account for the majority of Indiana bats statewide. As a result, the Service does not believe that Indiana bats use the Action Area during the spring staging period.

Summer (April 1 – August 15)
The Action Area contains 1,100 acres of forested habitat. Most of this forested habitat is in the southwest part of the Action Area, in and around the proposed construction limits. This forested area contains mature forest interspersed with open fields and streams. Much of the forested area within the construction limits contains some clutter in the understory from bush honeysuckle and/or young trees. There are multiple corridors through the forested areas, and the forested edges of open fields would facilitate flight through the landscape. Stream corridors also provide foraging and commuting habitat (Figure 5).

The habitat is about 4.7 km (3 mi.) from the edge of the buffer of the closest, known Indiana bat occurrence record (Figure 6), and there are two other Indiana bat buffers within 15 km (9.3 mi.).

These buffers represent the extent of the habitat considered used by each recorded maternity colony, based on the biology of the species (USFWS 2016).

The area around in the Action Area is rapidly developing with the expansion of the greater Cincinnati metropolitan area to the north. Much of the area immediately to the south and west of CVG is low-density residential development (Figure 7). The landscape surrounding this area is dominated by forests and fields and contains forested stream corridors connecting habitat through developed areas. Based on our knowledge of the species' biology, the presence of suitable habitat in the Action Area, and the connectivity of that habitat with other habitat on the landscape, the Action Area and construction limits contain habitat suitable to support Indiana bats.

The FAA has chosen not to survey for the species within the Action Area. In the absence of summer species survey data, the FAA has chosen to assume presence of the species in the Action Area during the summer. Thus, we are assuming that Indiana bats use the Action Area from April 1 – August 15 for roosting, foraging, and commuting. Specifically, we are assuming that one Indiana bat maternity colony occurs within the construction limits of the project. Because of the 1.4% post-WNS occupancy rate of the species in Kentucky (8 out of 569 sites) (USFWS 2018, unpublished data), we do not expect more than one colony in the Action Area. We assume that the maternity roosting area within a maternity home range comprises 357 acres (Menzel et al. 2005). Without additional information, we will conservatively assume that the maternity colony's primary and secondary roost trees are within the 238.78 forested acres that would be removed and that the colony also uses this area for foraging and commuting. Based on the species biology and the information we have on the composition of known maternity colonies, we assume that this maternity colony consists of 60 adult females that will arrive in the construction limits after migrating from their hibernacula. Based on an assumed sex ratio of 1:1, we assume that 60 adult males will also be associated with the maternity colony. All of these 60 males are expected to use the Action Area for foraging and commuting. Though males are not as concentrated in roosting as females, we are conservatively assuming that all 60 males roost within the construction limits. We assume that each of the 60 females will produce one pup; this will occur after the forested habitat is removed from the site. In summary, we assume that 180 Indiana bats (60 adult females, 60 adult males, and 60 juveniles) use the Action Area for commuting and foraging. Of those, 120 (all of the adult females and adult males) will return after hibernation to roost in the forested habitat within the construction limits. The 60 juveniles will be born in the maternity colony within the construction limits in June.

Fall Swarming (August 16 – October 14)

The Service estimates the fall swarming range as 16.1 km (10-mi.) buffer around a P1 and P2 hibernacula entrance and 8 km (5-mi.) buffer around a P3 and P4 hibernacula entrance (USFWS 2016). The project area is more than 32.2 km (20 mi.) from the nearest hibernaculum. Indiana bat winter hibernacula are well-documented in Kentucky, and winter surveys of these hibernacula account for the majority of Indiana bats statewide. The Service considers it unlikely that unknown Indiana bat swarming habitat is present within the Action Area due to the lack of potentially suitable winter habitat discussed above. As a result, the Service does not believe that Indiana bats use the Action Area during the fall swarming period.

Summary
We consider the Action Area occupied by Indiana bats from April 1 – August 15. During this time, 180 Indiana bats (60 adult males, 60 adult females, and 60 juveniles) will use the forested habitat in the Action Area for foraging and commuting. Of those 180 Indiana bats, 120 Indiana bats (60 adult females and 60 adult males) will return from hibernation to roost in the forested habitat within the construction limits. During the summer roosting period, an additional 60 juvenile Indiana bats will be born in the Action Area.

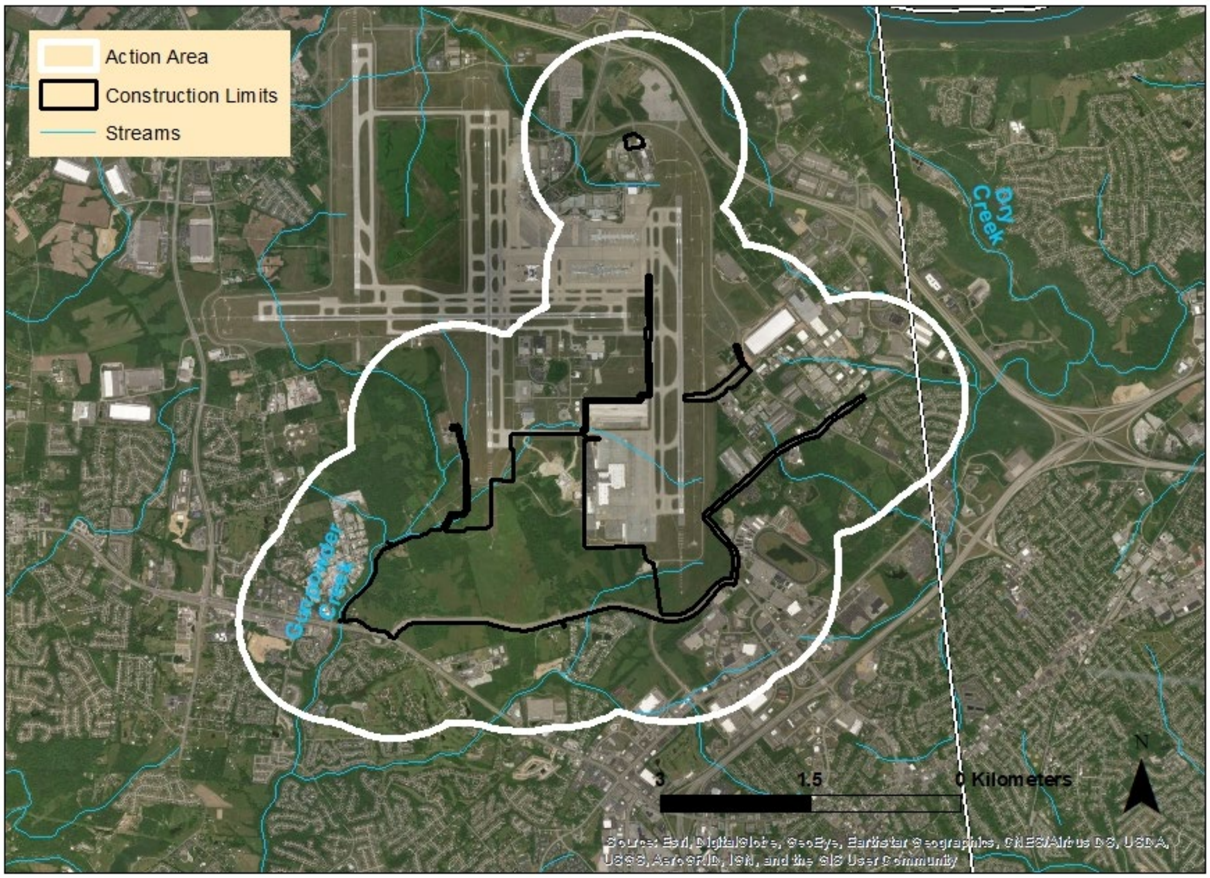

Figure 5. Stream corridors within and surrounding the Action Area of the project.

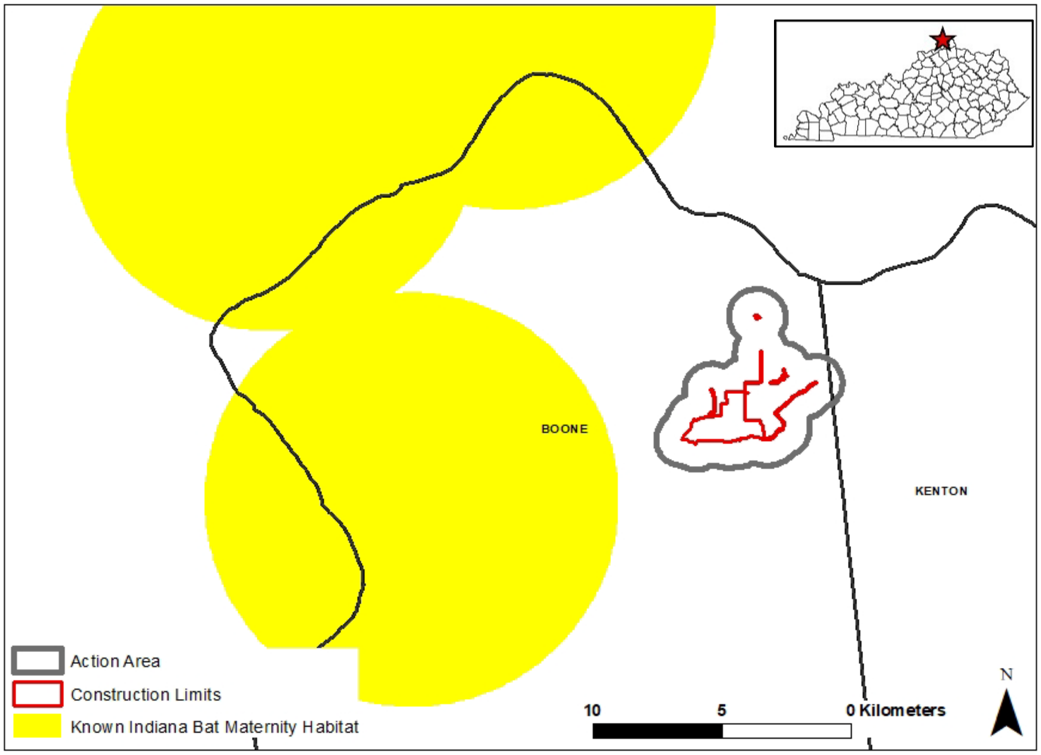

Figure 6. The Action Area in relation to known Indiana bat habitat in the surrounding landscape.

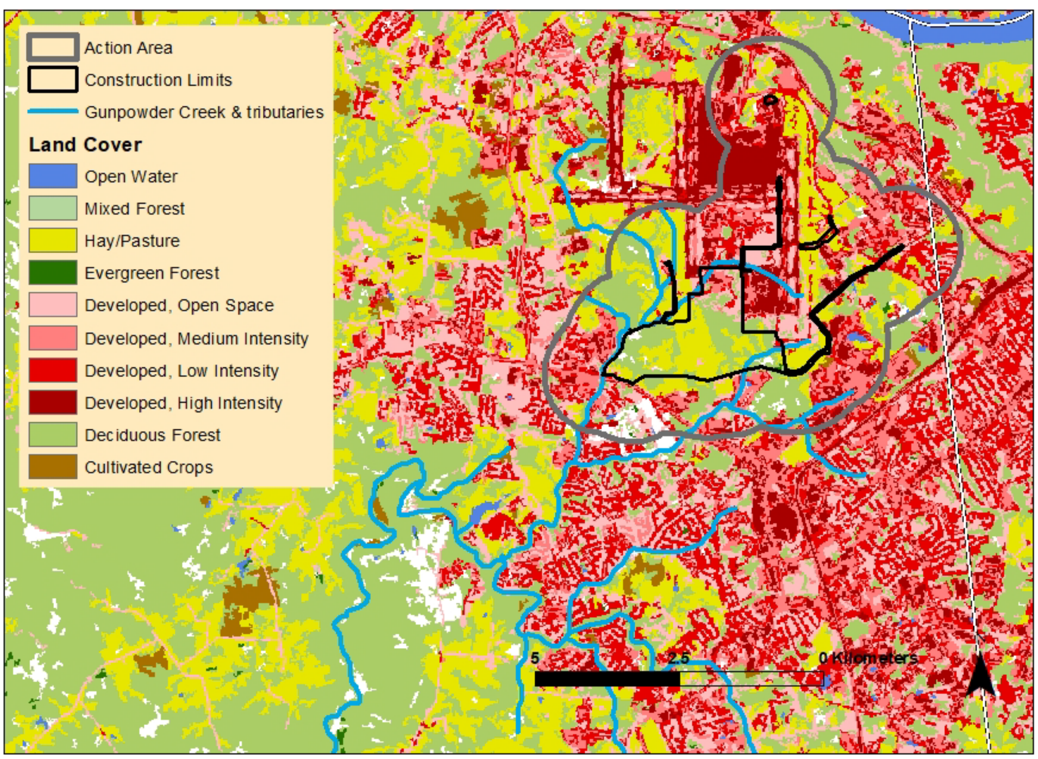

Figure 7. The landscape surrounding the Action Area.

3.2.2. Action Area Conservation Needs and Threats

Indiana bats in the Action Area are likely exposed to the same threats that the species is exposed to across its range. These threats are discussed in section 3.5. Below we discuss the two most pertinent threats related to this consultation.

Forest Loss and Fragmentation
Changes in land use, management and forest structure influence the location, quality, and quantity of suitable forested habitat. The area around the Action Area is rapidly losing forested habitat as development from the Cincinnati metropolitan area encroaches from the north.

White-nose Syndrome
WNS was first discovered in one cave in Kentucky in 2011 but has since spread across the state. Mortality at infected sites first became apparent in 2013, with an increase in observed mortality in 2014. Preliminary reports indicate that Pd and/or WNS has been detected in approximately 74% of caves surveyed in Kentucky (T. Hemberger, pers. comm. 2017). Many of those caves without positive records of WNS have not been surveyed in recent years. Indiana bats have shown declines at some hibernacula, and the overall post-WNS decline in Kentucky is estimated to be less than 9% (T. Hemberger, pers. comm. 2017). Although the population and trend data following the arrival of WNS at Kentucky hibernacula is difficult to interpret, the data are currently not showing the near or total loss of Indiana bat winter populations that has been documented in the northeastern United States.

Because Indiana bats can migrate hundreds of miles from their hibernacula and because WNS has been documented from Kentucky and all of the adjacent states, we assume that all the Indiana bats that are known and assumed to occupy habitat within the Action Area have been exposed to WNS. Therefore, Indiana bats in the Action Area are expected to be experiencing stress and reduced body weights from their exposure to WNS.

3.3. EFFECTS OF THE ACTION – INDIANA BAT

This section analyzes the direct and indirect effects of the Action on the Indiana bat, which includes the direct and indirect effects of interrelated and interdependent actions. Direct effects are caused by the Action and occur at the same time and place. Indirect effects are caused by the Action, but are later in time and reasonably certain to occur.

Based on the description of the Action in section 2.0 and the species' biology in section 3.0, we have identified four stressor(s) to the Indiana bat (i.e., the alteration of the environment that is relevant to the species) that may result from the Action: noise and vibration, night lighting, water quality degradation, and tree removal. Below, we discuss the best available science relevant to each stressor. Then, we describe the Stressor-Exposure-Response pathways that identify the circumstances for an individual bat's exposure to the stressor (i.e., the overlap in time and space between the stressor and an Indiana bat). Finally, we identify and consider how proposed conservation measures may reduce the severity of the stressor or the probability of an individual bat's exposure for each pathway.

3.3.1. Noise and Vibration

Noise and vibration are stressors that may disrupt bats by causing individuals to flush from roost trees during the day and/or night timeframes, and/or alter travel corridors and foraging behaviors. Bats may be exposed to this stressor during both the construction and operation components of the Action. Significant changes in noise levels in an area could result in temporary to permanent alteration of bat behaviors. The novelty of these noises and their relative volume levels will likely dictate the range of responses from individuals or colonies of bats.

Noise and vibration will occur during both the construction and operation components of the Action. During site preparation, part of the construction component of the Action, the felling of trees and operation of heavy equipment and tools will produce noise and vibrations. This could occur during any time of the year. Noise and vibration will occur on the site during other construction activities and during the operation of the facility. During most of the other construction activities and the operation component, the site will be absent of trees and natural vegetation and will no longer provide habitat for the Indiana bat. The bats that currently use the site will be exposed to noise and vibration from adjacent, existing CVG facilities, interstate and major highways, and other urban and commercial land uses; therefore, we would expect them to be habituated to noise and vibration to some extent.

Applicable Science
Bats exposed to noise and vibration may flush from their roost trees. Bats that flush during the daytime are at greater risk of harm due to predation (Mikula et al. 2016). Additionally, bats that flush their roost and/or avoid travel and foraging areas in response to this stressor may be harmed due to an increase in energy expenditure. Increased energy demands could have a significant effect on bats due to their low body mass. Because females require increased energy reserves during lactation (Kurta et al. 1989), an increased demand for energy in response to noise and vibrations could be especially detrimental to lactating females and, subsequently, their pups.

Studies have found that Indiana bats can tolerate some level of noise and vibration. For example, several construction projects on Fort Drum have occurred adjacent to multiple known Indiana bat roosts (U.S. Army Garrison Fort Drum 2011). Construction around these project sites has been ongoing for multiple years during the active season but has not seemingly appeared to affect known roosts or Indiana bat behavior. The last known capture and roosting locations of Indiana bats near these projects have been within approximately 800 and 400 meters (0.5 and 0.25 mi) of the construction activities, respectively. A military installation generally has large amounts of noise and disturbance, but Indiana bats have continued to occupy Fort Drum, suggesting that noise from machinery may disturb colonies of roosting bats, but such disturbances would have to be severe to cause roost abandonment. Gardner et al. (1991) had evidence that Indiana bats continued to roost and forage in an area with active timber harvest. This suggested that noise and exhaust emissions from machinery could possibly disturb colonies of roosting bats, but such disturbances would have to be severe to cause roost abandonment. Callahan (1993) noted the likely cause of the bats in his study area abandoning a primary roost tree was disturbance from a bulldozer clearing brush adjacent to the tree. In another study near 1-70 and the Indianapolis

Airport, a primary maternity roost was located 1,970 ft. (0.6 km) south of 1-70 (3D/International, Inc. 1996). This primary maternity roost was not abandoned despite constant noise from the Interstate and airport runways. However, the roost's proximity to 1-70 may be related to a general lack of suitable roosting habitat in the vicinity, and due to the fact that the noise levels from the airport were not novel to the bats (i.e., the bats had apparently habituated to the noise) (USFWS 2002). Noise and vibration could cause an Indiana bat to flush from its roost, expending extra energy and making it more vulnerable to predation (Mikula et al. 2016). Novel noises would be expected to result in some changes to bat behaviors, but research suggests that bats can become habituated to this stressor.

Effects Pathway – Indiana Bat #1	
Activity: Construction	
Stressor: Noise and vibration	
Exposure (time)	April 1 – October 14, 2019-21
Exposure (space)	Roosting and foraging habitat throughout Action Area
Resource affected	Individuals (adults and juveniles)
Individual response	• Flushing from roost trees results in extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Flushing from roost trees will increase chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.
Interpretation	Bats may become startled by the noise and/or vibrations and flush from their roosts. Most of the activities causing this stressor will occur concurrently with habitat removal or after the habitat has been removed when the species would no longer be present in the construction limits. Indiana bats exposed to this stressor during habitat removal are likely to respond in a way that would lead to adverse effects. Indiana bats exposed to this stressor during the construction phase after habitat removal would be exposed to low levels of this stressor and, because of their current proximity to other sources of noise and vibration, we expect them to be habituated and to respond minimally to the stressor.
Effect	Adverse, harm

Effects Pathway – Indiana Bat #2	
Activity: Operation	
Stressor: Noise and vibration	
Exposure (time)	April 1 – October 14; indefinitely
Exposure (space)	Roosting and foraging habitat throughout Action Area
Resource affected	Individuals (adults, juveniles)
Individual response	• Flushing from roost trees results in extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Flushing from roost trees will increase chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.

Interpretation	The activities causing this stressor during operation will occur after the habitat has been removed. Thus, Indiana bats exposed will be limited to those using habitat on the margins of the facility. The bats that remain within the Action Area during the operation of the new facility are already exposed to noise and vibration from adjacent existing CVG facilities, interstate and major highways, and other urban and commercial land uses. We would expect them to be habituated to this. We do not expect the additional noise and vibration contributed by the proposed Action to significantly increase the stressor in the Action Area. We do not expect Indiana bats to respond to the additional noise and vibration during operation in a way that would be significant.
Effect	Insignificant

3.3.2. Night Lighting

Lighting will be involved during the construction and operation of the facility. Lighting during construction will be minimal, occurring in the early morning, late evening, and, rarely, at night. Forested areas will not be lit; lighting will occur in areas already cleared of trees, and no lighting will be needed to remove trees. Once construction is complete, the safe operation of the air cargo hub facility will require artificial lighting to illuminate the new aircraft apron, connections to existing CVG runways, roadways, and parking areas.

<u>*Applicable Science*</u>
Studies document highly variable responses among species to artificial lighting. Some bat species seem to benefit from artificial lighting, taking advantage of high densities of insects attracted to light (Jung and Kalko 2010); however, other species may avoid artificial light (Furlonger et al. 1987, Rydell 1992) or not be affected (Stone et al. 2012). Lighting can cause delays in night bat activity (Stone et al. 2009; Downs et al. 2003). Effects of artificial lighting on bat activity may vary with season and moon phase (Jung and Kalko 2010).

While there is limited information regarding Indiana bats' response to increased light levels, slow-flying bats such as *Rhinolophus*, *Myotis*, and *Plecotus* species have echolocation and wing-morphology adapted for cluttered environments (Norberg and Rayner 1987) and emerge from roosts relatively late when light levels are low, probably to avoid predation by diurnal birds of prey (Jones and Rydell 1994). In Indiana, Indiana bats avoided foraging in urban areas, and Sparks et al. (2005) suggested that it may have been in part due to high light levels. Using captive bats, Alsheimer (2011) found that a closely related species, the little brown bat (*M. lucifugus*), was more active in the dark than light.

Effects Pathway – Indiana Bat #3	
Activity: Construction	
Stressor: Night lighting	
Exposure (time)	April 1 – August 15, 2019-21; temporary
Exposure (space)	Roosting, foraging, and commuting habitat in and near construction limits

Resource affected	Habitat, used by individuals (juveniles, adults)
Individual response	• Increased visibility to predators increases chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.
Interpretation	Indiana bats will likely avoid areas lit within the construction limits because they will be lit after they are cleared of suitable habitat. Indiana bats that use the periphery of the construction limits will likely be habituated to lighting already in the area and not significantly impacted by the additional lighting of the construction of the proposed project.
Effect	Insignificant, discountable

Effects Pathway – Indiana Bat #4	
Activity: Operation	
Stressor: Night lighting	
Exposure (time)	April 1 – August 15; perpetuity
Exposure (space)	Roosting, foraging, and commuting habitat in and near project footprint
Resource affected	Habitat, used by individuals (juveniles, adults)
Individual response	• Increased visibility to predators increases chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.
Interpretation	Indiana bats will likely avoid areas lit within the construction limits because they will be lit after they are cleared of suitable habitat. Indiana bats that use the periphery of the construction limits will likely be habituated to lighting already in the area and not significantly impacted by the additional lighting of the operation of the proposed project.
Effect	Insignificant, discountable

3.3.3. Aquatic Resource Loss and Degradation

The proposed Action would permanently impact 8,815 linear feet (lf) of perennial stream in the Gunpowder Creek drainage. In the absence of specific information about the nature of the impacts, we are assuming that the proposed impacts would render the 8,815 lf of perennial streams in the Action Area unusable by Indiana bats for foraging and drinking and destroy the potential for production of Indiana bat prey in these reaches. The ephemeral and intermittent streams do not likely provide important foraging habitat for Indiana bats because of their relative size and flow status. Of the perennial streams to be impacted, 62% scored within the “poor” rating on the Rapid Bioassessment Protocol, and, thus, do not provide high-quality foraging habitat for Indiana bats.

Impacts to streams may affect Indiana bats indirectly by degrading the quality of aquatic resources downstream of the construction limits by reducing aquatic insect populations that make up part of their diet. Water quality may be degraded as a result of increased sedimentation during construction or the discharge of hazardous materials during construction or operation. Hazardous materials that could potentially contaminate water include diesel fuel, gasoline, hydraulic fluids, oils, lubricants, solvents, adhesives, battery chemicals, deicing agents, and herbicides. Spills and/or leakage of these materials into the environment could affect water quality resulting in reduced densities of aquatic insects that bats consume.

Applicable Science

Indiana bats feed on aquatic and terrestrial insects. Numerous foraging habitat studies have found that Indiana bats often forage in closed to semi-open forested habitats and forest edges located in floodplains, riparian areas, lowlands, and uplands; old fields and agricultural fields are also used (USFWS 2007). Drinking water is essential, especially when bats actively forage. Indiana bats obtain water from streams, ponds and water-filled road ruts in forest uplands.

The Indiana bat's diet varies seasonally and among different ages, sexes, and reproductive status (USFWS 1999). Four orders of insects contribute most: Coleoptera, Diptera, Lepidoptera, and Trichoptera (Belwood 1979, Brack 1983, Brack and LaVal 1985, Lee 1993, Kiser and Elliot 1996, Kurta and Whitaker 1998, Murray and Kurta 2002, Whitaker 2004). Various reports differ considerably in which of these orders is most important. Consistent use of moths, flies, beetles, and caddisflies throughout the year at various colonies suggests that Indiana bats are selective predators to a certain degree, but incorporation of other insects into the diet also indicates that these bats can be opportunistic (Murray and Kurta 2002). Brack and LaVal (1985) and Murray and Kurta (2002) suggested that the Indiana bat may best be described as a "selective opportunist."

Filling streams in the construction limits will permanently reduce aquatic insect habitat, which will reduce the amount of prey available to Indiana bats. The Proposed Action will also impact streams downstream of the construction limits. Negative impacts of sedimentation on aquatic insect larvae is well-documented. In a literature review, Henley et. al (2000) summarized how stream sedimentation impacts these communities. Sediment suspended in the water column affects aquatic insect food sources by physically removing periphyton from substrate and reducing light available for primary production of phytoplankton. Sediment that settles out of the water column onto the substrate fills interstitial spaces occupied by certain aquatic insect larvae. Increases in sedimentation can change the composition of the insect community in a stream. In a three-year study measuring sedimentation and macroinvertebrate communities before, after, and during disturbance from a highway construction site, Hendrick (2008) found increased turbidity and total suspended solids downstream from the construction that correlated with a shift in macroinvertebrate communities. The change, however, was not great, and the Hilsenhoff Biotic Index used to evaluate the effects decreased from "excellent" before construction to "good" after construction. The use of BMPs likely minimized the effects of the construction on the macroinvertebrate communities.

Effects Pathway – Indiana Bat #5	
Activity: Construction	
Stressor: Aquatic resource loss	
Exposure (time)	Perpetuity
Exposure (space)	Foraging habitat within the construction footprint
Resource affected	Habitat, used by individuals (juveniles, adults)

Individual response	• Increased fight distances to access foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success.
Interpretation	Indiana bats are expected to utilize other streams in the Gunpowder Creek watershed.
Effect	Insignificant

Effects Pathway – Indiana Bat #6	
Activity: Construction	
Stressor: Aquatic resource degradation, sedimentation	
Exposure (time)	Temporary, during 18 month construction period
Exposure (space)	Aquatic foraging habitat downstream of the project site.
Resource affected	Prey (aquatic insects), used by individuals (juveniles, adults)
Individual response	• Increased effort to access sufficient foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success.
Interpretation	BMPs associated with the 404 permit to limit impacts to streams on-site and downstream aquatic resources.
Interpretation	We expect the effects of sedimentation of aquatic resources to be temporary and minimal due to the temporary nature of the activity and implementation of the conservation measure.
Effect	Insignificant

Effects Pathway – Indiana Bat #7	
Activity: Construction and Operation	
Stressor: Aquatic resource degradation, pollutants	
Exposure (time)	Perpetuity
Exposure (space)	Aquatic foraging habitat downstream of the project site.
Resource affected	Prey (aquatic insects), used by individuals (juveniles, adults)
Individual response	• Increased effort to access sufficient foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success.
Conservation Measures	• Implementation of BMPs associated with the 404 permit to limit impacts to streams on site and downstream aquatic resources. • Installation of vegetated shoulders, swales, and storm water treatment areas to filter contaminants out of water before entering streams. • Limiting use of deicing agents to only the amount necessary.
Interpretation	We expect that implementation of the conservation measure will minimize and/or prevent contamination from pollutants.
Effect	Insignificant, discountable

3.3.4. Tree Removal

The Action Area contains 1,100 acres of forested habitat, comprising 20% of the Action Area. The Action would result in the removal and loss of 238.78 acres of forested habitat, approximately 22% of the forested habitat within the Action Area. Of the total 238.78 acres to be removed, 122 acres would be removed from February – March 2019, and 116.78 acres would be removed from April – May 2019. The trees removed during the April – May timeframe may be occupied by Indiana bats when they are removed. We do not know which trees will be removed during the occupied timeframe or exactly which trees Indiana bats would be occupying. The resulting forested habitat loss would be permanent. The loss of this habitat would create a larger gap in forested habitat between the largest block of forested habitat within the Action Area and potential foraging corridors in the Dry Creek watershed to the east (Fig. 5).

Loss of Roost Trees (Occupied) - Applicable Science

Risk of injury or death from being crushed when a tree is felled is most likely to impact non-volant pups, but adults may also be injured or killed. This risk is greater for adults during cooler weather when bats periodically enter torpor and would be unable to arouse quickly enough to respond (i.e., flush and potentially avoid being in the roost when it is felled). Belwood (2002) reported on the felling of a dead maple in a residential lawn in Ohio that resulted in one dead adult Indiana bat female and 33 non-volant young. Three of the young bats were already dead when they were picked up, and two more died subsequently. The rest were apparently retrieved later by adult bats that had survived.

In addition to the expenditure of additional energy to find new roost trees, the removal of primary or alternate maternity roosts can lead to the fragmentation or break up of the maternity colony (Sparks et al. 2003, Silvis et al. 2014). The effect of colony fragmentation on Indiana bats is unknown. However, Indiana bats presumably congregate in large maternity colonies due to the benefits it provides. Barclay and Kurta (2007) stated that Indiana bats benefit from the formation of maternity colonies through (1) information sharing about roosting and foraging habitats, (2) reduced predation risk, and (3) thermoregulatory advantages. However, this colonial behavior also comes with risks, such as increased parasite transmission and competition for resources.

Effects Pathway – Indiana Bat #8	
Activity: Construction	
Stressor: Tree removal, loss of roost trees (occupied)	
Exposure (time)	April – May, 2019
Exposure (space)	116.78 forested acres
Resource affected	Habitat (roost trees), individuals (adults)
Individual response	• Bats struck by equipment or crushed by a felled tree will be injured or die. • Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.

	• Colony fragmentation could decrease thermoregulation efficiency / decreased foraging efficiency that can decrease fitness and result in reduced survival / reproductive success. • Colony fragmentation will increase the risk of predation.
Conservation Measures	No tree clearing will occur when non-volant pups would likely be present (June 1 – July 31). This measure minimizes the severity of effects on the Indiana bat by avoiding direct effects to non-volant pups.
Interpretation	Bats occupying trees that are removed may be injured or killed. Injured bats may subsequently die. Those that survive will have to spend extra energy in addition to what is necessary to for foraging, pup rearing, social interactions, or other activities. The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors (e.g., WNS), is likely to reduce fitness and subsequently reduce survival and reproductive success.
Effect	Harm, direct or indirect

Loss of Roost Trees (Unoccupied) - Applicable Science

The potential for indirect effects of tree removal of Indiana bats during the unoccupied timeframe to is rooted in the well-documented knowledge that Indiana bats exhibit strong fidelity to their summer roosting areas and foraging habitat (Kurta et al. 2002; Garner and Gardner 1992; USFWS 2007). Indirect effects to Indiana bats associated with the removal of forested habitats occur through several pathways that lead to a reduction in individual fitness as a result of increased energy expenditure. This evaluation is supported by numerous bat researchers, including Kurta and Rice (2002), who commented:

> *The U.S. Fish and Wildlife Service often allows potential roost trees to be cut after Indiana bats leave for hibernation in order to make way for developments such as new bridges, highways, and housing projects. This policy understandably is intended to allow human developments to proceed while preventing direct "take" of Indiana bats. This practice, however, should be limited, because it destroys potential roost trees without establishing whether they actually are used by Indiana bats, which may leave the bats with no shelter when they return in spring in an energetically stressed condition. Upon returning, the bats have just completed 6-7 months of hibernation and an extensive migration, and they arrive already pregnant and at a time when air temperatures are low and food (flying insects) is scarce. Excessive precipitation and/or colder-than-average temperatures drastically reduce reproductive success of temperate bats (Grindal et al. 1992; Lewis 1993), and such negative effects likely would occur even during normal weather if Indiana bats do not have adequate shelter.*

Indiana bats must have the energetic resources to carry out the different phases of their lifecycle. Certain processes in their life cycle are particularly costly (Kunz et al. 1998). Indiana bats must enter into hibernation with enough fat reserves to survive the winter (Speakman and Rowland

1999) and, for females, to trigger ovulation and gestation following emergence (Zhao et al. 2003). After migrating to their summer habitat, Indiana bats must be prepared to cope with spring conditions by having sufficient energy resources to thermoregulate during cooler weather conditions and at a time when prey is scarce (Kurta and Rice 2002). Additionally, they must have sufficient energy resources throughout the summer roosting period to cope with unpredictable stressors, such as unseasonably cold temperatures or high precipitation that can negatively affect reproductive success (Grindal et al. 1992) and survival.

Forested habitat loss or alteration during the hibernation season (i.e., while the bats are not present) harms Indiana bats by requiring the increased use of energy to respond to the habitat loss or alteration, when bats return to summer habitats. This is likely to impair essential behavior patterns associated with sheltering (roosting), breeding and/or feeding (foraging). This impairment, in turn, results in reduced survival and/or reproduction of the affected individuals. These effects are compounded in the Action Area because most of the returning bats are coming from hibernacula infected with white-nose syndrome (WNS). Individuals surviving WNS have additional energetic demands. For example, WNS-affected bats have less fat reserves than non-WNS-affected bats when they emerge from hibernation (Reeder et al. 2012; Warnecke et al. 2012) and have wing damage (Reichard and Kunz 2009, Meteyer et al. 2009) that makes migration and foraging more challenging. Females that survive the migration to their summer habitat must partition energy resources between foraging, keeping warm, maintain a successful pregnancy, rearing pups, and healing their own bodies.

Effects Pathway – Indiana Bat #9	
Activity: Construction	
Stressor: Tree removal, loss of roost trees (unoccupied)	
Exposure (time)	One time removal; removal will expose Indiana bats to indirect effects from April 1 – October 14, 2019.
Exposure (space)	122 forested acres
Resource affected	Habitat (roost trees), used by individuals (adults)
Individual response	• Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Colony fragmentation could decrease thermoregulation efficiency / decreased foraging efficiency that can decrease fitness and result in reduced survival / reproductive success. • Colony fragmentation will increase the risk of predation.
Conservation Measures	This habitat will be removed from February 1 – March 31 when it would not be used by Indiana bats.

Interpretation	Direct effects are avoided. Adult Indiana bats will experience indirect effects after they arrive at their summer roosting habitat the first year after tree removal. The extra energy to find new habitat is in addition to what is necessary for foraging, pup rearing, social interactions, or other activities. The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors (e.g., WNS), is likely to result in adverse effects. Indiana bats are expected to adapt to this stressor in subsequent years after they have found new suitable habitat.
Effect	Harm, indirect

Forest Loss and Fragmentation – Applicable Science

In addition to loss of roosting habitat, foraging and commuting habitat can become degraded by forest loss and fragmentation. Patterson et al. (2003) noted that the mobility of bats allows them to exploit fragments of habitat. However, they cautioned that reliance on already diffuse resources (e.g., roost trees) leaves bats highly vulnerable, and that energetics may preclude the use of overly patchy habitats.

In a fragmented landscape, Indiana bats may have to fly across less suitable habitat. This could pose greater risk from predators (e.g., raptors) (Mikula et al. 2016). Indiana bats consistently follow tree-lined paths rather than cross large open areas (Gardner et al. 1991, Murray and Kurta 2004). Murray and Kurta (2004) found that Indiana bats increased their commuting distances by 55% to follow these paths rather than flying over large agricultural fields. However, if these corridors are not available, Indiana bats may be forced over open areas. For example, Kniowski and Gehrt (2014) observed Indiana bat flying across open expanses of cropland >1 km (0.6 miles) to reach remote, isolated woodlots or riparian corridors.

Indiana bat maternity colonies in Illinois, Indiana, Michigan, and Kentucky have been shown to use the same roosting and foraging areas during subsequent years (Gardner et al. 1991; Humphrey et al. 1977; Kurta and Murray 2002; Kurta et al. 1996, 2002). Bats using familiar foraging and roosting areas are thought to benefit from decreased susceptibility to predators, increased foraging efficiency, and the ability to switch roosts in case of emergencies or alterations surrounding the original roost (Gumbert et al. 2002). Conversely, bats that must use new or inferior habitats after a loss or alteration of their normal forested habitat would not have these same benefits.

Racey and Entwistle (2003) discussed the difficulties of categorizing space requirements in bats, as they are highly mobile and show relatively patchy use of habitat (and use of linear landscape features), although connectivity of habitats has some clear advantages (e.g., aid orientation, attract insects, provide shelter from wind and/or predators). Carter et al. (2002) found Indiana bat roosts in a highly fragmented landscape in their southern Illinois, although both the number of patches and mean patch size were higher in the area surrounding roosts than around randomly selected points. Kniowski and Gehrt (2014) suggest longer or more frequent commuting flights will be required by Indiana bats in highly fragmented landscapes, with smaller, more distant suitable habitat patches, to obtain similar resources compared to landscapes with larger, more abundant habitat patches. This has been observed directly in Ohio where radio tagged bats in areas with limited forested cover moved further than those with greater forested cover (K. Lott, USFWS, pers. comm.).

Effects Pathway – Indiana Bat #10	
Activity: Construction	
Stressor: Tree removal, forest loss and fragmentation	
Exposure (time)	One time removal; exposure will be permanent
Exposure (space)	238.78 forested acres
Resource affected	Forested habitat, used by individuals (juveniles, adults)
Individual response	• Increased effort to access sufficient foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success. • Increased visibility to predators increases chances of predation.
Interpretation	The loss of roost trees will adversely affect Indiana bats the first year after the removal of those trees (discussed in effects pathway #9). We expect them to find new roosting habitat that they will continue to use in subsequent years. The tree removal will create a larger gap in habitat between the Gunpowder Creek tributaries and the Dry Creek tributaries that Indiana bats may be using for foraging and commuting habitat. The gap would make access this other drainage difficult, requiring more energy expenditure and/or exposure to predators, or would cut off access to habitat altogether. The 180 individuals that use the Action Area in the summer after habitat removal are expected to be indirectly harmed.
Effect	Harm

3.3.5. Collision

The increased number of aircraft to CVG in response to the new air cargo hub will increase the opportunity for collisions with bats.

<u>*Applicable Science*</u>
The U.S. Department of Agriculture, through an interagency agreement with the FAA, compiles a database of all reported wildlife strikes to U.S. civil aircraft and to foreign carriers experiencing strikes in the U.S. (Dolbeer and Wright 2008). They have compiled 82,057 strike reports from 1,418 U.S. airports and 207 foreign airports from 1990 through 2007 and estimated that this total represents only about 20% of the strikes that have occurred during that timeframe. Bat strikes represented 0.3 percent of total strikes, with 253 individuals from eight identified species reported, although many bats were not identified to species. Seven bat collisions were reported in Ohio and four in Kentucky during that 17-year timeframe. Adding the undetected incidents (estimated in Dolbeer and Wright 2008) equals a total of approximately 35 bat deaths (of any species) due to aircraft collisions in airports across Kentucky in the 17-year timeframe. The majority of strikes with bats (53%) occurred during the July to September timeframe. Bat

strikes most often occurred during the night, with few occurring during dawn, dusk, and daylight hours.

Effects Pathway – Indiana Bat #11	
Activity: Operation	
Stressor: Collisions with aircraft	
Exposure (time)	April 1 – October 14; indefinitely
Exposure (space)	Runways and airways at and around CVG
Resource affected	Individuals (juveniles, adults)
Individual response	Collision with aircraft will cause injury and/or mortality.
Interpretation	The incidence of bat collisions with aircraft is relatively low. The relatively low occurrence rate of bat collisions with aircraft coupled with the relatively minor increase in air traffic that the new air cargo hub would bring to the air traffic already at CVG makes any increase in Indiana bat deaths that would be attributable to the proposed Action undetectable.
Effect	Discountable

3.3.6. Conservation Measures

The first two Conservation Measures listed in the description of the proposed Action directly relate to specific stressors and are discussed with those relevant stressors in the above sections. Those conservation measures will not be discussed further in this section. This section will discuss the effects of the third conservation measure, the contribution to the IBCF. The funds in the IBCF are used to permanently protect Indiana bat and northern long-eared bat in Kentucky for the conservation and recovery of the species. This conservation measure would have a beneficial effect on the Indiana bat by ensuring that the species has suitable habitat available for roosting, commuting, and foraging during the summer and/or fall swarming periods of their lifecycle. As this benefit would occur in the future, we cannot quantify the effect it will have.

3.3.7. Summary of Effects

The proposed Action would expose the Indiana bat to seven stressors that we have identified. Sections 3.3.1-3.3.5 evaluated the effects of the stressors; this is summarized below in Table 1. We identified three stressors as likely to adversely affect the Indiana bat: noise and vibration, loss of roost trees, and forest loss and fragmentation. We believe the remaining stressors would have insignificant or discountable effects on the species. In addition to the identified stressors, the conservation measure described in section 3.3.6 will have a beneficial effect on the Indiana bat.

Table 1. A summary of the effects of the Action on the Indiana bat.

Stressors	Adverse	Insignificant/ Discountable
Noise and vibration, during construction	x	
Noise and vibration, during operation		x
Night lighting		x
Aquatic resource loss		x
Aquatic resource degradation		x
Tree removal, loss of roost trees	x	
Tree removal, forest loss and fragmentation	x	
Collison		x

3.3.8. Cumulative Effects

For purposes of consultation under ESA §7, cumulative effects are the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future Federal actions that are unrelated to the proposed Action are not considered, because they require separate consultation under §7 of the ESA. No cumulative effects were identified by the applicant and none are anticipated by the Service.

3.4. CONCLUSION - INDIANA BAT

In this section, we summarize and interpret the findings of the previous sections (status, baseline, effects, and cumulative effects) relative to the purpose of a BO under §7(a)(2) of the ESA, which is to determine whether a Federal Action is likely to:

a) jeopardize the continued existence of species listed as endangered or threatened; or
b) result in the destruction or adverse modification of designated critical habitat.

"Jeopardize the continued existence" means to engage in an Action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02).

We have considered the status of the species across its range, the status of the species within the Action Area, and the effects of the Action to the Indiana bat. In our effects analysis, we identified how Indiana bats would be adversely affected by the Action. We estimated that 120

Indiana bats will arrive at the construction limits of the project after migrating from their hibernacula to use the habitat for roosting, foraging, and/or commuting. Of these, 120 (60 females and 60 males) have the potential to be adversely affected by noise and vibration and/or removal of their roost trees, either indirectly while they are unoccupied or directly while they are occupied. Juveniles will not be affected by these stressors, because they will be born after the tree removal occurs. All 180 of the Indiana bats that would use the construction limits for foraging and/or commuting (after the pups are born) would be indirectly harmed by the loss and fragmentation of foraging and commuting habitat. We assume that, as a result of the Action, 180 Indiana bats will experience indirect harm.

The recovery goals for the species include obtaining a minimum overall population estimate of 457,000 and demonstrating positive population growth rate. The number of bats adversely affected by the Action would be 180. This less than 1% of the 2017 rangewide estimate of Indiana bats (530,705). The Action would, therefore, adversely affect only a small proportion of the rangewide species' population. Most of the effects would be indirect and are not expected to result in mortality. Some effects may result in a reduction in reproductive success; most of this reduction would be short-term during the construction phase, though there could be some long-term effects from the resulting forest fragmentation.

Further, the contribution to the Imperiled Bat Conservation Fund is expected to promote the survival and recovery of the species through protecting and managing existing forested habitat suitable to support the species, particularly those that would expand existing conservation ownerships.

3.5. INCIDENTAL TAKE STATEMENT - INDIANA BAT

ESA §9(a)(1) and regulations issued under §4(d) prohibit the take of endangered and threatened fish and wildlife species without special exemption. The term "take" in the ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (ESA §3). In regulations at 50 CFR §17.3, the Service further defines:

- "harass" as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering;"
- "harm" as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering;" and
- "incidental take" as "any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity."

Under the terms of ESA §7(b)(4) and §7(o)(2), taking that is incidental to and not intended as part of the agency Action is not considered prohibited, provided that such taking is in compliance with the terms and conditions of an incidental take statement (ITS).

For the exemption in ESA §7(o)(2) to apply to the Action considered in this BO, the FAA must undertake the non-discretionary measures described in this ITS, and these measures must become binding conditions of any permit, contract, or grant issued for implementing the Action. The FAA has a continuing duty to regulate the activity covered by this ITS. The protective coverage of §7(o)(2) may lapse if the FAA fails to:

- assume and implement the terms and conditions; or
- require a permittee, contractor, or grantee to adhere to the terms and conditions of the ITS through enforceable terms that are added to the permit, contract, or grant document.

In order to monitor the impact of incidental take, the FAA must report the progress of the Action and its impact on the species to the Service as specified in this ITS.

3.5.1. Amount or Extent of Take Anticipated

This section specifies the amount or extent of take of the Indiana bat that the Action is reasonably certain to cause, which we estimated in the "Effects of the Action" section of this BO. We reference, but do not repeat, these analyses here. In response to the project proponent's decision to assume presence of the species in the Action Area without providing site-specific species occurrence data, we had to make certain assumptions, based on the best available scientific and commercial data, to estimate that number of individuals (see section 3.2, Environmental Baseline). We evaluated the potential for these individuals to be exposed to the stressors resulting from the proposed Action. Finally, relying on the best available scientific and commercial data, we evaluated how the individuals' responses to their exposure to these stressors would apply to the statutory and regulatory definition of take (see section 3.3, Effects of the Action). From our evaluation, the Service anticipates that the proposed Action is reasonably certain to cause the incidental take of 180 individual Indiana bats consistent with the definition of harm (Table 2).

The Service anticipates that the Action is reasonably certain to cause incidental take of individual Indiana bats consistent with the definition of harm resulting from forested habitat removal during the construction of the propose project. The Service anticipates that the Action is reasonably certain to cause incidental take of individual Indiana bats consistent with the definition of harm (see section 5 Effects of the Action).

Table 2. Summary of Expected Incidental Take Resulting from the Action

	# of Individuals	Take Type
Indiana bat	180	Harm

The Service anticipates the incidental taking of Indiana bats associated with this project will be difficult to detect for the following reasons:

- The individuals are small, mostly nocturnal, and when not hibernating, occupy forested habitats where they are difficult to observe;
- The Indiana bat forms small maternity colonies under loose bark or in the cavities of trees, and males and non-reproductive females may roost individually, which makes finding roost trees difficult;
- Finding dead or injured specimens during or following project implementation is unlikely; and
- The take is in the form of non-lethal harm that is difficult to observe (e.g., reduced reproductive success).

Because of the difficulty in determining a level of take based on the number of bats that will be adversely affected, the Service has decided, instead, that it is appropriate to base the level of exempted incidental take on the acreage of suitable roosting habitat that will be affected by the Action. Therefore, the level of take anticipated in this BO is all 180 Indiana bats expected to use the 238.78 acres of forested habitat in the construction limits. This surrogate measure sets a clear standard for determining when the extent of taking is exceeded, because all anticipated take will result from habitat removal. Due to the difficulty of detecting take of the Indiana bat caused by the Action, the FAA will monitor the extent of taking using this surrogate measure. Instructions for monitoring and reporting take are provided in section 5.4.

The amount of take was determined based on the proposed Action as described in section 2 of this BO and includes the conservation measures listed in section 2.4. The FAA shall ensure that the project will occur as designed, planned, and documented in this BO.

3.5.2. Reasonable and Prudent Measures

The FAA has coordinated with the Service during the consultation process and has incorporated appropriate conservation measures into the proposed Action to minimize the effects of the Action on the Indiana bat. The Service does not have additional measures to include as reasonable and prudent measures (RPMs) in this BO.

3.5.3. Terms and Conditions

Terms and Conditions (T&Cs) detail the implementation of RPMs. This BO does not include any (T&Cs) as there are no RPMs.

3.5.4. Monitoring and Reporting Requirements

In order to monitor the impacts of incidental take, the FAA must report the progress of the Action and its impact on the species to the Service as specified in the incidental take statement (50 CFR §402.14(i)(3)). This section provides the specific instructions for such monitoring and reporting. As necessary and appropriate to fulfill this responsibility, the FAA must require any permittee, contractor, or grantee to accomplish the monitoring and reporting through enforceable terms that are added to the permit, contract, or grant document. Such enforceable terms must include a requirement to immediately notify the FAA and the Service if the amount or extent of incidental take specified in this ITS is exceeded during Action implementation.

The FAA will monitor the take of this project by (1) ensuring that all of the identified Conservation Measures are implemented and maintained, as necessary, by the contractor(s) and (2) informing the Service as soon as possible if the amount of take is exceeded or if any Indiana bats are observed or injured within the project area. The FAA will report any changes or deviations to the above monitoring requirements to the Service's Kentucky Field Office as soon as possible.

4. Northern Long-eared Bat

4.1. STATUS OF THE SPECIES – NORTHERN LONG-EARED BAT

This section summarizes the best available data about the biology and current condition of the northern long-eared bat (*Myotis septentrionalis*) throughout its range that are relevant to formulating an opinion about the Action. The Service published its decision to list the northern long-eared bat as threatened on April 2, 2015 (80 FR 17973) under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) with an interim rule under ESA §4. The Service finalized the 4(d) rule on January 14, 2016 (81 FR 1900). The Service determined that designating critical habitat for the species was not prudent (81 FR 24707). The Service has not completed a recovery plan for the species.

4.1.1. Species Description

The northern long-eared bat (*Myotis septentrionalis*) is a medium-sized bat species, weighing an average 5 to 8 grams, with females tending to be slightly larger than males (Caceres and Pybus 1997). Pelage colors include medium to dark brown fur on its back, dark brown, but not black, ears and wing membranes, and tawny to pale-brown fur on the ventral side (Nagorsen and Brigham 1993; Whitaker and Mumford 2009). As indicated by its common name, the northern long-eared bat is distinguished from other Myotis species by its large ears that average 17 mm (Whitaker and Mumford 2009) and, when laid forward, extend beyond the nose but less than 5 mm beyond the muzzle (Caceres and Barclay 2000). The tragus is long (averaging 9mm), pointed, and often curved (Nagorsen and Brigham 1993; Whitaker and Mumford 2009).

4.1.2. Life History

The northern long-eared bat hibernates in caves and mines in the winter (typically October through April) and migrates to summer habitat. While the northern long-eared bat is not considered a long distance migratory species, short migratory movements between summer roost and winter hibernacula covering between to 56 km (34.8 mi) and 88.5 km (55 mi) have been documented (Nagorsen and Brigham 1993; Griffith 1945). In general, northern long-eared bats arrive at hibernacula in August or September, enter hibernation in October and November, and leave the hibernacula in March or April (Caire et al. 1979; Whitaker and Hamilton 1998; Amelon and Burhans 2006). In northern latitudes, such as in upper Michigan's copper mining district, northern long-eared bat hibernation may begin as early as late August and may last for eight and nine months (Stones and Fritz 1969; Fitch and Shump 1979). Northern long-eared bats have shown a high degree of philopatry for a hibernaculum (Pearson 1962), although they may not return to the same hibernaculum in successive seasons (Caceres and Barclay 2000). The spring migration period likely runs from mid-March to mid-May, with the females giving birth in late May or early June (Caire et al. 1979; Easterla 1968; Whitaker and Mumford 2009). However, parturition may occur as late as July (Whitaker and Mumford 2009). Fall migration likely occurs between mid-August and mid-October.

Adult northern long-eared bat longevity is estimated to be up to 19 years based on banding records (Hall et al. 1957; Kurta 1995). Prior to WNS, most mortality for northern long-eared and many other species of bats occurs during the juvenile stage (Caceres and Pybus 1997). The species typically breeds from late July in northern regions to early October in southern regions. Breeding commences when males begin to swarm around hibernacula and initiate copulation activity (Whitaker and Hamilton 1998; Whitaker and Mumford 2009; Caceres and Barclay 2000; Amelon and Burhans 2006). Hibernating females store sperm until spring, exhibiting a delayed fertilization strategy (Caceres and Pybus 1997). Copulation occasionally occurs again in the spring (Racey 1982). Ovulation takes place at the time of emergence from the hibernaculum, followed by fertilization of a single egg, resulting in a single embryo (Cope and Humphrey 1972; Caceres and Pybus 1997; Caceres and Barclay 2000); gestation is approximately 60 days (Kurta 1995). Males are reproductively inactive until late July, with testes descending in most males during August and September (Caire et al. 1979; Amelon and Burhans 2006).

Maternity colonies, consisting of females and young, are generally small, numbering from about 30 (Whitaker and Mumford 2009) to 60 individuals (Caceres and Barclay 2000), but may be larger. Female roost site selection, in terms of canopy cover and tree height, changes depending on reproductive stage; relative to pre- and post-lactation periods, lactating northern long-eared bats have been shown to roost higher in tall trees situated in areas of relatively less canopy cover and tree density (Garroway and Broders 2008).

Emerging at dusk, most hunting occurs above the understory, 1 to 3 m (3.3 to 9.8 ft) above the ground, but under the canopy (Nagorsen and Brigham 1993). Foraging patterns indicate a peak activity period within 5 hours after sunset followed by a secondary peak within 8 hours after sunset (Kunz 1973). Northern long-eared bats seem to focus foraging in upland, mature forests (Caceres and Pybus 1998) with occasional foraging over forest clearings, water and along roads (Van Zyll de Jong 1985). However, most foraging occurs on forested hillsides and ridges, rather than along riparian areas (Brack and Whitaker 2001; LaVal et al. 1977). This coincides with data indicating that mature forests are an important habitat type for foraging northern long-eared bats (Caceres and Pybus 1998).

Foraging techniques include hawking and gleaning, in conjunction with passive acoustic cues (Nagorsen and Brigham 1993; Ratcliffe and Dawson 2003). Hawking is aerial foraging where the bat catches insects in flight through the use of echolocation. Gleaning is characterized by catching prey on surfaces via echolocation. The echolocation calls of this species are generally short in duration, high frequency, and of low intensity, characteristics that are difficult for some invertebrate prey to detect (Faure et al. 1993).

4.1.3. Habitat Characteristics and Use

Winter Habitat

Northern long-eared bats will typically hibernate between mid-fall through mid-spring each year. Suitable winter habitat (hibernacula) for the northern long-eared bat includes underground caves and cave-like structures (e.g. abandoned or active mines, railroad tunnels). These hibernacula typically have large passages with significant cracks and crevices for roosting. Microclimate preferences for northern long-eared bats are similar to Indiana bats and include relatively constant, cool temperatures (0-9 degrees Celsius), high humidity and minimal air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible.

Summer Habitat

The northern long-eared bat typically occupies its summer habitat from mid-May through mid-August each year. During summer, northern long-eared bats roost singly or in colonies underneath bark or in cavities, crevices, or hollows of both live and dead trees and/or snags. Studies have found tree roost selection to differ slightly between male and female northern long-eared bats, with males more readily using smaller diameter trees for roosting than females, suggesting males are more flexible in roost selection than females (Lacki and Schwierjohann 2001; Broders and Forbes 2004; Perry and Thill 2007). Males and non-reproductive females may also roost in cooler places, such as caves and mines.

In general, northern long-eared bats appear to use tree species in proportion to the tree species' availability in the forest stands. This implies that finding trees with suitable characteristics for roosting is more important than the specific tree species (Foster and Kurta 1999; Krynak 2010; Menzel et al. 2002; Sasse and Pekins 1996; Schultes 2002). Northern long-eared bats switch roosts often (Sasse and Perkins 1996), typically every 2-3 days (Foster and Kurta 1999; Owen et al. 2002; Carter and Feldhamer 2005; Timpone et al. 2010). A 2004 study by Jackson tracked 30 northern long-eared bats over two years and found the mean number of different roost used by each bat to be 8.6 (range 2 – 11).

The home range for northern long-eared bats may vary by sex. Broders et al. (2006) found home ranges of females to be larger than males. Also, Broders et al. (2006) and Henderson and Broders (2008) found foraging areas (of either sex) to be six or more times larger than roosting areas. Female summer home range size may range from 19 to 172 ha (47-425 acres) (Lacki et al. 2009). Owen et al. (2003) estimated average maternal home range size to be 65 ha (161 acres). The mean distance between roost trees and foraging areas of radio-tagged individuals in New Hampshire was 620 m (2034.1 ft) (Sasse and Perkins 1996).

Northern long-eared bats are often found roosting in intact, cluttered, interior (Broders et al. 2006, Henderson et al. 2008) and older (Carter and Feldhamer 2005, Lacki and Schwierjohann 2001, Perry and Thill 2007) forests. Roost selection is likely adaptable and variable depending on the forest characteristics (Ford et al. 2006). Northern long-eared bats readily exploited alterations to forest structure, likely due to enlargement of existing or creation of new canopy gaps (Johnson et al. 2009).

They have also been found, although rarely, roosting in structures like barns and sheds. The northern long-eared bat emerges at dusk to forage in upland and lowland woodlots and tree-lined corridors, feeding on insects, which they catch while in flight using echolocation. This species also feeds by gleaning insects from vegetation and water surfaces.

4.1.4. Numbers, Reproduction, and Distribution

The northern long-eared bat ranges across much of the eastern and north central United States (U.S.), and all Canadian provinces west to the southern Northwest Territories and eastern British Columbia (Nagorsen and Brigham 1993; Caceres and Pybus 1997) (Fig. 7). The northern long-eared bat's range includes the following 37 states and the District of Columbia: Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming. Historically, the species has been most frequently observed in the northeastern U.S. and in the Canadian Provinces of Quebec and Ontario, with sightings increasing during swarming and hibernation (Caceres and Barclay 2000). However, throughout the majority of the species' range it is patchily distributed, and historically was less common in the western portions of the range (Amelon and Burhans 2006).

Although they are typically found in low numbers in inconspicuous roosts, most records of northern long-eared bats are from winter hibernacula surveys (Caceres and Pybus 1997). More than 780 hibernacula have been identified throughout the species' range in the United States, although many hibernacula contain only a few (1 to 3) individuals (Whitaker and Hamilton 1998).

Known hibernacula (sites with one or more winter records of northern long-eared bat) include: Alabama (2), Arkansas (41), Connecticut (8), Delaware (2), Georgia (7), Illinois (21), Indiana (25), Kentucky (119), Maine (3), Maryland (8), Massachusetts (7), Michigan (103), Minnesota (11), Missouri (more than 269), Nebraska (2), New Hampshire (11), New Jersey (7), New York (90), North Carolina (22), Oklahoma (9), Ohio (7), Pennsylvania (112), South Carolina, (2), South Dakota (21), Tennessee (58), Vermont (16), Virginia (8), West Virginia (104), and Wisconsin (67). Other states within the species' range have no known hibernacula, which may be due to either no suitable hibernacula present or a lack of survey effort. They are typically found roosting in small crevices or cracks on cave or mine walls or ceilings and, thus, are easily overlooked during surveys and usually observed in small numbers (Griffin 1940; Barbour and Davis 1969; Caire et al. 1979; Van Zyll de Jong 1985; Caceres and Pybus 1997; Whitaker and Mumford 2009).

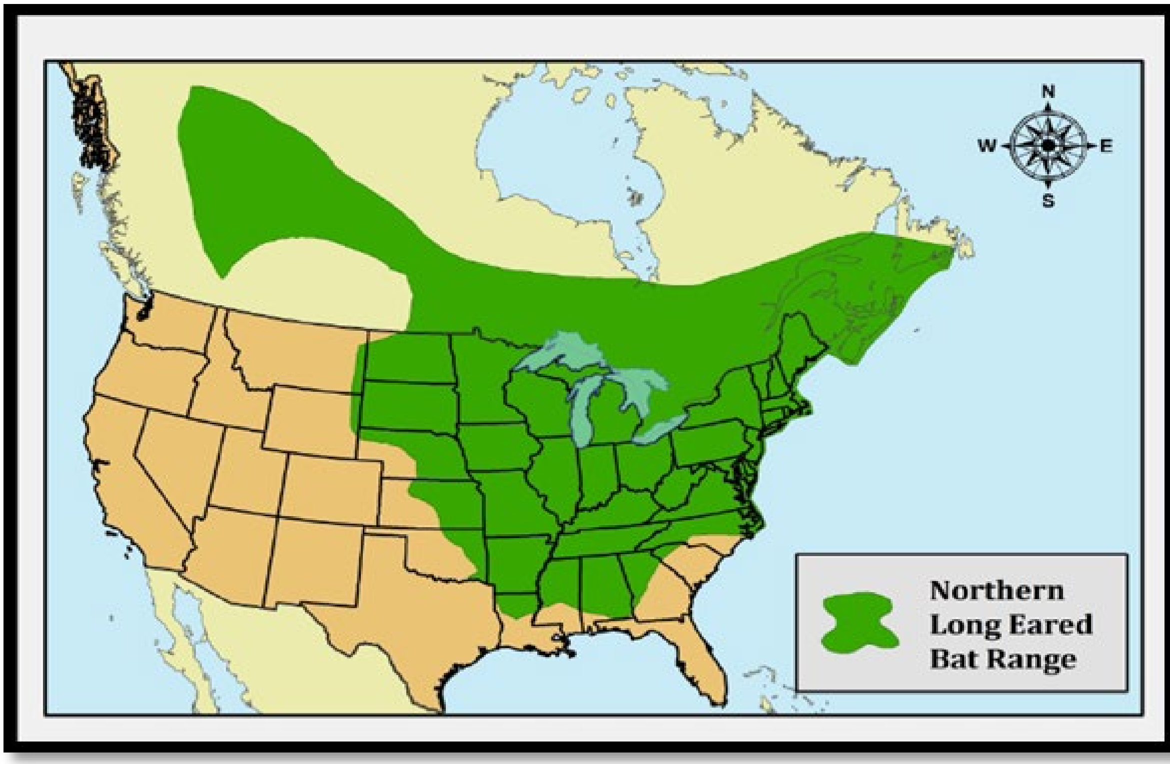

Figure 7. Range of the Northern Long-eared Bat.

4.1.5. Conservation Needs and Threats of the Northern Long-eared Bat

In recent years, no other threat is more severe and immediate for northern long-eared bat than WNS. WNS has spread rapidly in bat populations from the Northeast to the Midwest and Southeast and it is unlikely that northern long-eared bat populations would be declining so dramatically without the impact of WNS. Turner et al. (2011) reported a 98 percent decline in the number of hibernating northern long-eared bats at 30 hibernacula in New York, Pennsylvania, Vermont, Virginia, and West Virginia after WNS was documented at those sites. In hibernacula surveys in New York, Vermont, Connecticut, and Massachusetts, Langwig et al. (2012) reported larger declines in hibernacula with larger pre-WNS populations of northern long-eared bats, suggesting a density-dependent decline due to WNS. Although some species' populations stabilized at drastically reduced levels compared to pre-WNS (e.g., tri-colored bat, Indiana bat), each of the 14 populations of northern long-eared bats evaluated within the study became locally extinct within 2 years due to disease presence and none of these populations were remaining 5 years post-WNS (Langwig et al. 2012). However, due to their life-history trait of favoring small cracks or crevices in cave ceilings, which makes them more challenging to locate during hibernacula surveys, hibernacula data in some states (particularly those with a greater number caves with more cracks or crevices) may not give an entirely clear picture of the level of decline the species is experiencing (Turner et al. 2011). When dramatic declines due to WNS occur, the overall rate of decline appears to vary by site; some sites experience the progression from the detection of a few bats with visible fungus to wide-spread mortality after a few weeks and at other sites after a year or more (Turner et al. 2011). It appears likely that WNS will spread throughout most of the range of the species, and addressing the threat of WNS is their first and foremost conservation need.

The proposed listing rule only briefly discusses other threats to the species since the emergence of WNS is the cause of the dramatic declines experienced by the species that prompted listing under the ESA (78 FR 61080). Other factors do pose as threats to the species, especially in conjunction with WNS; these include modification to hibernacula, disturbance to hibernating bats, forested removal, and collision with wind turbines.

4.2. ENVIRONMENTAL BASELINE – NORTHERN LONG-EARED BAT

The Environmental Baseline analyzes the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and the ecosystem within the Action Area. The environmental baseline is a "snapshot" of the species' health in the Action Area at the time of the consultation, and does not include the effects of the Action under review.

4.2.1. Action Area Numbers, Reproduction, and Distribution

Winter Hibernation (November 15 – March 31)
There are no previously documented northern long-eared bat hibernacula in the Action Area. The June 4, 2018 habitat assessment report describes that no caves or karst topography were found during field investigations in the survey area. Based on this assessment, it is unlikely that northern long-eared bats use the Action Area during hibernation.

Spring Staging (April 1 – May 14)
The Service's Kentucky Field Office uses a 0.8 km (0.5 mile) buffer around northern long-eared bat hibernacula entrances to identify spring staging areas (USFWS 2016). The project area is more than 32.2 km (20 miles) from the nearest hibernaculum. The Service considers it unlikely that unknown northern long-eared bat spring staging habitat is present within the Action Area due to the lack of potentially suitable winter habitat discussed above. As a result, the Service does not believe that northern long-eared bats use the Action Area during spring staging.

Summer (April 1 – August 15)
The Action Area contains approximately 1,100 acres of forested habitat. Most of this forested habitat is in the southwest part of the Action Area in and around the proposed construction limits. This forested area contains mature forest interspersed with open fields and streams. Much of the forested areas within the construction limits contain some clutter in the understory from bush honeysuckle and/or young trees. The multiple corridors through the forested areas and the forested edges of open fields would facilitate flight through the landscape. Stream corridors provide foraging and commuting habitat (Fig. 5).

The habitat is about 19.3 km (12 mi.) from the edge of the buffer of the closest northern long-eared bat record (Fig. 8). There is another buffer within about 20 km (12.4 mi.). These buffers represent the extent of the habitat considered used by that recorded maternity colony, based on the biology of the species (USFWS 2016).

The area around in the Action Area is rapidly developing with the expansion of the greater Cincinnati metropolitan area to the north. Much of the area immediately to the south and west of CVG are low-density residential development (Fig. 7, section 4.2). The landscape surrounding this area is dominated by forests and fields and contains forested stream corridors connecting habitat through developed areas. Based on our knowledge of the species' biology, the presence of suitable habitat in the Action Area, and the connectivity of that habitat with other habitat on the landscape, the Action Area could support northern long-eared bats.

The FAA has chosen not to survey for the species within the Action Area. In the absence of summer species survey data, the FAA has chosen to assume presence of the species in the Action Area during the summer. Thus, we are assuming that northern long-eared bats use the Action Area from April 1 – August 15 for roosting, foraging, and commuting. Specifically, we are assuming that a northern long-eared bat maternity colony occurs within the construction limits of the project. We assume that the maternity roosting area within a maternity home range comprises 161 acres (Owen et al. 2003). Because of the 3.2% post-WNS occupancy rate of the species in Kentucky (35 out of 1,097 sites) (USFWS, 2018, unpublished data), we do not expect more than one colony in the Action Area. Without additional information, we will assume that all the maternity colony's roost trees are within the 238.78 forested acres that would be removed and that the colony also uses this area for foraging and commuting. Based on the species biology and the information we have on the composition of known maternity colonies, we assume that this maternity colony consists of 45 adult females that will arrive in the construction limits after migrating from their hibernacula. Based on an assumed sex ratio of 1:1, we assume that 45 adult males correspond with the maternity colony. All of these 45 males are expected to use the construction limits for roosting, foraging, and commuting. We assume that each of the 45 females will produce one pup; this will occur after the forested habitat is removed from the site. In summary, we assume that 135 northern long-eared bats (45 adult females, 45 adult males, and 45 juveniles) use the forested habitat in the Action Area for commuting and foraging. Of those northern long-eared bats, 90 (45 adult females and 45 adult males) will return from hibernation to roost in the forested habitat within the construction limits. The 45 juveniles will be born in the maternity colony within the construction limits in June.

Fall Swarming (August 16 – October 14)

The Service estimates the fall swarming range as a 8 km (5-mi.) buffer around a northern long-eared bat hibernacula entrance (USFWS 2016). The project area is more than 32.2 km (20 miles) from the nearest hibernaculum. The Service considers it unlikely that unknown northern long-eared bat swarming habitat is present within the Action Area due to the lack of potentially suitable winter habitat discussed above. As a result, the Service does not believe that northern long-eared bats use the Action Area during fall swarming.

Summary

We consider the Action Area occupied by northern long-eared bats from April 1 – August 15. During this time, 135 northern long-eared bats (45 adult males, 45 adult females, and 45 juveniles) will use the forested habitat in the Action Area for foraging and commuting. Of those northern long-eared bats, 90 (45 adult males and 45 adult females) will return from hibernation to roost in the forested habitat within the construction limits. During the summer roosting period, 45 juveniles will be born in the construction limits.

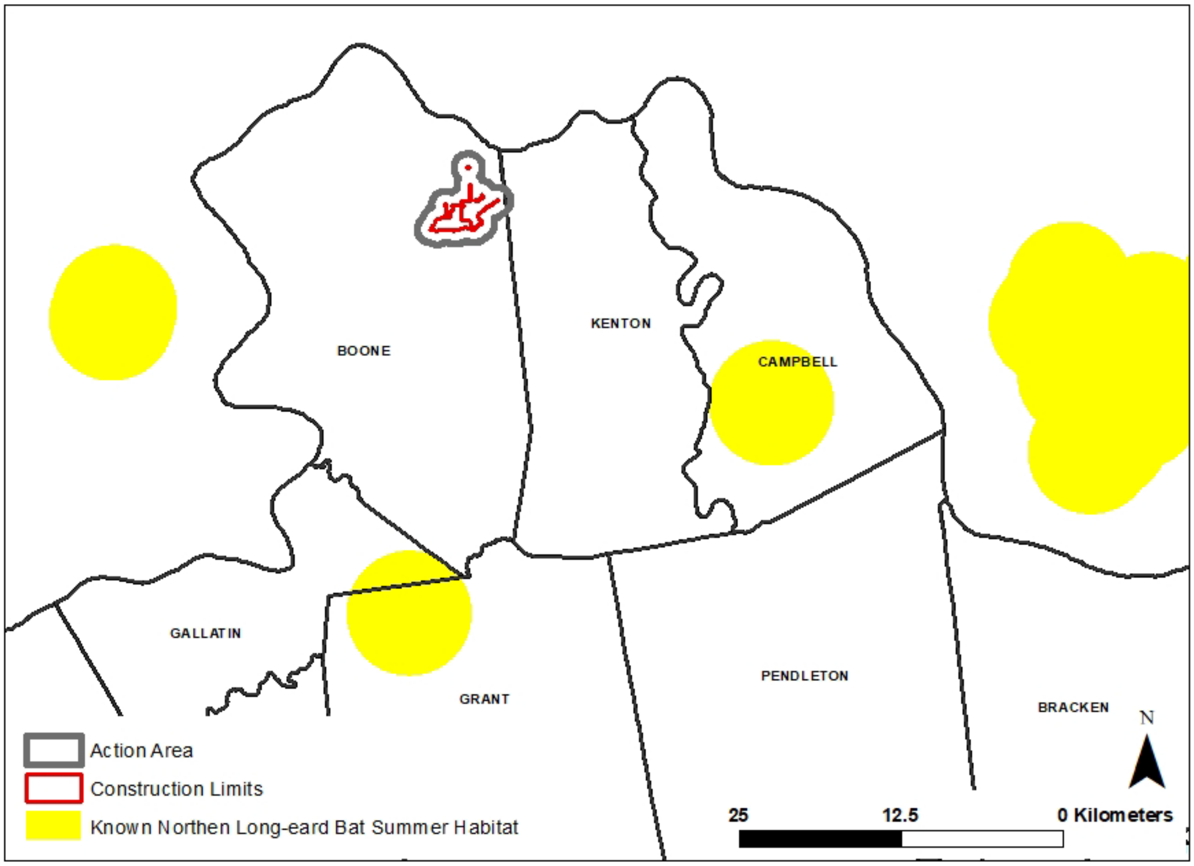

Figure 8. The Action Area in relation to known northern long-eared bat habitat in the surrounding landscape.

4.2.2. Action Areas Conservation Needs and Threats

Northern long-eared bats in the Action Area are likely exposed to the same threats that the species is exposed to across the range. These are discussed in section 4.5. Below we discuss the two most pertinent to this consultation.

White-nose Syndrome

The occurrence and spread of WNS in Kentucky is discussed in section 3.2.2. Because other bats that share hibernacula with northern long-eared bats can migrate hundreds of miles from their hibernacula and WNS has been documented from Kentucky and all of the adjacent states, we assume that all the northern long-eared bats that are known and assumed to occupy habitat within the Action Area have been exposed to WNS. Therefore, northern long-eared bats in the Action Area are expected to be experiencing stress and reduced body weights from their exposure to WNS.

Forest Loss and Fragmentation
Changes in land use, management and forest structure influences the location, quality, and quantity of suitable forested habitat. The area around the Action Area is rapidly losing forested habitat as development from the Cincinnati metropolitan area encroaches from the north.

4.3. EFFECTS OF THE ACTION – NORTHERN LONG-EARED BAT

This section analyzes the direct and indirect effects of the Action on the northern long-eared bat, which includes the direct and indirect effects of interrelated and interdependent actions. Direct effects are caused by the Action and occur at the same time and place. Indirect effects are caused by the Action, but are later in time and reasonably certain to occur.

Based on the description of the Action in section 2.0 and the species' biology in section 4.0, we have identified four stressor(s) to the northern long-eared bat (i.e., the alteration of the environment that is relevant to the species) that may result from the Action: noise and vibration, night lighting, aquatic resource loss and degradation, and tree removal. Below, we discuss the best available science relevant to each stressor. Then, we describe the Stressor-Exposure-Response pathways that identify the circumstances for an individual bat's exposure to the stressor (i.e., the overlap in time and space between the stressor and a northern long-eared bat). Finally, we identify and consider how proposed conservation measures may reduce the severity of the stressor or the probability of an individual bat's exposure for each pathway.

4.3.1. Noise and Vibration

Noise and vibration are stressors that may disrupt bats by causing individuals to flush from roost trees during the day and/or night timeframes, and/or alter travel corridors and foraging behaviors. Bats may be exposed to this stressor during both the construction and operation components of the Action. Significant changes in noise levels in an area could result in temporary to permanent alteration of bat behaviors. The novelty of these noises and their relative volume levels will likely dictate the range of responses from individuals or colonies of bats.

Noise and vibration will occur during both the construction and operation components of the Action. During site preparation, part of the construction component of the Action, the felling of trees and operation of heavy equipment and tools will produce noise and vibrations. This could occur during any time of the year. Noise and vibration will occur on the site during other construction activities and during the operation of the facility. During most of the other construction activities and the operation component, the site will be absent of trees and natural vegetation and will no longer provide habitat for the northern long-eared bat. The bats that currently use the site are exposed to noise and vibration from adjacent existing CVG facilities, interstate and major highways, and other urban and commercial land uses; therefore, we would expect them to be habituated to noise and vibration to some extent.

Applicable Science
A literature search revealed no northern long-eared bat-specific studies related to noise/vibration; however, due to the information available for similar tree-roosting bat species it is reasonable to assume that noise/vibration is also a stressor on the northern long-eared bat. Therefore, the

applicable science for this stressor is the same as that used previously for the Indiana bat (see section 3.3.1).

Effects Pathway – Northern long-eared bat #1	
Activity: Construction	
Stressor: Noise and vibration	
Exposure (time)	April 1 – October 14, 2019
Exposure (space)	Roosting and foraging habitat throughout Action Area
Resource affected	Individuals (adults, juveniles)
Individual response	• Flushing from roost trees results in extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Flushing from roost trees will increase chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.
Interpretation	Bats may become startled by the noise and/or vibrations and flush from their roosts. Most of the activities causing this stressor will occur concurrently with habitat removal or after the habitat has been removed when the species would no longer be present in the construction limits. Northern long-eared bats exposed to this stressor during habitat removal are likely to respond in a way that would lead to adverse effects. Northern long-eared bats exposed to this stressor during the construction phase after habitat removal would be exposed to low levels of this stressor and, because of their current proximity to other sources of noise and vibration, we expect them to be habituated and to respond minimally to the stressor.
Effect	Adverse, harm

Effects Pathway – Northern long-eared bat #2	
Activity: Operation	
Stressor: Noise and vibration	
Exposure (time)	April 1 – October 14; indefinitely
Exposure (space)	Roosting and foraging habitat throughout Action Area
Resource affected	Individuals (adults, juveniles)
Individual response	• Flushing from roost trees results in extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Flushing from roost trees will increase chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.

Interpretation	The activities causing this stressor during operation will occur after the habitat has been removed. Thus, northern long-eared bats exposed will be limited to those using habitat on the margins of the facility. The bats that remain within the Action Area during the operation of the new facility are already exposed to noise and vibration from adjacent existing CVG facilities, interstate and major highways, and other urban and commercial land uses. We would expect them to be habituated to this. We do not expect the additional noise and vibration contributed by the proposed Action to significantly increase the stressor in the Action Area. We do not expect northern long-eared bats to respond to the additional noise and vibration during operation in a way that would be significant.
Effect	Insignificant

4.3.2. Night Lighting

Lighting will be involved during the construction and operation of the facility. Lighting during construction will be minimal, occurring in the early morning, late evening, and, rarely, at night. Forested areas will not be lit; lighting will occur in areas already cleared of trees, and no lighting will be needed to remove trees. Once construction is complete, the safe operation of the air cargo hub facility will require artificial lighting to illuminate the new aircraft apron, connections to existing CVG runways, roadways, and parking areas.

Applicable Science
A literature search revealed no northern long-eared bat-specific studies related to night lighting; however, due to the information available for similar tree-roosting bat species it is reasonable to assume that noise/vibration is also a stressor on the northern long-eared bat. Therefore, the applicable science for this stressor is the same as that used previously for the Indiana bat (see section 3.3.2).

Effects Pathway – Northern Long-eared Bat #3	
Activity: Construction	
Stressor: Night lighting	
Exposure (time)	April 1 – August 15; temporary
Exposure (space)	Roosting, foraging, and commuting habitat in and near construction limits
Resource affected	Habitat, used by individuals (juveniles, adults)
Individual response	• Increased visibility to predators increases chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.

Interpretation	Northern long-eared bats will likely avoid areas lit within the construction limits because they will be lit after they are cleared of suitable habitat. Northern long-eared bats that use the periphery of the construction limits will likely be habituated to lighting already in the area and not significantly impacted by the additional lighting of the construction of the proposed project.
Effect	Insignificant, discountable

Effects Pathway – Northern Long-eared Bat #4	
Activity: Operation	
Stressor: Night lighting	
Exposure (time)	April 1 – August 15; perpetuity
Exposure (space)	Roosting, foraging, and commuting habitat in and near project footprint
Resource affected	Habitat, used by individuals (juveniles, adults)
Individual response	• Increased visibility to predators increases chances of predation. • Avoidance of the stressor can require extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.
Interpretation	Northern long-eared bats will likely avoid areas lit within the construction limits because they will be lit after they are cleared of suitable habitat. Northern long-eared bats that use the periphery of the construction limits will likely be habituated to lighting already in the area and not significantly impacted by the additional lighting of the operation of the proposed project.
Effect	Insignificant, discountable

4.3.3. Aquatic Resource Loss and Degradation

The proposed Action would permanently impact 8,815 linear feet (lf) of perennial stream in the Gunpowder Creek drainage. In the absence of specific information about the nature of the impacts, we are assuming that the proposed impacts would render the 8,815 lf of perennial streams in the Action Area unusable by northern long-eared bat for foraging and drinking and destroy the potential for production of northern long-eared bat prey in these reaches. Impacts to streams may affect northern long-eared bats indirectly by degrading the quality of aquatic resources downstream of the construction limits and reducing aquatic insect populations that make up part of their diet. Water quality may be degraded as a result of increased sedimentation during construction or the discharge of hazardous materials during construction or operation. Hazardous materials that could potentially contaminate water include diesel fuel, gasoline, hydraulic fluids, oils, lubricants, solvents, adhesives, battery chemicals, deicing agents, and herbicides. Spills and/or leakage of these materials into the environment could affect water quality resulting in reduced densities of aquatic insects that bats consume.

Applicable Science

Northern long-eared bats occasionally forage over water, and insects with aquatic larvae (e.g., flies, caddisflies) comprise a portion, but not the majority, of their diet. The northern long-eared bat has a diverse diet including moths, flies, leafhoppers, caddisflies, and beetles (Nagorsen and Brigham 1993; Brack and Whitaker 2001; Griffith and Gates 1985), with diet composition differing geographically and seasonally (Brack and Whitaker 2001).

The applicable science for how increased in sedimentation can decrease aquatic insects is the same as that used previously in the BO for the Indiana bat (see section 3.3.3).

Effects Pathway – Northern Long-eared Bat #5	
Activity: Construction	
Stressor: Aquatic resource loss	
Exposure (time)	perpetuity
Exposure (space)	Foraging habitat within the construction footprint
Resource affected	Habitat, used by individuals (juveniles, adults)
Individual response	• Increased fight distances to access foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success.
Interpretation	Northern long-eared bats are expected to utilize other foraging habitat in the vicinity.
Effect	Insignificant

Effects Pathway – Northern Long-eared Bat #6	
Activity: Construction	
Stressor: Aquatic resource degradation, sedimentation	
Exposure (time)	Temporary, during 18 month construction period
Exposure (space)	Aquatic foraging habitat downstream of the project site.
Resource affected	Prey (aquatic insects), used by individuals (juveniles, adults)
Individual response	• Increased effort to access sufficient foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success.
Interpretation	BMPs associated with the 404 permit to limit impacts to streams on site and downstream aquatic resources.
Interpretation	We expect the effects of sedimentation of aquatic resources to be temporary and minimal due to the temporary nature of the activity and implementation of the conservation measure.
Effect	Insignificant

Effects Pathway – Northern Long-eared Bat #7	
Activity: Construction and Operation	
Stressor: Aquatic resource degradation, pollutants	
Exposure (time)	Perpetuity
Exposure (space)	Aquatic foraging habitat downstream of the project site.

Resource affected	Prey (aquatic insects), used by individuals (juveniles, adults)
Individual response	• Increased effort to access sufficient foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success.
Conservation Measures	• Implementation of BMPs associated with the 404 permit to limit impacts to streams on site and downstream aquatic resources. • Installation of vegetated shoulders, swales, and storm water treatment areas to filter contaminants out of water before entering streams. • Limiting use of deicing agents to only the amount necessary.
Interpretation	We expect that implementation of the conservation measure will minimize and/or prevent contamination from pollutants.
Effect	Insignificant, discountable

4.3.4. Tree Removal

The Action Area contains 1,100 acres of forested habitat, comprising 20% of the Action Area. The Action would result in the removal and loss of 238.78 acres of forested habitat, approximately 22% of the forested habitat within the Action Area. Of the total 238.78 acres to be removed, 122 acres would be removed from February – March and 116.78 acres would be removed from April – May. The trees removed during the April – May timeframe may be occupied by northern long-eared bats when they are removed. We do not know which trees will be removed during the occupied timeframe or exactly which trees northern long-eared bats would be occupying. The resulting forested habitat loss would be permanent. The loss of this habitat would create a larger gap in forested habitat between the largest block of forested habitat within the Action Area and potential foraging corridors in the Dry Creek watershed to the east (Fig. 5, section 3.2.1).

Loss of Roost Trees (Occupied) – Applicable Science

The literature we reviewed contains no reports of northern long-eared bat mortality resulting from roost tree removal; however, the risk of injury or death from being crushed when a tree is felled is expected to be similar to the reports and studies referenced for the Indiana bat in section 3.3.4.

Effects Pathway – Northern Long-eared Bat #8	
Activity: Construction	
Stressor: Tree removal, loss of roost trees (occupied)	
Exposure (time)	April – May 2019
Exposure (space)	116.78 forested acres
Resource affected	Habitat (roost trees), used by individuals (adults)
Individual response	• Bats struck by equipment or crushed by a felled tree will be injured or die. • Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success.

	• Colony fragmentation could decrease thermoregulation efficiency / decreased foraging efficiency that can decrease fitness and result in reduced survival / reproductive success. Colony fragmentation will increase the risk of predation.
Conservation Measures	No tree clearing will occur when non-volant pups would likely be present (June 1 – July 31). This minimizes the severity of effects on the Indiana bat by avoiding direct effects to non-volant pups.
Interpretation	Bats occupying trees that are removed may be injured or killed. Injured bats may subsequently die. Those that survive will have to spend extra energy in addition to what is necessary to for foraging, pup rearing, social interactions, or other activities. The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors (e.g., WNS), is likely to reduce fitness and subsequently reduce survival and reproductive success.
Effect	Harm, direct or indirect

<u>*Loss of Roost Trees (Unoccupied) – Applicable Science*</u>

Much of the literature reviewed regarding indirect effects resulting from roost tree loss involved several species of tree roosting bats and overlaps with the applicable science for the Indiana bat. However, there have also been northern long-eared bat studies conducted within the Action Area. Silvis et al. (2014) tracked three maternity colonies of northern long-eared bats to evaluate their social and resource networks (i.e., roost trees) during a study at Fort Knox. Roost and social network structure differed between maternity colonies, and roost availability was not strongly related to network characteristics or space use. In model simulations based on the tracking data, removal of more than 20 percent of roosts initiated social network fragmentation, with greater loss causing more fragmentation. Sociality among bats may contribute to reproductive success, and fragmented colonies may experience reduced success. In the same Fort Knox study area with the same three maternity colonies, Silvis et al. (2015) removed a primary maternity roost tree during winter from one colony, 24 percent of the secondary roosts from another colony, and none from the third. Neither removal treatment altered the number of roosts used by individual bats, but secondary roost removal doubled the distances moved between sequentially used roosts. These effects may be compounded in the Action Area because most of the returning bats are coming from hibernacula infected with white-nose syndrome (WNS), as discussed in section 3.3.4.

Effects Pathway – Northern Long-eared Bat #9	
Activity: Construction	
Stressor: Tree removal, loss of roost trees (unoccupied)	
Exposure (time)	One time removal; removal will expose individuals to indirect effects from April 1 – October 14.
Exposure (space)	122 forested acres
Resource affected	Habitat (roost trees), used by individuals (adults)

Individual response	• Increased effort to find new suitable roosting habitat requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Colony fragmentation could decrease thermoregulation efficiency / decreased foraging efficiency that can decrease fitness and result in reduced survival / reproductive success. • Colony fragmentation will increase the risk of predation.
Conservation Measures	This habitat will be removed from February 1 – March 31 when it would not be used by northern long-eared bats.
Interpretation	Direct effects are avoided. Adult northern long-eared bats will experience indirect effects after they arrive at their summer roosting habitat the first year after tree removal. The extra energy to find new habitat is in addition to what is necessary for foraging, pup rearing, social interactions, or other activities. The use of additional energy in response to habitat loss, especially when combined with the energy needs associated with normal life cycle processes (e.g., migration, pregnancy, lactation, etc.) or other stressors (e.g., WNS), is likely to result in adverse effects. Northern long-eared bats are expected to adapt to this stressor in subsequent years after they have found new suitable habitat.
Effect	Harm, indirect

Forest Loss and Fragmentation – Applicable Science
Much of the literature reviewed regarding the effects of forest loss and fragmentation on the northern long-eared bat involved several species of tree roosting bats and overlaps with the applicable science for the Indiana bat (Section 3.3.4). Though conducted in Canadian forests, a study by Henderson et al (2008) suggests that fragmentation of forests affects the distribution of northern long-eared bats through the loss of forest cover and specifically the loss of deciduous stands. Further, the study determined that while male northern long-eared bats appear to be affected at the landscape level by fragmentation, females appear to be affected at the fragment level. Therefore, it is expected that if forest fragments do not contain a large enough roosting resource base to support a colony, female northern long-eared bats will not be present. In summary, their study concluded that although northern long-eared bats are highly mobile, a specialization on forest resources can produce sensitivity to the effects of forest fragmentation.

Effects Pathway – Northern Long-eared Bat #10	
Activity: Construction	
Stressor: Tree removal, forest loss and fragmentation	
Exposure (time)	One time removal; exposure will be permanent
Exposure (space)	238.78 forested acres
Resource affected	Forested habitat, used individuals (juveniles, adults)
Individual response	• Increased fight distances to access foraging resources requires extra energy expenditure that can reduce fitness and result in reduced survival / reproductive success. • Reduced foraging efficiency can reduce fitness and result in reduced survival / reproductive success.

	• Increased visibility to predators increases chances of predation.
Interpretation	The loss of roost trees will adversely affect northern long-eared bats the first year after the removal of those trees (discussed in effects pathway #9). We expect them to find new roosting habitat that they will continue to use in subsequent years. The tree removal will create a larger gap in habitat between the Gunpowder Creek tributaries and the Dry Creek tributaries that northern long-eared bats may be using for foraging and commuting habitat. The gap would make access this other drainage difficult, requiring more energy expenditure and/or exposure to predators, or would cut off access to habitat altogether. The 135 individuals that use the Action Area in the summer after habitat removal are expected to respond in a way that would lead to harm of the individuals.
Effect	Harm

4.3.5. Collision

The increased number of aircraft to CVG in response to the new air cargo hub will increase the opportunity for collisions with bats.

Applicable Science
The risk of aircraft collision to bats is discussed in section 3.3.5 and would apply to northern long-eared bats.

Effects Pathway – Northern Long-eared Bat #11	
Activity: Operation	
Stressor: Collisions with aircraft	
Exposure (time)	April 1 – October 14; indefinitely
Exposure (space)	Runways and airways at and around CVG
Resource affected	Individuals (juveniles, adults)
Individual response	Collision with aircraft will cause injury and/or mortality.
Interpretation	The incidence of bat collisions with aircraft is relatively low. The relatively low occurrence rate of bat collisions with aircraft coupled with the relatively minor increase in air traffic that the new air cargo hub would bring to the air traffic already at CVG makes any increase in northern long-eared bat deaths that would be attributable to the proposed Action undetectable.
Effect	Discountable

4.3.6. Conservation Measures

The first two Conservation Measures listed in the description of the proposed Action directly relate to specific stressors and are discussed with those relevant stressors in the above sections. Those conservation measures will not be discussed further in this section. This section will discuss the effects of the third conservation measure, the contribution to the IBCF. The funds in the IBCF are used to permanently protect Indiana bat and northern long-eared bat habitat in

Kentucky for the conservation and recovery of the species. This conservation measure would have a beneficial effect on the northern long-eared bat by ensuring that the species has suitable habitat available for roosting, commuting, and foraging during the summer and/or fall swarming periods of their lifecycle. As this benefit would occur in the future, we cannot quantify the effect it will have.

4.3.7. Summary of Effects

The proposed Action would expose the northern long-eared bat to seven stressors that we have identified. Sections 4.3.1 - 4.3.5 evaluated the effects of the stressors; this is summarized below in Table 3. We identified three stressors as likely to adversely affect the northern long-eared bat: noise and vibration, loss of roost trees, and forest loss and fragmentation. We believe the remaining stressors would have insignificant or discountable effects on the species. In addition to the identified stressors, the conservation measure described will have a beneficial effect on the northern long-eared bat (see section 4.3.6).

Table 3. A summary of the effects of the Action on the northern long-eared bat.

Stressors	**Adverse**	**Insignificant/ Discountable**
Noise and vibration, during construction	x	
Noise and vibration, during operation		x
Night lighting		x
Aquatic resource loss		x
Aquatic resource degradation		x
Tree removal, loss of roost trees	x	
Tree removal, forest loss and fragmentation	x	
Collison		x

4.3.8. CUMULATIVE EFFECTS

For purposes of consultation under ESA §7, cumulative effects are the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future Federal actions that are unrelated to the proposed Action are not considered, because they require separate consultation under §7 of the ESA. No cumulative effects were identified by the applicant and none are anticipated by the Service.

4.4. CONCLUSION – NORTHERN LONG-EARED BAT

In this section, we summarize and interpret the findings of the previous sections (status, baseline, effects, and cumulative effects) relative to the purpose of a BO under §7(a)(2) of the ESA, which is to determine whether a Federal Action is likely to:

c) jeopardize the continued existence of species listed as endangered or threatened; or
d) result in the destruction or adverse modification of designated critical habitat.

"Jeopardize the continued existence" means to engage in an Action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02).

We have considered the status of the species across its range, the status of the species within the Action Area, and the effects of the Action to the northern long-eared bat. In our effects analysis, we identified how northern long-eared bats would be adversely affected by the Action. We estimated that 90 northern long-eared bats will arrive at the construction limits of the project after migrating from their hibernacula to use the habitat for roosting, foraging, and/or commuting. All those have the potential to be adversely affected by noise and vibration and/or removal of their roost trees, either indirectly while they are unoccupied or directly while they are occupied. Juveniles will not be affected by these stressors, because they will be born after the tree removal occurs. All 135 of the northern long-eared bats that would use the construction limits for foraging and/or commuting (after the pups are born) would be indirectly harmed by the loss and fragmentation of foraging and commuting habitat. We assume that, as a result of the Action, 135 northern long-eared bats will experience indirect harm.

Further, the contribution to the Imperiled Bat Conservation Fund is expected to promote the survival and recovery of the species through protecting and managing existing forested habitat suitable to support the species, particularly those that would expand existing conservation ownerships.

4.5. INCIDENTAL TAKE STATEMENT – NORTHERN LONG-EARED BAT

ESA §9(a)(1) and regulations issued under §4(d) prohibit the take of endangered and threatened fish and wildlife species without special exemption. The term "take" in the ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (ESA §3). In regulations at 50 CFR §17.3, the Service further defines:

- "harass" as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering;"
- "harm" as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife

by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering;" and

- "incidental take" as "any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity."

Regulations issued under ESA §4(d) prohibit the taking of the northern long-eared bat under specific conditions and circumstances, which are more limited than under the definitions above. These prohibitions include incidental take of northern long-eared bats in their hibernacula and from tree removal activity if it: (1) occurs within 0.25 miles of known northern long-eared bat hibernacula or (2) cuts or destroys known, occupied maternity roost trees or any other trees within a 150-foot radius around a known, occupied maternity tree during the pup season (June 1 to July 31) (50 CFR §17.40). In this BO, we anticipate that tree removal will cause the incidental take of northern long-eared bats. However, no hibernacula will be affected and no known northern long-eared bat roost trees or trees within a 150-foot radius or known roost trees will be removed during June or July. Therefore, such taking is (1) not prohibited under the northern long-eared bat 4(d) rule and (2) does not require special exemption through an incidental take statement.

4.5.1. Amount or Extent of Take Anticipated

In this section we quantify the amount or extent of take of the northern long-eared bat that the Action is reasonably certain to cause. This take is excepted under the 4(d) rule for the species and is, therefore, not prohibited. We estimated the take in the "Effects of the Action" section of this BO. We reference, but do not repeat, these analyses here.In response to the project proponent's decision to assume presence of the species in the Action Area without providing site-specific species occurrence data, we had to make certain assumptions, based on the best available scientific and commercial data, to estimate that number of individuals (see section 3.2, Environmental Baseline). We evaluated the potential for these individuals to be exposed to the stressors resulting from the proposed Action. Finally, relying on the best available scientific and commercial data, we evaluated how the individuals' responses to their exposure to these stressors would apply to the statutory and regulatory definition of take (see section 4.3, Effects of the Action). From our evaluation, the Service anticipates that the proposed Action is reasonably certain to cause the incidental take of 135 individual northern long-eared bats consistent with the definition of harm (Table 4). This take is excepted under the 4(d) rule for the species.

Table 4. Summary of expected incidental take resulting from the Action. This take is excepted under the 4(d) rule for the species.

Species	# of Individuals	Take Type
Northern long-eared bat	135	Harm, not prohibited

The Service anticipates the incidental taking of northern long-eared bats associated with this project will be difficult to detect for the following reasons:

- The individuals are small, mostly nocturnal, and when not hibernating, occupy forested habitats where they are difficult to observe;
- The northern long-eared bat forms small maternity colonies under loose bark, in crevices, or in the cavities of trees, and males and non-reproductive females may roost individually, which makes finding roost trees difficult;
- Finding dead or injured specimens during or following project implementation is unlikely; and
- The take is in the form of non-lethal harm that is difficult to observe (e.g., reduced reproductive success).

Because of the difficulty in determining a level of take based on the number of bats that will be adversely affected, the Service has decided, instead, that it is appropriate to base the level of exempted incidental take on the acreage of suitable roosting habitat that will be affected by the Action. Therefore, the level of take anticipated in this BO is all 135 northern long-eared bats expected to use the 238.78 acres of forested habitat in the construction limits. This surrogate measure sets a clear standard for determining when the extent of taking is exceeded, because all anticipated take will result from habitat removal. Due to the difficulty of detecting take of the northern long-eared bat caused by the Action, the FAA will monitor the extent of taking using this surrogate measure. Instructions for monitoring and reporting take are provided in section 4.8.

The amount of take was determined based on the proposed Action as described in section 2 of this BO and includes the conservation measures listed in section 2.4. The FAA shall ensure that the project will occur as designed, planned, and documented in this BO.

4.5.2. Reasonable and Prudent Measures

The FAA has coordinated with the Service during the consultation process and has incorporated appropriate conservation measures into the proposed Action to minimize the effects of the Action on the northern long-eared bat. The Service does not have additional measures to include as reasonable and prudent measures (RPMs) in this BO.

4.5.3. Terms and Conditions

Terms and Conditions (T&Cs) detail the implementation of RPMs. This BO does not include any (T&Cs) as there are no RPMs.

4.5.4. Monitoring and Reporting Requirements

In order to monitor the impacts of incidental take, the FAA must report the progress of the Action and its impact on the species to the Service as specified in the incidental take statement (50 CFR §402.14(i)(3)). This section provides the specific instructions for such monitoring and reporting. As necessary and appropriate to fulfill this responsibility, the FAA must require any permittee, contractor, or grantee to accomplish the monitoring and reporting through enforceable terms that are added to the permit, contract, or grant document. Such enforceable terms must include a requirement to immediately notify the FAA and the Service if the amount or extent of incidental take specified in this ITS is exceeded during Action implementation.

The FAA will monitor the take of this project by (1) ensuring that all of the identified Conservation Measures are implemented and maintained, as necessary, by the contractor(s) and (2) informing the Service as soon as possible if the amount of take is exceeded or if any northern long-eared bats are observed or injured within the project area. The FAA will report any changes or deviations to the above monitoring requirements to the Service's Kentucky Field Office as soon as possible.

5. CONSERVATION RECOMMENDATIONS

§7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by conducting conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary activities that an Action Agency may undertake to avoid or minimize the adverse effects of a proposed action, implement recovery plans, or develop information that is useful for the conservation of listed species. The Service has not identified any conservation recommendations for this BO.

6. RE-INITIATION NOTICE

Formal consultation for the Action considered in this BO is concluded. Reinitiating consultation is required if the FAA retains discretionary involvement or control over the Action (or is authorized by law) when:

a) the amount or extent of incidental take is exceeded;
b) new information reveals that the Action may affect listed species or designated critical habitat in a manner or to an extent not considered in this BO;
c) the Action is modified in a manner that causes effects to listed species or designated critical habitat not considered in this BO; or
d) a new species is listed or critical habitat designated that the Action may affect.

This consultation was assigned FWS ID #04EK1000-2017-F-0412. Please refer to this number in any correspondence concerning this consultation.

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Appendix D

APPENDIX D
HAZARDOUS MATERIALS

This appendix contains the Executive Summaries for the Phase I Environmental Site Assessments for the Detailed Study Area. The full document was not included due to its large size. However, upon request the full document can be provided.

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PHASE I ENVIRONMENTAL SITE ASSESSMENT

Project Janus – Southern Portion

Aero Parkway

Florence, Kentucky 41042

Submitted To: Mark C. Griffin

Transactions, NA Operations Real Estate

399 Fairview Ave North

Seattle, WA 98109

Submitted By: Golder Associates Inc.

1335 Dublin Road, Suite 126-D

Columbus, Ohio 43215 USA

Distribution: Amazon

October 20, 2017 **Project No. 1671158**

A world of capabilities delivered locally

Golder Associates

October 20, 2017 Project No. 1671158

Mark C. Griffin
Transactions, NA Operations Real Estate
399 Fairview Ave North
Seattle, WA 98109

RE: REPORT ON THE PHASE I ENVIRONMENTAL SITE ASSESSMENT
PROJECT JANUS – SOUTHERN PORTION (SUBJECT PROPERTY)
FLORENCE, KENTUCKY

Dear Mr. Ludtka

Golder Associates (Golder) is pleased to present to Amazon this Phase I Environmental Site Assessment Report for the Subject Property. Information presented in this Report is subject to the general limitations presented in the Report and Golder's Proposal dated February 22, 2017.

Golder appreciates this opportunity to assist you with your environmental needs. If you have any questions or comments regarding the information presented in this report, please call our office.

Sincerely,

GOLDER ASSOCIATES INC.

Jamie E. Bailey
Project Geologist

David P. Regalbuto
Associate & Hydrogeologist

JEB/DPR

cc:

Summary

DLR Group, on behalf of Amazon (the User), retained Golder Associates Inc. (Golder) to perform a Phase I Environmental Site Assessment (ESA) of the property located on Aero Parkway in Florence, Kentucky (the Subject Property). The purpose of this Phase I ESA is to identify recognized environmental conditions (RECs) in connection with the Subject Property, to the extent feasible, pursuant to the processes prescribed in the ASTM Practice E 1527-13 entitled "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process" (ASTM Standard), and the EPA Rule entitled, "Standards and Practices for All Appropriate Inquiries; Final Rule" (AAI Rule), 40 CFR Part 312, the Golder Proposal dated February 22, 2017 (the Proposal), and Golder's professional judgment.

This Summary is to be used only in conjunction with the attached Project Janus – Southern Portion, dated June 30, 2017 (the Report). All definitions used in this Summary have the same meanings as in the Report, and the use of this Summary is subject to the limitations and conditions contained in the Report. The Report shall govern in the event of any inconsistency between this Summary and the Report.

The Subject Property is a portion of the Cincinnati/Northern Kentucky International Airport (CVG) and is situated in a mixed-use setting including agricultural, wooded, vacant, light industrial, commercial and residential properties approximately 3.15 miles due west of the intersection of I-275 and I-75 in the greater Cincinnati area.

The Subject Property is currently undeveloped and consists of grass fields and dense woods. Ms. Alison Chadwell, Senior Project Manager/Engineer for the CVG indicated that the Subject Property is utilized for recreational purposes by CVG personnel.

The Subject Property has one gated access road that enters into the north-central portion from the east off of Wendell H. Ford Boulevard. Also located on the northern portion is a 'mobile' cement plant that is utilized by DHL and the CVG for improvement and maintenance purposes. It also appears that a small 'shed' type building that houses a back-up generator for lights associated with the runway protection zone (RPZ) south of runway 18C-36C is also located in the western portion of the Subject Property.

Golder did not identify recognized environmental conditions (RECs) at the Subject Property.

Golder did not identify Conditional RECs (CRECs) at the Subject Property.

Golder identified the following Historical RECs (HRECs) at the Subject Property:

- A stationary firing range and a skeet range were historically located on the Subject Property where tractor trailers are currently staged along Wendell H. Ford Boulevard in the northeastern portion. The associated closure report states that soils were removed prior to redevelopment by removal, treatment, and disposal of soil containing lead shot and slugs, and by burial under as much as two feet of fill soil. These soils now partially underlay the adjacent DHL Facility. At the Kentucky Department for Environmental Protection (KDEP) request, soil from range areas that were excavated but not subsequently covered with fill or pavement were sampled; results for lead content ranged in concentration from 18.8 to 32.1 mg/kg, which is less than residential preliminary remediation goals (PRGs) for lead and therefore received a no further action (NFA) status. It is Golder's opinion that the Former Firing Ranges are considered a HREC and therefore do not require additional investigation at this time.

- A former fire training pit was historically located adjacent to the west of the current fire training pit near Gunpowder Creek prior to 1988. Information received from the KDEP via FOIA request indicated that the Kenton County Airport Board (KCAB) was required to submit a closure plan for the solid waste management units (SWMU) identified as the burn pit, adjacent drum storage area and associated UST, and the former surface impoundment areas historically located at the fire pit by December 31, 1988.

  A case status summary by KDEP personnel, dated December 1, 2004 references the SWMUs and discusses remedial actions that are occurring at the Subject Property but is not clear as to which SWMUs are being addressed.

  A report provided by the CVG titled *Closure Report, Former Fire Training Area*, written by Dames & Moore and dated June 17, 1999, details the work performed to obtain clean closure for the Former Burn Pit and North Drum Storage Area. The conclusions state that the Former Burn Pit and North Drum Storage Area were excavated and contaminated soil was removed prior to commencement of the compliance monitoring period. The chemicals-of-concern (COC) that were detected in the site groundwater were either well below the approved site-specific standards or are equivalent to background (upgradient) conditions for both shallow and deep wells. The authors provided evidence for interpreting that benzene detected in groundwater at MW-4R comes not from site contamination but from natural conditions in the deep bedrock.

  Post-closure care of the site was also implemented in addition to a paved roadway (Tower Drive) being installed over the site. Post-closure care includes the following:

  - Maintenance of signage delimiting the site and stipulation usage restrictions;
  - Recording of deed notification restricting usage of the site; and,
  - Decommissioning of the monitoring well system used to establish closure.

  It is Golder's opinion that the Former Burn Pit and North Drum Storage Area are considered a HREC and therefore do not require additional investigation at this time.

Golder identified the following de minimis conditions at the Subject Property:

- Aircraft de-icing fluids, consisting primarily of ethylene and propylene glycols and other additives, are utilized for aircraft de-icing operations. The glycols are CERCLA hazardous substances. Golder has reviewed several historical site assessments and plans prepared by the KCAB and reviewed by KDEP. KCAB currently maintains a comprehensive glycol spill containment and control plan, however, it is possible that surface waters on the Subject Property may have been historically impacted by releases of glycol.

Because KDEP has reviewed prior investigations conducted by the KCAB and has not required further assessment of surface water on the Subject Property, impacts on the Subject Property that exceed human health and environmental criteria are not expected. The possible releases of glycol are considered de-minimis conditions.

- Golder also observed cloudy surface water conditions on surface water flowing through a drainage ditch just west of Wendell H. Ford Boulevard. Golder notified CVG personnel, who are investigating and will provide additional information. This impact may be caused by a variety of conditions, and at present is considered a de-minimis condition.

PHASE I ENVIRONMENTAL SITE ASSESSMENT

Vesper Site
Limaburg Creek Road and Aero Parkway
Florence, Boone County, Kentucky

The Kleingers Group

November 14, 2017

OBG

TABLE OF CONTENTS

List of Appendices

List of Acronyms

ACM	Asbestos-Containing Material
AST	Aboveground Storage Tank
ASTM	American Society of Testing and Materials
BF	Brownfields
CEG	Conditionally Exempt Generator
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CESQG	Conditionally Exempt Small Quantity Generators
CORRACTS	RCRA Corrective Action Sites
CREC	Controlled Recognized Environmental Condition
CVG	Cincinnati/Northern Kentucky International Airport
EC	Engineering Controls
EDR	Environmental Data Resources
ERNS	Emergency Response Notification System

ESA	Environmental Site Assessment
HIG	Historical Information Gatherers
HISTLFDUMPS	Historic Landfills/Old Town Dumps
HREC	Historical Recognized Environmental Condition
IC	Institutional Controls
kg/month	kilogram/month
KGS	Kentucky Geological Survey
KPDES	Kentucky Pollutant Discharge Elimination System
LFSWDS	Landfill and Solid Waste Disposal Sites
LQG	Large Quantity Generators
LUST	Leaking Underground Storage Tank
NFRAP	No Further Remedial Action Planned
NPL	National Priority List
PVA	Property Valuation Administrator
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RUST	Registered Underground Storage Tank
SEMS	Superfund Enterprise Management System
SEMSARCH	SEMS Archive
SLPL	State Lead Priority List
SQG	Small Quantity Generators
TSD	Treatment, Storage and Disposal
USC	United States Code
USEPA	United States Environmental Protection Agency
USGS	United States Geological Service
UST	Underground Storage Tank
VCP	Voluntary Cleanup Program

EXECUTIVE SUMMARY

In accordance with an agreement with The Kleingers Group (Kleingers), dated January 25, 2017, O'Brien & Gere Engineers, Inc. (OBG) was retained by Kleingers to conduct a Phase I Environmental Site Assessment (ESA) for the property located along Limaburg Creek Road and Aero Parkway, Florence, Boone County, Kentucky (subject property). The subject property consists of one full parcel and three partial parcels totaling approximately 200 acres. One of the parcels is fully within the subject property limits and two of the partial parcels, both of which consist of their northern portions north of Aero Parkway, are owned by KY18 Acres LLC, a limited liability corporation represented by Paul Vesper. The fourth parcel, which consists of approximately 20 acres in the northern portion of the subject property south of Limaburg Creek Road, is owned by Lisa Vittitoe. A small approximately 1-acre portion of this parcel is located to the north of Limaburg Creek Road and is not considered part of the subject property. OBG understands that the anticipated future use of the property will be for light industrial and/or warehousing development.

The Phase I ESA was performed to identify recognized environmental conditions (RECs) associated with the subject property as a result of past and/or present site activities and current site conditions. As such, OBG's work in performing this Phase I ESA has been conducted in accordance with the American Society for Testing and Materials (ASTM) "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, designation E1527-13" (ASTM E1527-13). Any exceptions to, or deletions from, this practice are described in this report.

There were no historical RECs (HRECs) or controlled RECs (CRECs) identified in connection with the subject property.

This Phase I ESA is valid for 180 days from the date of the earliest interview, search for recorded environmental lien, review of federal, tribal, state, and local environmental records, site reconnaissance, or environmental professional declaration, whichever is first. An update to the Phase I ESA performed within 180 days of the above-referenced tasks will extend the validity of the report for one year from the date of the earliest interview, search for recorded environmental lien, review of federal, tribal, state, and local environmental records, site reconnaissance, or environmental professional declaration, whichever occurs first.

Appendix E

APPENDIX E
SECTION 106 CONSULTATION

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Consulting Parties Letters

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U.S. Department
of Transportation
**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

President Robert Webster
Kenton County Historical Society
P.O. Box 641
Covington , KY 41012

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear President Webster:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

The Area of Potential Effects (APE), as shown in **Exhibit 1, Area of Potential Effects**, is the area in which the proposed project may cause alterations in the character or use of historic resources. At this time, cultural resource investigations are underway for both aboveground and archaeological resources.

FAA is identifying organizations with an interest in this project and its potential to affect historic properties. This letter is intended to initiate Section 106 consultation, solicit any initial comments you may have on the proposed undertaking, and to find out whether you wish to become a consulting party for this project. Consulting parties have certain rights and obligations under the NHPA and its implementing regulations at 36 CFR Part 800. By becoming a consulting party, you will be informed of steps in the Section 106 process. Section 106 compliance is a requirement of the NEPA for which an Environmental Assessment is being prepared.

As part of the process, the FAA identified your organization as a potential local interested party that may wish to participate as a consulting party in the Section 106 process. The

purpose of this letter is to determine if you wish to participate in that regard. In order to become a consulting party, you must respond by August 15, 2018 to request consulting party status. If you are requesting consulting party status, we request that your organization nominate one representative and an alternate to participate on behalf of the group. Individuals may also participate in the Section 106 process as members of the public.

If you would like to request consulting party status on this project or have any questions, please contact Kristi Ashley of my staff by email at kristi.ashley@faa.gov.

Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

President Betty Roszmann
Erlanger Historical Society
3319 Crescent Avenue
Erlanger, KY 41018

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear President Roszmann:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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If you would like to request consulting party status on this project or have any questions, please contact Kristi Ashley of my staff by email at kristi.ashley@faa.gov.

Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
of Transportation
Federal Aviation Administration

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

President Steve Battistone
Campbell County Historical & Genealogical Society
8352 E. Main Street
Alexandria, KY 41001

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear President Battistone:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

President Emeritus Ken Reis
Campbell County Historical & Genealogical Society
8352 E. Main Street
Alexandria, KY 41001

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear President Emeritus Reis:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Rural/Open Space Planner Matt Becher
Boone County Preservation Review Board
2995 Washington Street
Burlington, KY 41005

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear Rural/Open Space Planner Becher:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

The Area of Potential Effects (APE), as shown in **Exhibit 1, Area of Potential Effects**, is the area in which the proposed project may cause alterations in the character or use of historic resources. At this time, cultural resource investigations are underway for both aboveground and archaeological resources.

FAA is identifying organizations with an interest in this project and its potential to affect historic properties. This letter is intended to initiate Section 106 consultation, solicit any initial comments you may have on the proposed undertaking, and to find out whether you wish to become a consulting party for this project. Consulting parties have certain rights and obligations under the NHPA and its implementing regulations at 36 CFR Part 800. By becoming a consulting party, you will be informed of steps in the Section 106 process. Section 106 compliance is a requirement of the NEPA for which an Environmental Assessment is being prepared.

As part of the process, the FAA identified your organization as a potential local interested party that may wish to participate as a consulting party in the Section 106 process. The purpose of this letter is to determine if you wish to participate in that regard. In order to become a consulting party, you must respond by August 15, 2018 to request consulting party status. If you are requesting consulting party status, we request that your organization nominate one representative and an alternate to participate on behalf of the group. Individuals may also participate in the Section 106 process as members of the public.

If you would like to request consulting party status on this project or have any questions, please contact Kristi Ashley of my staff by email at kristi.ashley@faa.gov.

Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
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**Federal Aviation
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Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

President Betsy Conrad
Boone County Historical Society
P.O. Box 23
Florence, KY 41022

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear President Conrad:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Archives and Records Commissioner Terry Manuel
Kentucky Historical Society
100 W. Broadway Street
Frankfort, KY 40601

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear Archives and Records Commissioner Manuel:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Mildred Anderson
3135 Petersburg Road
Burlington, KY 41005

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear Ms. Anderson:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
of Transportation
Federal Aviation Administration

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Carl W. Anderson
3121 Petersburg Road
Burlington, KY 41005

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear Mr. Anderson:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Charles H. Anderson
7720 McVille Road
Burlington, KY 41005

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport – Request for Participation

Dear Mr. Anderson:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
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**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Robert K. England
2766 Coachlight Lane
Burlington, KY 41005

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear Mr. England:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Steven J. Popham
313 Crown Point Circle
Crestview Hills, KY 41017

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear Mr. Popham:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

Tribal Consultation

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U.S. Department
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**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Principal Chief Richard Sneed
Cherokee Agency
88 Council House Loop Road
Cherokee, NC 28719

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear Principal Chief Sneed:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

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**Federal Aviation
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Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Principal Chief Bill John Baker
Cherokee Nation
P.O. Box 948
Tahlequah, OK 74465

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear Principal Chief Baker:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

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**Federal Aviation
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2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Governor Bill Anoatubby
Chickasaw Nation
520 E. Arlington
Ada, OK 74820

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear Governor Anoatubby:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
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**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Dr. David Pollack
Manager, Kentucky Native American
Heritage Commission
1020A Export St.
Lexington, KY 40504

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear Dr. Pollack:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
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**Federal Aviation
Administration**

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2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Tribal Administrator Jodi Hayes
Shawnee Tribe
P.O. Box 189 29 S. Highwy 69A
Miami, OK 74355

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear Tribal Administrator Hayes:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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FAA is identifying organizations with an interest in this project and its potential to affect historic properties. This letter is intended to initiate Section 106 consultation, solicit any initial comments you may have on the proposed undertaking, and to find out whether you wish to become a consulting party for this project. Consulting parties have certain rights and obligations under the NHPA and its implementing regulations at 36 CFR Part 800. By becoming a consulting party, you will be informed of steps in the Section 106 process. Section 106 compliance is a requirement of the NEPA for which an Environmental Assessment is being prepared.

As part of the process, the FAA identified your organization as a potential local interested party that may wish to participate as a consulting party in the Section 106 process. The purpose of this letter is to determine if you wish to participate in that regard. In order to become a consulting party, you must respond by August 15, 2018 to request consulting party status. If you are requesting consulting party status, we request that your organization nominate one representative and an alternate to participate on behalf of the group. Individuals may also participate in the Section 106 process as members of the public.

If you would like to request consulting party status on this project or have any questions, please contact Kristi Ashley of my staff by email at kristi.ashley@faa.gov.

Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Everett Bandy, THPO
Quapaw Tribe of Indians
5681 S. 630 Road
Quapaw, OK 74363

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear THPO Bandy:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Principal Chief Joe Bunch
United Keetoowah Band
of Cherokee Indians in Oklahoma
P.O. Box 746
Tahlequah, OK 74465

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear Principal Chief Bunch:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
of Transportation
Federal Aviation Administration

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

President William Quackenbush
Wisconsin Inter-Tribal Repatriation Committee
P.O. Box 67
Lac Du Flambeau, WI 54538

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear President Quackenbush:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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If you would like to request consulting party status on this project or have any questions, please contact Kristi Ashley of my staff by email at kristi.ashley@faa.gov.

Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

U.S. Department
of Transportation
Federal Aviation Administration

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

July 12, 2018

Tribal Chairman Floyd Azure
Fort Peck Assinoboine and Sioux Tribes
P.O. Box 1027 501 Medicine Bear Rd.
Poplar, MT 59255

RE: Section 106 Consultation for Cincinnati/Northern Kentucky International Airport - Request for Participation

Dear Tribal Chairman Azure:

This letter is notification that the Kenton County Airport Board (KCAB) is proposing to construct an air cargo hub at the Cincinnati/Northern Kentucky International Airport (CVG). This project has been determined an 'undertaking' subject to the National Historic Preservation Act (NHPA) and its implementing regulations under Section 106 36 CFR part 800 (as amended). The proposed project and its associated activities are also subject to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) has initiated preparation of an Environmental Assessment to meet its regulatory obligations. The agency intends to complete Section 106 in conjunction with the NEPA process.

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If you would like to request consulting party status on this project or have any questions, please contact Kristi Ashley of my staff by email at kristi.ashley@faa.gov.

Sincerely,

Tommy L. Dupree
Acting Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, Kenton County Airport Board, Jennifer Ryall, Kentucky Heritage Council, Chris Gunn, Kentucky Heritage Council

Sarah Potter

From: kristi.ashley@faa.gov
Sent: Thursday, December 6, 2018 6:08 PM
To: dfrazier@astribe.com; 106nagpra@astribe.com
Subject: CVG air Cargo Facility Consultation

Dear Devon Frazier:

The Federal Aviation Administration (FAA) is the lead agency on the development of an air cargo facility at the Cincinnati/Northern Kentucky International Airport (CVG). I am sending the following links to archaeological reports prepared for this project. This project constitutes a federal undertaking subject to review under Section 106 of the National Historic Preservation Act, as amended and its implementing regulations , 36 CFR Part 800 and therefore the FAA is consulting with the Kentucky Heritage Council. Please review the Phase I and Phase II reports below. If you should have any concerns or questions please contact me at the contact information below. I would greatly appreciate any comments by December 28, 2018. Thank you.

Phase I Reports
https://filesend.landrum-brown.com/download.aspx?f=15456-HqzVzdaaeYqM
https://filesend.landrum-brown.com/download.aspx?f=15457-9Sfy5iRN2ftH
https://filesend.landrum-brown.com/download.aspx?f=15458-hYeazFFMuXAV
https://filesend.landrum-brown.com/download.aspx?f=15459-Vzcdf5128r7n
https://filesend.landrum-brown.com/download.aspx?f=15460-tLrM3fNGgPrY
https://filesend.landrum-brown.com/download.aspx?f=15461-gTNyF12dJmKU
https://filesend.landrum-brown.com/download.aspx?f=15466-SSHyZUZUzBf7

Phase II Reports
https://filesend.landrum-brown.com/download.aspx?f=15462-AWdbENCTEL3K
https://filesend.landrum-brown.com/download.aspx?f=15463-HQ4XRJHN7YDX
https://filesend.landrum-brown.com/download.aspx?f=15464-5HWDDGrYs5uS
https://filesend.landrum-brown.com/download.aspx?f=15465-FBjsCy6mG5mY

Everyone has been made for some particular work, and the desire for that work has been put in every heart. **– Rumi**

Kristi Ashley
Environmental Specialist
FAA, Memphis Airports District Office
2600 Thousand Oaks Blvd., STE 2250
Memphis, TN 38118-2462
901.322.8197
901.322.8195 fax
Kristi.Ashley@FAA.GOV

Sarah Potter

From: kristi.ashley@faa.gov
Sent: Thursday, December 6, 2018 6:08 PM
To: dhunter@miamination.com
Subject: CVG Air Cargo Facility Consultation

Dear Diane Hunter:

The Federal Aviation Administration (FAA) is the lead agency on the development of an air cargo facility at the Cincinnati/Northern Kentucky International Airport (CVG). I am sending the following links to archaeological reports prepared for this project. This project constitutes a federal undertaking subject to review under Section 106 of the National Historic Preservation Act, as amended and its implementing regulations , 36 CFR Part 800 and therefore the FAA is consulting with the Kentucky Heritage Council. Please review the Phase I and Phase II reports below. If you should have any concerns or questions please contact me at the contact information below. I would greatly appreciate any comments by December 28, 2018. Thank you.

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2600 Thousand Oaks Blvd., STE 2250
Memphis, TN 38118-2462
901.322.8197
901.322.8195 fax
Kristi.Ashley@FAA.GOV

Sarah Potter

From: kristi.ashley@faa.gov
Sent: Thursday, December 6, 2018 6:07 PM
To: ahunter@osagenation-nsn.gov
Subject: CVG Air Cargo Facility Consultation

Dear Andrea Hunter:

The Federal Aviation Administration (FAA) is the lead agency on the development of an air cargo facility at the Cincinnati/Northern Kentucky International Airport (CVG). I am sending the following links to archaeological reports prepared for this project. This project constitutes a federal undertaking subject to review under Section 106 of the National Historic Preservation Act, as amended and its implementing regulations , 36 CFR Part 800 and therefore the FAA is consulting with the Kentucky Heritage Council. Please review the Phase I and Phase II reports below. If you should have any concerns or questions please contact me at the contact information below. I would greatly appreciate any comments by December 28, 2018. Thank you.

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Kristi Ashley
Environmental Specialist
FAA, Memphis Airports District Office
2600 Thousand Oaks Blvd., STE 2250
Memphis, TN 38118-2462
901.322.8197
901.322.8195 fax
Kristi.Ashley@FAA.GOV

Sarah Potter

From: kristi.ashley@faa.gov
Sent: Thursday, December 6, 2018 6:06 PM
To: bbarnes@estoo.net
Subject: CVG Air Cargo Facility Consultation

Dear Brett Barnes:

The Federal Aviation Administration (FAA) is the lead agency on the development of an air cargo facility at the Cincinnati/Northern Kentucky International Airport (CVG). I am sending the following links to archaeological reports prepared for this project. This project constitutes a federal undertaking subject to review under Section 106 of the National Historic Preservation Act, as amended and its implementing regulations , 36 CFR Part 800 and therefore the FAA is consulting with the Kentucky Heritage Council. Please review the Phase I and Phase II reports below. If you should have any concerns or questions please contact me at the contact information below. I would greatly appreciate any comments by December 28, 2018. Thank you.

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FAA, Memphis Airports District Office
2600 Thousand Oaks Blvd., STE 2250
Memphis, TN 38118-2462
901.322.8197
901.322.8195 fax
Kristi.Ashley@FAA.GOV

APE Correspondence

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Sarah Potter

To: Sarah Potter
Subject: FW: Cincinnati Northern Kentucky International Airport Amazon Development

From: Ryall, Jennifer (Heritage Council) <Jennifer.Ryall@ky.gov>
Sent: Friday, July 20, 2018 2:27 PM
To: Sarah Potter <spotter@landrum-brown.com>
Cc: kristi.ashley@faa.gov
Subject: RE: Cincinnati Northern Kentucky International Airport Amazon Development

Hi Sarah,

The revised aboveground APE presented in the attachment to your e-mail from yesterday (7-19-18) looks appropriate to address both indirect and direct effects for this project.

Thanks for your help,
~Jenn

Jennifer Ryall
Environmental Review Coordinator
Kentucky Heritage Council
410 High Street
Frankfort, Kentucky 40601
Phone: (502)564-7005 ext 4565

From: Sarah Potter <spotter@landrum-brown.com>
Sent: Thursday, July 19, 2018 4:34 PM
To: Ryall, Jennifer (Heritage Council) <Jennifer.Ryall@ky.gov>
Cc: kristi.ashley@faa.gov
Subject: RE: Cincinnati Northern Kentucky International Airport Amazon Development

Hi Jenn – See attached exhibit. I will call to follow-up.

Thanks!

Sarah

Sarah Potter

From: Ryall, Jennifer (Heritage Council) <Jennifer.Ryall@ky.gov>
Sent: Wednesday, December 12, 2018 11:42 AM
To: Sarah Potter; kristi.ashley@faa.gov; Gunn, Chris (Heritage Council)
Subject: CVG/Air Cargo Hub Expanded (Final) Aboveground APE and Souther House Addnl Info.

Importance: High

Hi Sarah and Kristi,

In talking with Sarah this morning, I told her I'd follow up with this e-mail response to provide Landrum & Brown and FAA an updated response based on these two recent updates/additional information from Landrum & Brown/K&V/E&A.

Expanded Aboveground APE:
Our office recommends that the proposed expanded aboveground APE appropriately addresses all potential visual and noise impacts addressed through the EA process and now, through the Section 106 process. We understand that, in addition to the properties already identified for the Air Cargo Hub project, the expanded APE includes the Ephraim Uitz House (BE-125) and the Joel Garnett House (BE-376) in addition to a number of unassessed historic properties. Our office recommends that the Ephraim Uitz House retains sufficient integrity and significance to remain Listed on the National Register of Historic Places (NRHP) and that the Joel Garnett House retains sufficient integrity and significance to remain Eligible for listing on the NRHP. We understand that there may be additional unassessed historic properties within this expanded APE but that these would all be within the acceptable range of the noise contours. We also understand that the proposed undertaking would not create significant air pollutant emissions or water pollutants. As such, it does not appear that any of the *additional* properties (Listed, Eligible, or currently unassessed) would not experience any negative direct or indirect effects within the expanded aboveground APE.

Souther House (BE-176) Additional Information:
In the revised report ***Historic Resources Survey of 206 Acres and NRHP Evaluation of BE176, BE1661, BE1663, and BE1664, Boone County, Kentucky*** by Beth Sullebarger, Revised April 25, 2018, which our office received on November 30, 2018, additional information has been presented as it relates to our previous disagreement on the NRHP eligibility of the Souther House (BE-176). We now understand that the house and its outbuildings have experienced significant alterations that have negatively impacted the integrity of the Souther Farm. As it relates to changes to the house, we understand that the house has been extensively altered by additions and removal of original fabric including the removal of a chimney and one of the original front doors. We also understand that many of the outbuildings on the Souther Farm have been moved to the site from other locations and other barns and outbuildings have been demolished and/or reconfigured. As such, although the property retains some integrity and significance, it does not retain sufficient integrity as a whole and, based on this additional information, our office now recommends that the Souther Farm is Not Eligible for listing on the NRHP.

Based on the information above, we're hopeful of getting a final letter from FAA discussing where they are in the consulting parties/Tribes process and getting one final, overall determination of effect and NRHP eligibility for the entire project inclusive of all aboveground historic resources (within the full, expanded aboveground APE discussed above) and all archaeological resources. We now think we're at a point where we can provide our final response to FAA's official determination even if we're still wrapping up the consulting parties/Tribes process and consulting on the scope of the adverse effect as it relates to archaeological resources. Please tell the consultant thank you for the additional research they provided to help our office understand the integrity and evolution of the Souther Farm. Let us know how we can help move this project along to the next step. A big thanks to Sarah, also, for staying in great communication with our office and helping us move past potential points of confusion or delay – it's greatly appreciated.

Thanks,
~Jenn

Jennifer Ryall
Environmental Review Coordinator
Kentucky Heritage Council
410 High Street
Frankfort, Kentucky 40601
Phone: (502) 892-3619

FAA's Determination of Effects

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U.S. Department of Transportation
Federal Aviation Administration

Memphis Airports District Office
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Phone (901) 322-8180

January 28, 2019

Mr. Craig A. Potts
Executive Director
State Historic Preservation Officer
Tourism, Arts and Heritage Cabinet
Kentucky Heritage Council
410 High Street
Frankfort, KY 40601

RE: Section 106 Consultation, Effects Determination
Proposed Air Cargo Hub Facility Development
Cincinnati Northern Kentucky International Airport (CVG)
KHC #53234

Dear Mr. Potts:

This is in response to comments received to the letter dated January 3, 2018 concerning the subject proposed undertaking. In accordance with Section 106 of the National Historic Preservation Act, the FAA has reviewed the effects on historic properties for the proposed air cargo hub at the Cincinnati Northern Kentucky International Airport (CVG), Covington, KY. This letter clarifies the determinations and comments received to date regarding this undertaking.

***Tribal Consultation**:* The FAA initiated Section 106 consultation with the following Native American tribes:

- Cherokee Agency on behalf of Eastern Band of Cherokee Nation
- Cherokee Nation
- Chickasaw Nation
- Shawnee Tribe
- Quapaw Tribe of Indians
- United Keetoowah Band of Cherokee Indians in Oklahoma
- Fort Peck Assinoboine and Sioux Tribes

Elizabeth Toombs, Tribal Historic Preservation Officer of the Cherokee Nation responded and expressed interest in participating as a consulting party to the Native American Tribes listed above. Therefore, FAA is officially including the Cherokee Nation as a consulting party. To date, no additional comments have been received from the Cherokee Nation. The remaining Native American Tribes did not respond to the FAA's correspondence. All project documentation and this determination of effect letter has been provided to those tribes participating in the consultation.

In addition, since the initial consultation, the U.S. Army Corps of Engineers has requested additional Native American Tribes be contacted to determine their interest in participating in consultation. These additional Native American Tribes include:

- Absentee-Shawnee Tribe
- Eastern Shawnee Tribe

- Miami Nation
- Osage Nation

FAA has contacted these Native American Tribes and Diane Hunter, Tribal Historic Preservation Officer for the Miami Nation. Miami Nation accepted the request to serve as a consulting party. Therefore, FAA is officially including the Miami Nation as a consulting party. No response was received from the remaining three Native American Tribes.

Area of Potential Effects: The Area of Potential Effects (APE) for this undertaking was defined as the area in which the proposed project may cause an alteration in the character or use of historic resources. Concurrence with the APE by the Kentucky Heritage Council (KHC) was received via email dated July 20, 2018. Since that time, the APE was expanded to include areas potentially impacted by noise. Concurrence by the KHC on the expanded APE was received via email on December 12, 2018.

Identification Efforts of Historic Properties in the APE: The FAA, through a series of cultural resource surveys, identified historic resources located within the direct and indirect APE. The resources are included in **Table 1** (see attached) along with a description, eligibility determination, and the date consultation/concurrence occurred with the KHC. **Table 2** (see attached) provides the correspondence that has occurred with the KHC on reports prepared as part of this undertaking.

The surveys identified forty-nine (49) sites within the direct and indirect APE, of which thirty-seven (37) were archaeological resources and twelve (12) were aboveground resources. Through consultation with KHC, thirty-three (33) of the archaeological sites were determined not eligible and four (4) were determined eligible for listing in the National Register of Historic Places (NRHP). Two (2) aboveground resources were previously identified, Ephraim Uitz House (listed on the NRHP) and the Joel Garnett House (eligible). The remaining ten (10) aboveground resources were determined not eligible for the NRHP.

Finding of Effect: A determination of effects for NRHP eligible properties is as follows:

Direct Effects:

Archaeological Resources

Site 15Be688: This site will be destroyed as part of the undertaking, therefore, FAA makes a determination of adverse effect on historic properties for Site 15Be688.

Site 15Be694: This site will be destroyed as part of the undertaking, therefore, FAA makes a determination of adverse effect on historic properties for Site 15Be694.

Site 15Be697: This site will be destroyed as part of the undertaking, therefore, FAA makes a determination of adverse effect on historic properties for Site 15Be697.

Site 15Be717: Site 15Be717 was identified during a Phase I Archaeological Survey conducted by K&V during February and March 2018. The site is a historical period archaeological homestead site located near the William Aylor Family Cemetery (15Be715). The farmstead was occupied from the 1830s to the 1950s. Many alterations to the house and outbuildings have occurred and a fire burned down most of the above ground buildings in the 1950s. The 15Be717 archaeological site, including the small extant shed/outhouse was recommended as not eligible for the NRHP by K&V. However, the KHC disagreed and recommended the site be considered potentially eligible for the NRHP and either be avoided or Phase II investigations occur at the site. Phase II investigations were initiated at the site by E&A, but immediately terminated due to the presence of asbestos contaminated materials. As a result of the contamination and due to safety concerns, Phase II investigations on this site were not completed; therefore, the site is recommended as potentially eligible for the NRHP. The FAA makes a determination of an adverse effect on historic properties for Site 15Be717.

Aboveground Resources

Site Be176 (Souther House): Site Be176 was identified during a historic resources survey conducted by K&V during February, March, November, and December 2017 and recommended as not eligible for the NRHP (*Historic Resources Survey of 206 Acres and NRHP Evaluation of BE176, BE1661, BE1663, and BE1664, Boone County, Kentucky* by Beth Sullebarger). However, the KHC disagreed with the recommendation (March 7, 2018). Subsequently in April 2018, K&V revised their original report to include greater detail of the definitions of a double cell house, its history or lack thereof, as a farmstead, and an in-depth discussion of the application of Criterion A and C and how the Souther House does not have the integrities needed for eligibility. K&V maintained the belief that the Souther House does not retain sufficient integrity to be considered eligible for the NRHP due to a large number of alterations that have occurred to the property. In addition, Margo Warminski, Architectural Historian for Environment & Archaeology, LLC (E&A), reviewed the revised K&V report and agreed the property does not retain sufficient integrity to be eligible for listing in the NRHP because alterations have negatively affected the integrities of design, materials, workmanship, and feeling. The revised K&V report and E&A's agreement of the revised K&V report, were submitted to and received by the KHC on November 30, 2018. Based on this information, FAA recommends this site as not eligible for listing on the NRHP and makes a determination of no historic property affected.

Indirect Effects: The FAA conducted a view-shed and noise analysis to determine potential indirect effects from operation and construction of the proposed undertaking.

View-shed Analysis - Two (2) reports evaluated indirect effects for the aboveground portion of the project. The first report (*Historic Resources Survey of 206 Acres and NRHP Evaluation of BE176, BE1661, BE1663, and BE1664 Boone County, Kentucky – Beth Sullebarger,* revised April 25, 2018) identified five historic resources (Shed/outhouse, Be1661, Be1663, Be1664, and Be176). The second report (*Historic Resources Report Cincinnati/Northern Kentucky International Airport Air Cargo Hub Development Project Area of Potential Effect for Indirect Effects, Boone County, Kentucky – Margo Warminski,* dated August 2018) identified five historic resources (Be1667 through Be1671). None of the ten identified historic resources located within the Indirect APE boundary were recommended eligible for listing in the NRHP and therefore would not experience a visual effect to setting due to the proposed undertaking.

Noise Analysis - The Joel Garnett House (Be376), which is eligible for the NRHP, and the Ephraim Uitz House (Be125), which is listed on the NRHP, are also located within the indirect APE for the proposed undertaking. In addition, there are additional unassessed historic properties within the Indirect APE.

The Ephraim Uitz House would be located outside of the 1.5 dB increase within the 65 DNL of both the Future (2021) and Future (2026) Proposed Action noise contours, which is FAA's threshold for a significant noise impact. Therefore the proposed undertaking would not significantly change the property's setting or diminish the integrity of the property's significant features because it would maintain its existing architecture and setting and maintain the association with past events. In addition, the Future (2021) and Future (2026) Proposed Action would not cause significant air pollutant emissions or water pollutants that could affect these structures. Therefore, the FAA finds No Adverse Effect from the proposed undertaking on the Ephraim Uitz House and farmstead within the indirect APE.

The Joel Garnett House would be located outside of the 1.5 dB increase within the 65 DNL of both the Future (2021) and Future (2026) Proposed Action noise contours, which is FAA's threshold for a significant noise impact. Therefore the proposed undertaking would not significantly change the property's setting or diminish the integrity of the property's significant features because it would maintain its existing architecture. In addition, the Future (2021) and Future (2026) Proposed Action would not cause significant air pollutant emissions or water pollutants that could affect these structures. Therefore, the FAA finds No Adverse Effect from the proposed undertaking on the Joel Garnett House within the Indirect APE.

Additional potential unassessed historic properties located within the Indirect APE would not experience a significant noise impact, as the 1.5 dB increase within the 65 DNL for both the Future (2021) and Future (2026) Proposed Action noise contour remains on-Airport property. Therefore, the FAA finds No Adverse Effect from the proposed undertaking on the additional potential unassessed historic properties within the Indirect APE.

Summary: Based on the results of the studies and an assessment of effects to historic properties, the FAA has determined that this proposed undertaking will have an adverse effect on four historic properties; Sites 15Be688, 15Be694, 15Be697, and 15Be717. Please review this finding and the enclosed documentation in accordance with 36 CFR Part 800.8.

If you have any questions regarding the EA or this request, please contact Kristi Ashley of my staff at (901) 322-8197 or by email at Kristi.Ashley@faa.gov.

Sincerely,

Phillip J. Braden
Manager, Memphis Airports District Office

Enclosures

cc: Debbie Conrad, KCAB
Jennifer Ryall, KHC
Chris Gunn, KHC

Table 1 Cultural Resources Identified within the APE

	Site #	APE	Site Type	Surveyed/Evaluated	FAA Determination	KHC Concurrence	Notes
Archaeological Resources							
1	15BE305	Direct APE	Prehistoric Open Habitation without Mounds	Sussenbach 1986 (ID #008-048); Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	extensive ground disturbance
2	15Be307	Direct APE	Prehistoric Open Habitation without Mounds	Sussenbach 1986 (ID #008-048)	Not Eligible	No Available Record	
3	15BE315	Direct APE	Indeterminate Prehistoric Mid-Archaic, Open habitation	Edging 1987 (ID #008-059)	Not Eligible	Not Eligible-per January 14 email from Chris Gunn	extensive ground disturbance
4	15BE320	Direct APE	Indeterminate Prehistoric Open Habitation without Mounds	Sussenbach 1986 (ID #008-052)	Not Eligible	Not Assessed	extensive ground disturbance
5	15BE327	Direct APE	Previously Recorded Historic Residence/ Farmstead/ Dump	Environment & Archaeology, LLC (January 2018)	Not Eligible	Not Eligible-March 7, 2018	extensive ground disturbance
6	15BE328	Direct APE	Historic Farm/Residence	Sussenbach 1986 (ID #008-052)	Not Eligible	Not Assessed	extensive ground disturbance
7	15BE330	Direct APE	Historic Farm/Residence	Environment & Archaeology, LLC (March 2016)	Not Eligible	Not Eligible-April 19, 2016	extensive ground disturbance
8	15BE331	Direct APE	Historic Farm/Residence	Environment & Archaeology, LLC (March 2016)	Not Eligible	Not Eligible-April 19, 2016	extensive ground disturbance
9	15BE334	Direct APE	Historic Farm/Residence	Environment & Archaeology, LLC (March 2016)	Not Eligible	Not Eligible-April 19, 2016	extensive ground disturbance
10	15BE338	Direct APE	Indeterminate Prehistoric Open Habitation	Sussenbach 1986 (ID #008-052), Environment & Archaeology, LLC (March 2016)	Not Eligible	Not Eligible-April 19, 2016	extensive ground disturbance
11	15BE339	Direct APE	Indeterminate Prehistoric Open Habitation	Sussenbach 1986 (ID #008-052), Environment & Archaeology, LLC (March 2016)	Not Eligible	Not Eligible-April 19, 2016	extensive ground disturbance
12	15BE340	Direct APE	Indeterminate Prehistoric	Sussenbach 1986 (ID #008-052), Environment & Archaeology, LLC (March 2016)	Not Eligible	Not Eligible-April 19, 2016	extensive ground disturbance
13	15BE549	Direct APE	Historic Farm/Residence	Bybee 2007 (ID #008-151)	Not Eligible	Not Eligible-Inventory Site	extensive ground disturbance
14	15BE550	Direct APE	Historic Farm/Residence	Bybee 2007 (ID #008-151)	Not Eligible	Not Eligible-Inventory Site	extensive ground disturbance
15	15BE682	Direct APE	Historic Cemetery (Ann Popham Cemetery)	Environment & Archaeology, LLC (March 2016)	Not Eligible	Not Eligible-April 19, 2016	previously removed/relocated
16	15BE685	Direct APE	Unaffiliated Prehistoric Lithic Scatter	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
17	15BE686	Direct APE	Unaffiliated Prehistoric Lithic Scatter	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
18	15BE687	Direct APE	Unaffiliated Prehistoric Lithic Scatter	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
19	15BE688	Direct APE	Historic Residence/ Farmstead	Phase I - Great Rivers Archaeological Services (February 28, 2017), Phase II - Environment & Archaeology, LLC (October 2018)	Eligible	Eligible-November 9, 2018	
20	15BE689	Direct APE	Historic Residence/ Farmstead	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
21	15BE690	Direct APE	Unaffiliated Prehistoric Lithic Scatter	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
22	15BE691	Direct APE	Historic Residence/ Farmstead	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
23	15BE692	Direct APE	Airport-Barlow Historic Cemetery	Great Rivers Archaeological Services (February 28, 2017), Environment & Archaeology, LLC (August 2018)	Not Eligible	Not Eligible-Avoidance or Relocation-September 27, 2018	relocation recommended
24	15BE693	Direct APE	Unaffiliated Prehistoric Lithic Scatter	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
25	15BE694	Direct APE	Historic Residence/ Farmstead	Phase I - Great Rivers Archaeological Services (February 28, 2017), Phase II - Environment & Archaeology, LLC (July 2018)	Eligible	Eligible-August 29, 2018	
26	15BE695	Direct APE	Unaffiliated Prehistoric Lithic Scatter	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
27	15BE696	Direct APE	Unaffiliated Prehistoric Lithic Scatter	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
28	15BE697	Direct APE	Historic Residence/ Farmstead	Phase I - Great Rivers Archaeological Services (February 28, 2017), Phase II - Environment & Archaeology, LLC (August 2018)	Eligible	Eligible-September 24, 2018	
29	15BE698	Direct APE	Unaffiliated Prehistoric Lithic Scatter	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
30	15BE699	Direct APE	Unaffiliated Prehistoric Lithic Scatter	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
31	15BE700	Direct APE	Unaffiliated Prehistoric Lithic Scatter with Historic Component	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
32	15BE701	Direct APE	Unaffiliated Prehistoric Lithic Scatter with Historic Component	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
33	15BE702	Direct APE	Unaffiliated Prehistoric Lithic Scatter	Great Rivers Archaeological Services (February 28, 2017)	Not Eligible	Not Eligible-August 8, 2017	
34	15BE703	Direct APE	Popham 2 Historic Cemetery	K&V Cultural Resources Management, LLC (February 28, 2017), Environment & Archaeology, LLC (August 2018)	Not Eligible	Not Eligible-Avoidance or Relocation-September 27, 2018	relocation recommended
35	15BE715	Direct APE	Aylor Historic Cemetery	K&V Cultural Resources Management, LLC (April 15, 2017), Environment & Archaeology, LLC (August 2018)	Not Eligible	Not Eligible-Avoidance or Relocation-September 27, 2018	relocation recommended
36	15BE716	Direct APE	Historic Residence/ Farmstead-Associated with BE176	K&V Cultural Resources Management, LLC (January 2018)	Not Eligible	Not Eligible-March 14, 2018	
37	15BE717	Direct APE	Historic Farm/Residence	K&V Cultural Resources Management, LLC (April 15, 2017)	Eligible	Eligible-per email September 26, 2018	Phase II investigations were initiated at the site by E&A, but immediately terminated due to the presence of asbestos contaminated materials. As a result of the contamination and due to safety concerns, Phase II investigations on this site were not completed; therefore, the site is recommended as potentially eligible for the NRHP.

Aboveground Resources							
	Site #	APE	Site Type	Surveyed/Evaluated	FAA Recommendation	SHPO Concurrence	Notes
38	BE176	Direct APE	Historic Farmstead-Associated with 15BE716 (Souther House)	K&V Cultural Resources Management, LLC (April 25, 2018), Environment & Archaeology, LLC (May 23, 2018)	Not Eligible	Not Eligible-per December 12, 2018 email from Jennifer Ryall	
39	No Site # Assigned	Direct APE	shed/outhouse at 15BE717	K&V Cultural Resources Management, LLC (January 2018)	Not Eligible	Not Eligible-March 7, 2018	
40	BE1661	Direct APE	Tobacco Barn	K&V Cultural Resources Management, LLC (January 2018)	Not Eligible	Not Eligible-March 7, 2018	
41	BE1663	Direct APE	Tobacco Stripping Shed	K&V Cultural Resources Management, LLC (January 2018)	Not Eligible	Not Eligible-March 7, 2018	
42	BE1664	Direct APE	Historic Residence/ Farmstead (Vittitoe House)	K&V Cultural Resources Management, LLC (January 2018)	Not Eligible	Not Eligible-March 7, 2018	
43	BE1667	Indirect APE	Mayerhofer House	Environment & Archaeology, LLC (August 2018)	Not Eligible	Not Eligible-September 24, 2018	assessed for view-shed impact
44	BE1668	Indirect APE	George Irwin House	Environment & Archaeology, LLC (August 2018)	Not Eligible	Not Eligible-September 24, 2018	assessed for view-shed impact
45	BE1669	Indirect APE	Johnson House	Environment & Archaeology, LLC (August 2018)	Not Eligible	Not Eligible-September 24, 2018	assessed for view-shed impact
46	BE1670	Indirect APE	Kenner House	Environment & Archaeology, LLC (August 2018)	Not Eligible	Not Eligible-September 24, 2018	assessed for view-shed impact
47	BE1671	Indirect APE	5679 Limaburg Creek Road	Environment & Archaeology, LLC (August 2018)	Not Eligible	Not Eligible-September 24, 2018	assessed for view-shed impact
48	BE125	Indirect APE	Ephraim Uitz House	Previously assessed	Listed on NRHP	Listed on NRHP 1988	assessed for noise impacts
49	BE376	Indirect APE	Joel Garnett House	Previously assessed	Eligible	Unknown	assessed for noise impacts

Table 2 Cultural Resources Reports Correspondence

Report Name	Submitted By	Submitted On	Response Received
Phase I Archaeology Survey of Two Tracts Totaling Approximately 300 Acres for a Proposed Development at the Cincinnati/ Northern Kentucky International Airport, Boone County, Kentucky	Great Rivers Archaeological Services-Vincent Versluis	June 12, 2017	August 8, 2017 Concur Sites 15BE685, 15BE686, 15BE687, 15BE690, 15BE693, 15BE695, 15BE696, 15BE698, 15BE699, 15BE700, 15BE701, 15BE702 and isolated finds not eligible Recommend Sites 15BE303 and 15BE305 do not require further work Disagree that Sites 15BE689 and 15BE691 are potentially eligible, instead determine are not eligible Concur Sites 15BE688, 15BE694, and 15BE697 are potentially eligible Concur 15BE692 (cemetery) be avoided or undergo further work, but disagree on recommendation of not eligible, and instead state is potentially eligible
Historic Resources Survey of 206 Acres and NRHP Evaluation of BE176, BE1661, BE1663, and BE1664, Boone County, Kentucky	K & V Cultural Resources Management-Jeannine Kreinbrink	January 10, 2018	March 7, 2018- Concur BE-1661, BE-1664 Not Eligible Disagree on Recommendation for BE-176, Believe to be Eligible
Phase I Archaeology Survey of the 206 Acre Vesper and Vittitoe Properties, Boone County, Kentucky	K & V Cultural Resources Management-Jeannine Kreinbrink and Doug VonStrohe	January 10, 2018	March 14, 2018- Disagree 15BE715 Ineligible, Recommend Potentially Eligible: Avoidance or Further Work Disagree 15BE717 Ineligible, Recommend Potentially Eligible: Avoidance or Further Work Agree 15BE716 Ineligible
Phase I Cultural Resources Survey for the Kenton County Airport Board Cincinnati/ Northern Kentucky International Airport Air Cargo Hub Additions Project in Boone County, Kentucky	Environment & Archaeology, LLC-Andrea Crider and Courtney Stoll	February 8, 2018	March 7, 2018 Concur 15BE327, 15BE558, 15BE711, 15BE712, 15BE713, isolated finds and non-site localities are not eligible Concur 15BE708, 15BE709, 15BE710 are potentially eligible and if impacted require further work Concur 15BE714 requires avoidance or further work
Phase II Eligibility Testing Plan for Sites 15BE688, 15BE694, 15BE697, 15BE708, 15BE709, and 15BE710 and Scope of Work for Historic Cemeteries at Sites 15BE692, 15BE703, and 15BE714 for the Air Cargo Hub Additions Project at the Cincinnati/ Northern Kentucky International Airport Boone County, Kentucky	Environment & Archaeology, LLC-Courtney Stoll	March 12, 2018	April 11, 2018 (email) Request slight modifications in testing method for Phase II work
Revised Phase II Eligibility Testing Plan for Sites 15BE688, 15BE694, 15BE697, 15BE708, 15BE709, and 15BE710 and Scope of Work for Historic Cemeteries at Sites 15BE692, 15BE703, and 15BE714 for the Air Cargo Hub Additions Project at the Cincinnati/ Northern Kentucky International Airport Boone County, Kentucky	Environment & Archaeology, LLC-Courtney Stoll	April 20, 2018	May 10, 2018 (email) Request slight modifications in testing method for Phase II work
Phase II Eligibility Testing Plan for Site 15BE717 and Scope of Work for Historic Structure BE176 for the Air Cargo Hub Additions Project at the Cincinnati/ Northern Kentucky International Airport, Boone County, Kentucky	Environment & Archaeology, LLC-Courtney Stoll	April 24, 2018	May 21, 2018 Request slight modifications in testing method for Phase II work
Addendum Phase I Cultural Resources Survey for the Kenton County Airport Board Cincinnati/ Northern Kentucky International Airport Air Cargo Hub Additions Project in Boone County, Kentucky	Environment & Archaeology, LLC-Luke Erickson	July 4, 2018	July 26, 2018 Concur revisited sites 15BE303 and 15BE305, and new site 15BE721 and non-site locality are not eligible
Management Summary: Phase II Investigations of Site 15BE694 for the Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project in Boone County, Kentucky	Environment & Archaeology, LLC-Courtney Stoll	July 22, 2018	August 29, 2018 Concur that 15BE694 is eligible for NRHP, request preparation of a Phase III Data Recovery Plan

Report Name	Submitted By	Submitted On	Response Received
Management Summary: Phase II Investigations of Site 15BE697 for the Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project in Boone County, Kentucky	Environment & Archaeology, LLC-Courtney Stoll	August 23, 2018	September 24, 2018 Concur that 15BE697 is eligible for NRHP, request preparation of a Phase III Data Recovery Plan
Historic Resources Report Cincinnati/ Northern Kentucky International Airport Air Cargo Hub Development Project Area of Potential Effect for Indirect Effects	Environment & Archaeology, LLC-Margo Warminski	August 1, 2018	September 24, 2018 Concur BE-1667 through BE1671 are not eligible Disagree that BE176 is not eligible, maintain is potentially eligible
Evaluation of Eligibility of Historic Cemeteries at Sites 15BE692, 15BE703, and 15BE715 for the Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project in Boone County, Kentucky	Environment & Archaeology, LLC-Courtney Stoll	September 4, 2018	September 27, 2018 Concur Cemeteries at Sites 15BE692, 15BE703, and 15BE715 are not eligible
Phase II Testing of Site 15BE688 Within the Proposed Air Cargo Hub Additions Project Area at the Cincinnati/Northern Kentucky International Airport Boone County, Kentucky	Environment & Archaeology, LLC-Luke Erickson	August 23, 2018	September 28, 2018 Unable to make eligibility determination based on information provided. Request for further information and analysis.
Revised Phase II Testing of Site 15BE688 Within the Proposed Air Cargo Hub Additions Project Area at the Cincinnati/Northern Kentucky International Airport Boone County, Kentucky	Environment & Archaeology, LLC-Luke Erickson	October 15, 2018	November 9, 2018 Disagree that 15BE688 is ineligible. Recommend Phase III Data Recovery and Plan.
Phase III Data Recovery Plan for Sites 15BE694 and 15BE697 for the Cincinnati/ Northern Kentucky International Airport Air Cargo Hub Additions Project in Boone County, Kentucky	Environment & Archaeology, LLC-Courtney Stoll	November 29, 2018	December 29, 2018 Request more detailed explanation of analysis to be done and slight revisions to field plan
Revised Historic Resources Survey of 206 Acres and NRHP Evaluation of BE176, BE1661, BE1663, and BE1664, Boone County, Kentucky	Report Prepared by K & V Associates-Jeannine Kreinbrink. Letter detailing additional details to accompany report, and report submitted by, Environment & Archaeology, LLC-Margo Warminkski and Courtney Stoll	November 30, 2018	December 12, 2018 (email) Concur with revised eligibility of BE176 that the Souther House is not eligible
Phase III Data Recovery Plan for Site 15BE688 for the Cincinnati/ Northern Kentucky International Airport Air Cargo Hub Additions Project in Boone County, Kentucky	Environment & Archaeology, LLC-Courtney Stoll	December 18, 2018	Phone call to held regard this plan, and plan for 15BE694 and 15BE697 on January 16, 2019

Kentucky Heritage Council Concurrence on Effect Finding

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MATTHEW G. BEVIN
GOVERNOR

DON PARKINSON
SECRETARY

TOURISM, ARTS AND HERITAGE CABINET
KENTUCKY HERITAGE COUNCIL
THE STATE HISTORIC PRESERVATION OFFICE
410 HIGH STREET
FRANKFORT, KENTUCKY 40601
PHONE (502) 564-7005
FAX (502) 564-5820
www.heritage.ky.gov

REGINA STIVERS
DEPUTY SECRETARY

CRAIG A. POTTS
EXECUTIVE DIRECTOR
& STATE HISTORIC
PRESERVATION OFFICER

February 11, 2019

Federal Aviation Administration
ATTN: Mr. Phillip J. Braden, Manager
2600 Thousand Oaks Blvd., Suite 2250
Memphis, TN 38118

Re: Section 106 Determination of Effects, Air Cargo Hub Facility Development at Cincinnati/Northern Kentucky International Airport (CVG), Covington, KY[1]

Dear Mr. Braden:

Thank you for your letter presenting the Federal Aviation Administration's (FAA) determination of effects to historic properties for the above-mentioned project, received January 28, 2019. We appreciate the comprehensive overview of cultural resource identification efforts, and eligibility recommendations for cultural resources identified within the proposed project area. We additionally appreciate your official notification that the Cherokee Nation and the Miami Nation will participate as consulting parties for this project.

Our office informally concurred on the final Area of Potential Effect (APE) on December 12, 2018, after an expansion of the original APE to include areas potentially impacted by noise. We now formally concur with the final APE. We understand that this final APE encompasses forty-nine (49) cultural resources, including thirty-seven (37) archaeological sites and twelve (12) archaeological resources. Your letter additionally notes that thirty-three (33) of the archaeological sites have been determined to be not eligible for the National Register of Historic Places (NRHP), and that four archaeological resources – 15Be688, 15Be694, 15Be697, and 15Be717 – have been determined to be eligible for the NRHP. We also understand that ten (10) architectural resources have been determined Not Eligible for listing on the NRHP. We understand that BE-125 (the Ephraim Uitz House) was determined to retain sufficient integrity and significance to remain Listed on the NRHP and BE-376 (the Joel Garnett House) was determined to retain sufficient integrity and significance to remain Eligible for listing on the NRHP. Our office understands that there may be additional unassessed aboveground historic resources within the final APE but that these would all be within the acceptable range of the noise contours and would not experience any negative direct or indirect effects within the expanded APE. As such, our office withholds comment on the NRHP eligibility of any unassessed historic resources within the final APE for this project and is not requesting additional information on those properties.

Our office has already concurred, and continues to concur, with FAA's determination of Not Eligible for 9 of the 10 architectural resources initially identified. As it relates to our previous disagreement over the NRHP eligibility of the Souther House (BE-176), in the revised report ***Historic Resources Survey of 206 Acres and NRHP Evaluation of BE176, BE1661, BE1663, and BE1664, Boone County, Kentucky*** by Beth Sullebarger, Revised April 25, 2018, which our office received on November 30, 2018, additional

(Continued on Next Page)

1. This letter corrects our previous response dated January 31, 2019. That letter incorrectly stated that sites 15Jf688, 15Jf694, 15Jf697, and 15Jf717 were affected by the undertaking. The site trinomials have been corrected to reflect that the sites are located in Boone County, and that the affected sites are 15Be688, 15Be694, 15Be697, and 15Be717.

information has been presented. We now understand that the house and its outbuildings have experienced significant alterations that have negatively impacted the integrity of the Souther Farm. As it relates to changes to the house, we understand that the house has been extensively altered by additions and removal of original fabric including the removal of a chimney and one of the original front doors. We also understand that many of the outbuildings on the Souther Farm have been moved to the site from other locations and other barns and outbuildings have been demolished and/or reconfigured. As such, although the property retains some integrity and significance, it does not retain sufficient integrity as a whole. Based on this additional information, our office now recommends that the Souther Farm is Not Eligible for listing on the NRHP. As it relates to the Ephraim Uitz House (NRHP-Listed) and the Joel Garnett House (NRHP-Eligible), our office concurs with FAA's determinations of NRHP eligibility.

After review of the documentation of archeological resources, we concur with the FAA's determination of eligibility for the four archaeological sites listed above. Regarding the non-eligible resources, we wish to point out that a determination of eligibility was not made for sites 15Be320 and 15Be328. However, these sites have been destroyed by activities prior to the Air Cargo Hub undertaking, and will not therefore be affected by the current undertaking.

In consideration of the entire history of consultation, we **concur** with the FAA's determination that the Air Cargo Hub Project will result in an **Adverse Effect to Historic Properties** 15Be688, 15Be694, 15Be697, and 15Be717. We look forward to the completion of a Memorandum of Agreement to address the mitigation of the adverse effect to these properties developed in consultation with the identified consulting parties.

Should you have any questions concerning archaeological resources, feel free to contact Chris Gunn of my staff at (502) 892-3615 or chris.gunn@ky.gov. Questions concerning above-ground resources can be directed to Jennifer Ryall at (502) 892-3619 or jennifer.ryall@ky.gov.

Sincerely,

Craig A. Potts,
Executive Director and State Historic Preservation Officer

Memorandum of Agreement

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MEMORANDUM OF AGREEMENT BETWEEN THE FEDERAL AVIATION ADMINISTRATION AND THE KENTUCKY HERITAGE COUNCIL FOR THE RECOVERY OF ARCHEOLOGICAL DATA FROM ARCHEOLOGICAL SITE 15BE694, SITE 15BE697, AND SITE 15BE688, AND REMOVAL OF SITE 15BE717 IN BOONE COUNTY, KENTUCKY

WHEREAS, the Kenton County Airport Board (the Airport Board) has requested that the Federal Aviation Administration (FAA), as the lead agency, approve a proposed Air Cargo Facility Development (the undertaking) and associated Airport Layout Plan for the Cincinnati Northern Kentucky International Airport (the airport) pursuant to 36 CFR 800.6(b)(1); and

WHEREAS, the undertaking consists of construction of a primary package sortation building and support building, construction of a concrete aircraft parking apron and apron taxilanes, and construction of paved employee and visitor vehicle parking garage/lots (See Attachment 1); and

WHEREAS, the FAA, in consultation with the Kentucky Heritage Council, has defined the undertaking's area of potential effects (APE) for construction and visual impacts as depicted on Attachment 2; and

WHEREAS, the FAA has determined that the undertaking will have an adverse effect on four historic properties (Site15Be694, Site 15Be697, Site 15Be688, Site 15Be717) eligible for listing in the National Register of Historic Places and has consulted with the Kentucky Heritage Council pursuant to 36 CFR Part 800, the regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. § 470); and

WHEREAS, the Airport Board, the operator of the airport and the project applicant, has participated in the consultation process and has specific responsibilities to carry out the terms of this Memorandum of Agreement (MOA) regarding the effects of the undertaking on historic properties, and FAA has invited the Airport Board to sign this MOA as an invited signatory; and

WHEREAS, Amazon.com Services, Inc. (Amazon), the lessee of the airport property where the data recovery will take place, has specific responsibilities to make sure that the data recovery and documentation of the historic properties are carried out in accordance with this MOA, and FAA has invited Amazon to sign this MOA as an invited signatory; and

WHEREAS, the FAA has consulted with the Kentucky Heritage Council, Miami Tribe of Oklahoma, and the Cherokee Nation pursuant to 36 CFR 800 regarding the effects of the undertaking on historic properties and has invited the Airport Board, Amazon, the Miami Tribe of Oklahoma, and the Cherokee Nation to sign this MOA as invited and/or concurring signatories, and the Miami Tribe of Oklahoma and Cherokee Nation have declined; and

WHEREAS, in accordance with 36 CFR § 800.6(a)(1), the FAA has notified the Advisory Council on Historic Preservation (ACHP) of its adverse effect determination with specified documentation, and the ACHP has chosen not to participate in the consultation pursuant to 36 CFR § 800.6(a)(1)(iii); and

NOW, THEREFORE, the FAA and the Kentucky Heritage Council agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

The FAA, through coordination with the Kentucky Heritage Council, the Airport Board, and Amazon, shall ensure that the following measures are carried out:

STIPULATION I. PROFESSIONAL QUALIFICATIONS.

The FAA shall ensure the implementation and reporting of the results of the Data Recovery Plan are conducted by a professional archaeologist meeting the federal qualifications for an archaeologist as stipulated in 36 CFR 61, Appendix A, and in the Federal Register, Volume 48, Number 190, dated September 30, 1983. In addition, the FAA in consultation with the Airport Board, shall require the archaeological firm to produce a final report on the results of the archaeological investigation that will be reviewed for content and timing by FAA and Kentucky Heritage Council. The report to be completed under the Data Recovery Plan will meet Kentucky Heritage Council reporting *Standards in Treatment of Archaeological Properties: A Handbook*, dated 1980. All draft reports or other means of reporting on the results of the Data Recovery will be reviewed for content and timing by FAA and Kentucky Heritage Council. All reviews will be made according to the time frames set forth herein.

STIPULATION II. DOCUMENTATION

MITIGATION OF ADVERSE EFFECT

A. The Airport Board shall implement the approved data recovery plan, *Phase III Data Recovery Plan for Sites 15BE688, 15BE694, and 15BE697 for the Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project in Boone County, Kentucky* (Stoll 2018) (the Data Recovery Plan), at 15BE688, 15BE694 and 15BE697 (Attachment 3).

B. Construction within each of the areas specified in the Data Recovery Plan, including a surrounding 25-foot buffer area, shall not commence until field work is completed, as required by the Data Recovery Plan, and a summary letter documenting completion of such archaeological fieldwork (Summary Letter) is submitted by the Airport Board and approved by the FAA and the Kentucky Heritage Council. FAA and Kentucky Heritage Council will have fifteen (15) business days from receipt of the Summary Letter to offer comment on the Summary Letter or approve the Summary Letter. In the absence of any comments or explicit approval within said period, the Summary Letter shall be deemed accepted by the party failing to so comment; and as to such party or parties, all data recovery field work required by the Data Recovery Plan will be considered complete. Upon acceptance of the Summary Letter, deemed or otherwise, the Airport Board shall be free to proceed with its construction plans within 15Be694, 15Be697, and 15Be688. The Summary Letter shall serve as a planning milepost and does not substitute for a complete final report.

C. Final report(s) will provide an appropriate context for the analysis and interpretation of the artifacts and sites, research orientation, description of the field work, and analysis of the artifacts and shall follow the Kentucky Heritage Council specifications as presented in *Specifications for Conduction Fieldwork and Preparing Cultural Resource Assessment Reports*, Thomas N. Sanders, editor, 1991, revised 2006.

D. The final report(s) shall be submitted within eighteen (18) months following acceptance of the Summary Letter by the FAA and Kentucky Heritage Council. The final report will be a technical document. The Airport Board may submit one or more draft reports to FAA and Kentucky Heritage Council for comments. FAA and Kentucky Heritage Council will provide comments to the draft report(s) within thirty (30) calendar days following the Airport Board's request for such comments. The Airport Board will ensure that comments are considered in the final editing of the report.

E. The Airport Board will be responsible for the dissemination of report documentation within two (2) years of the acceptance of the final Summary Letter hereunder. The Airport Board will notify the FAA and Kentucky Heritage Council prior to any presentations that are offered in furtherance of such dissemination and will make a reasonable number of copies of presentations or displays available to the FAA and Kentucky Heritage Council.

ALTERNATIVE MITIGATION OF ADVERSE EFFECTS

Definition of the Project:
As alternative mitigation for the adverse effect to Site 15BE717, Amazon shall provide $50,000 in funding to support the Boone County Public Library's (BCPL) African Americans of Boone County initiative. The initiative's goal is to create relationship links between people: enslaved to slaveholders; enslaved to cemeteries/burial sites; enslaved to their descendants; enslaved to other enslaved; enslaved to Underground Railroad activities and escapes; and people to areas of geographical significance. The funding will assist with creating a database to support the African Americans of Boone County initiative as gateway to BCPL's ongoing research and provide a publically accessible research tool for genealogists and researchers interested in Boone County's African American history. The project requires extensive linking of data points for thousands of individuals identified within BCPL's spreadsheets, which contain thousands of lines of data, related to enslavement and Underground Railroad history in Boone County. The project is designed based on the structure of the Omeka- S Data Management System chosen as the platform for the project. Omeka-S allows data (people, locations, events, organizations, and source information) to be linked together through relationships and is free software. The end product will be an online, fully searchable, integrated database of all information related African American history and the Underground Railroad including, but not limited to: enslaved and their related family; slaveholders and related family; abolitionists and emancipationists; church affiliations and family affiliations; locations of slaveholding properties and other enslavement sites; and related sources up to 10,000 entries. The database will be housed onsite at BCPL's Main Library in Burlington, Kentucky and permanently supported as a component of the Underground Railroad of Boone County website.

STIPULATION III. EDUCATIONAL OUTREACH

The Airport Board will ensure that information on the results of the archaeological investigations is disseminated to both professional archaeologists and to the public through appropriate venues. Within ninety (90) calendar days of the acceptance of the final Summary Letter by both the FAA and Kentucky Heritage Council hereunder, the Airport Board will prepare and present a plan for the dissemination of information to the FAA and the Kentucky Heritage Council for review and approval.

The Airport Board will be responsible for conducting educational outreach within two (2) years of the acceptance of the final Summary Letter. The Airport Board will notify the FAA and Kentucky Heritage

Council prior to any presentations that are offered in furtherance of such dissemination and will make copies of presentations or displays available to the FAA and Kentucky Heritage Council.

STIPULATION IV. DURATION

This MOA will expire if its terms are not carried out within five (5) years from the date of its execution. Prior to such time, FAA shall consult with the other signatories to reconsider the terms of the MOA and amend it in accordance with Stipulation VIII below.

STIPULATION V. POST-REVIEW DISCOVERIES

A. Should previously unidentified significant archaeological properties or unanticipated effects to historic properties be discovered during the undertaking and after execution of this MOA, the Airport Board shall immediately notify the Kentucky Heritage Council and shall consult with the FAA, Kentucky Heritage Council, and any other consulting parties to determine an appropriate course of action. Construction in the vicinity of such properties or effects shall not resume until the requirements of 36 CFR 800.13(b)(3) have been satisfied. Additional consultation with the Kentucky Heritage Council and FAA may be required following any inadvertent discoveries. The FAA in cooperation with the Airport Board will consult with the Kentucky Heritage Council to record, document, and evaluate the National Register of Historic Places eligibility of the property and the undertaking's effects on the property, and, if eligible, to formulate a plan for resolving any effects.

B. In the event of the unanticipated discovery of an archaeological site or object of antiquity, the discovery should be reported to the Kentucky Heritage Council and to the Kentucky Office of State Archaeology in the Anthropology Department at the University of Kentucky in accordance with KRS 164.730. Should human remains unexpectedly be encountered during implementation of the Data Recovery Plan or during implementation of the undertaking, such person or persons encountering the human remains, and before resuming work, shall make a reasonable effort to refrain from disturbing or removing the human remains, protect the exposed portions of the human remains from inclement weather and vandalism, and immediately notify the Airport Board personnel. In accordance with KRS 72.020, the Airport Board will notify the County Sheriff, the County Coroner, the FAA, and the Kentucky Heritage Council. If the remains are not subject to a criminal investigation by local, state or federal authorities, the Kentucky Heritage Council's Policy Statement on treatment of Human Remains (1997) shall be used as guidance. Notwithstanding such guidance, all applicable state and federal laws and regulations governing the discovery and disposition of human remains shall be followed.

STIPULATION VI. MONITORING AND REPORTING

In the event the Data Recovery Plan (included as Attachment 3) takes longer than 18 months, the Airport Board shall provide, in consultation with Amazon, to FAA and Kentucky Heritage Council a summary report detailing work undertaken pursuant to its terms. Such report shall include any scheduling changes proposed, any problems encountered, and any disputes and objections received in the efforts to carry out the terms of this MOA.

STIPULATION VII. DISPUTE RESOLUTION

Should any signatory to this MOA object at any time to any actions proposed or the manner in which the terms of this MOA are implemented, the FAA shall consult with such party to resolve the objection. If the FAA determines that such objection cannot be resolved, the FAA shall request further comments or recommendations of the ACHP concerning the dispute pursuant to 36 C.F.R. Part 800. Any comments on the subject of the dispute provided by the ACHP in response to such a request will be considered by the FAA in accordance with 36 C.F.R. Part 800. The FAA's responsibility to carry out all other actions that are not the subject of the dispute, subject to the terms of this MOA, remain unchanged.

STIPULATION VIII. AMENDMENTS

This MOA may be amended when such an amendment is agreed to in writing by all signatories. The amendment will be effective on the date a copy signed by all of the signatories is filed with the ACHP.

STIPULATION IX. TERMINATION

If any signatory to this MOA determines that its terms will not or cannot be carried out, that party shall immediately consult with the other signatories to attempt to develop an amendment per Stipulation VIII, above. If within thirty (30) days (or another time period agreed to by all signatories) an amendment cannot be reached, any signatory may terminate the MOA upon written notification to the other signatories.

Once the MOA is terminated, and prior to work continuing on the undertaking, the FAA must either (a) execute a MOA pursuant to 36 CFR § 800.6 or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR § 800.7. The FAA shall notify the signatories as to the course of action it will pursue.

Execution of this MOA by the FAA and Kentucky Heritage Council, and implementation of its terms, is evidence that the FAA has taken into account the effects of this undertaking on historic properties and afforded the ACHP an opportunity to comment.

SIGNATORIES:

FEDERAL AVIATION ADMINISTRATION

Name

Date

Printed Name

KENTUCKY HERITAGE COUNCIL

Name

Date

Printed Name

Date

INVITED SIGNATORIES:

KENTON COUNTY AIRPORT BOARD

Name

Date

Printed Name

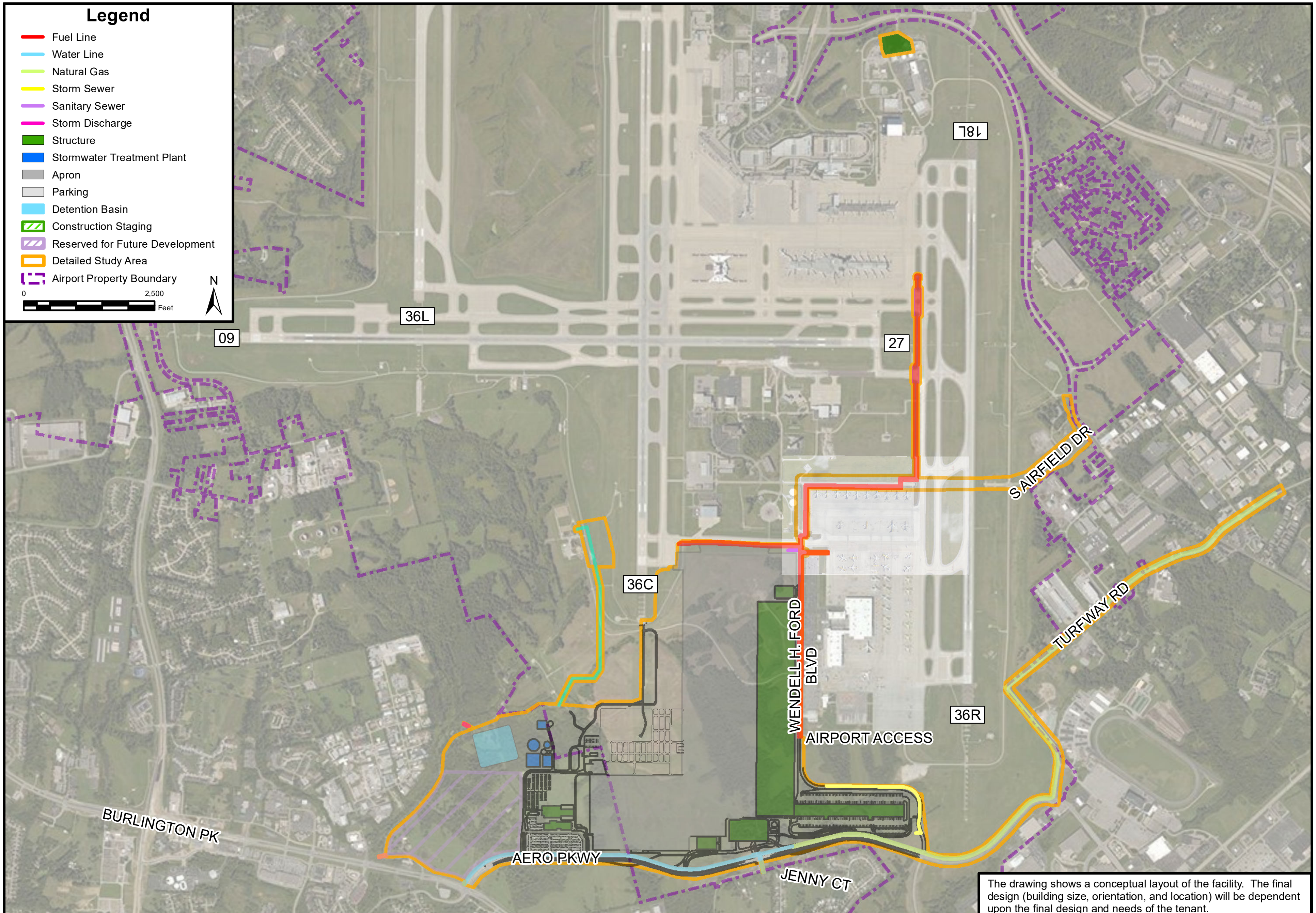
AMAZON.COM SERVICES, INC.

Name

Date

Printed Name

Attachment 1



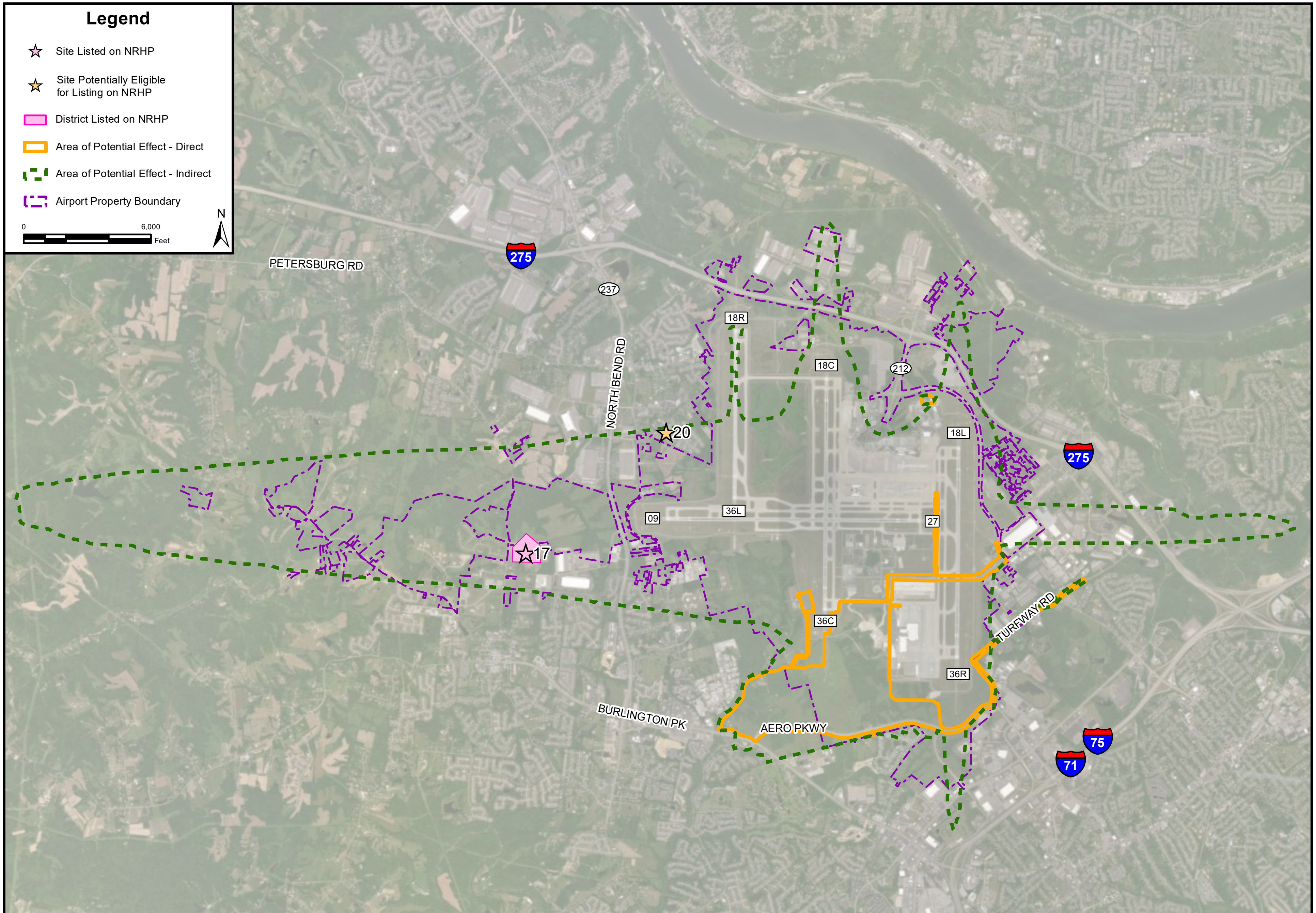
The drawing shows a conceptual layout of the facility. The final design (building size, orientation, and location) will be dependent upon the final design and needs of the tenant.

Air Cargo Facility
Environmental Assessment

Proposed Undertaking

EXHIBIT:
1

Attachment 2



Air Cargo Facility Environmental Assessment

Direct and Indirect Areas of Potential Effect

EXHIBIT:

SOURCES:U.S. National Park Service, National Register of Historic Places, Boone County Planning Commission

Attachment 3

Project: E&A-3044 February 2019

REVISED
PHASE III DATA RECOVERY PLAN FOR
SITES 15BE688, 15BE694, AND 15BE697 FOR THE
CINCINNATI/NORTHERN KENTUCKY
INTERNATIONAL AIRPORT
AIR CARGO HUB ADDITIONS PROJECT IN
BOONE COUNTY, KENTUCKY

FY18-9341

Lead Agency:
Federal Aviation Administration

Prepared For:
Kenton County Airport Board
P.O. Box 752000
Cincinnati, Ohio 45275
Attention: Debbie Conrad

Submitted by:
Environment & Archaeology, LLC
221 Main Street
Florence, Kentucky 41042
(859) 746-1778

Courtney Stoll, M.A., R.P.A.
Principal Investigator

Contains Privileged Information -- Do Not Release

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INTRODUCTION

The Kenton County Airport Board (KCAB) is proposing an Air Cargo Hub Additions Project at the Cincinnati/Northern Kentucky International Airport (Project Area) in Boone County, Kentucky (Figure 1). The project is under the jurisdiction of the Federal Aviation Administration (FAA) and will require compliance with the National Environmental Policy Act (NEPA).

In 2016, GRAS surveyed two parcels, one 210 acres and one 90 acres, for the proposed Air Cargo Hub Project (Versluis 2017). During their Phase I investigations, GRAS identified a total of eighteen previously unrecorded archaeological sites (15BE685-15BE702). Sites 15BE688, 15BE694, and 15BE697 were three of the sites recommended by GRAS for further Phase II investigations (Figure 2). In a letter dated August 8, 2017, the State Historic Preservation Officer (SHPO) at the Kentucky Heritage Council (KHC) concurred with the findings and recommendation for further work at Sites 15BE688, 15BE694, and 15BE697.

Environment & Archaeology, LLC of Florence, Kentucky, prepared a Phase II Testing Eligibility Testing Plan that included Sites 15BE688, 15BE694, and 15BE697. After an initial submission, *Environment & Archaeology, LLC* submitted a revised Scope of Work on April 20, 2018. On May 10, 2018, Chris Gunn of the KHC responded via email with requests for revisions to the planned Phase II work, which *Environment & Archaeology, LLC* agreed to follow. The Scope of Work included plans for further Phase II excavations on archaeological sites and further work on cemetery sites.

Two Phase II Management Summaries, addressing Sites 15BE694 and 15BE697, were submitted to the KHC via the FAA. Based on the findings during the Phase II excavations, *Environment & Archaeology, LLC* recommended that Sites 15BE694 and 15BE697 were eligible for the National Register of Historic Places (NRHP) and that further Phase III testing be undertaken. In a phone conversation with Chris Gunn of the KHC on August 22, 2018, Mr. Gunn asked that revised research questions for Site 15BE694 be submitted to him via email. He stated that he believed that the site was eligible, but that not enough data definitively proved that this site was associated with John R. Popham, around whom many of the research questions were developed. Revised research questions were submitted via email to Mr. Gunn on August 23, 2018. In letters dated August 29 and September 24, Mr. Gunn concurred with *Environment & Archaeology LLC's* recommendations that Sites 15BE694 and 15BE697 were eligible for the NRHP and required further investigations.

A Phase II Report, addressing Site 15BE688, was submitted to the KHC via the FAA. Based on the findings during the Phase II excavations, *Environment & Archaeology, LLC* recommended that Site 15BE688 was not eligible for the National Register of Historic Places (NRHP) and that further work was not recommended. In a letter dated September 28, 2018, the KHC responded to the report, requesting additional information in order to assess eligibility. A revised Phase II report was submitted to the KHC, which responded with a letter dated November 9, 2018. In this letter, the KHC stated that the report was still deficient in the revisions they had requested, and that the Phase II testing did not cover the areas of highest potential. Despite these deficiencies, the KHC recommended that the site was eligible for the National Register, and requested that any short-comings be addressed in Phase III work. In further phone conversation with Chris Gunn of the KHC, it was determined that the datum provided for the site in the Phase I report was inaccurate, and that the Phase II overlay had been off by approximately 38.5 meters. Mr. Gunn felt that despite this error, the site showed intact deposits of significant to qualify for the NRHP under Criterion D. *Environment & Archaeology, LLC* was requested to prepare a Phase III plan to address further work for Site 15BE688.

This Phase III Data Recovery Plan addresses Sites 15BE688, 15BE694, and 15BE697. The Phase III work on these sites will be conducted in compliance with the National Historic Preservation Act of 1966 (as amended), the Advisory Council on Historic Preservation's Procedures for the Protection of Historic and Cultural Properties (36CFR800), and will conform to the Department of the Interior's guidelines, "Recovery of Scientific, Prehistoric, Historic and Archaeological Data: Methods, Standards, and Reporting Requirements" (36CFR66). This plan is being developed in consultation with the Kentucky Heritage Council (KHC) and the Federal Aviation Administration (FAA) staff. The final report will include data from the Phase III Data Recovery and the Phase II Eligibility Testing.

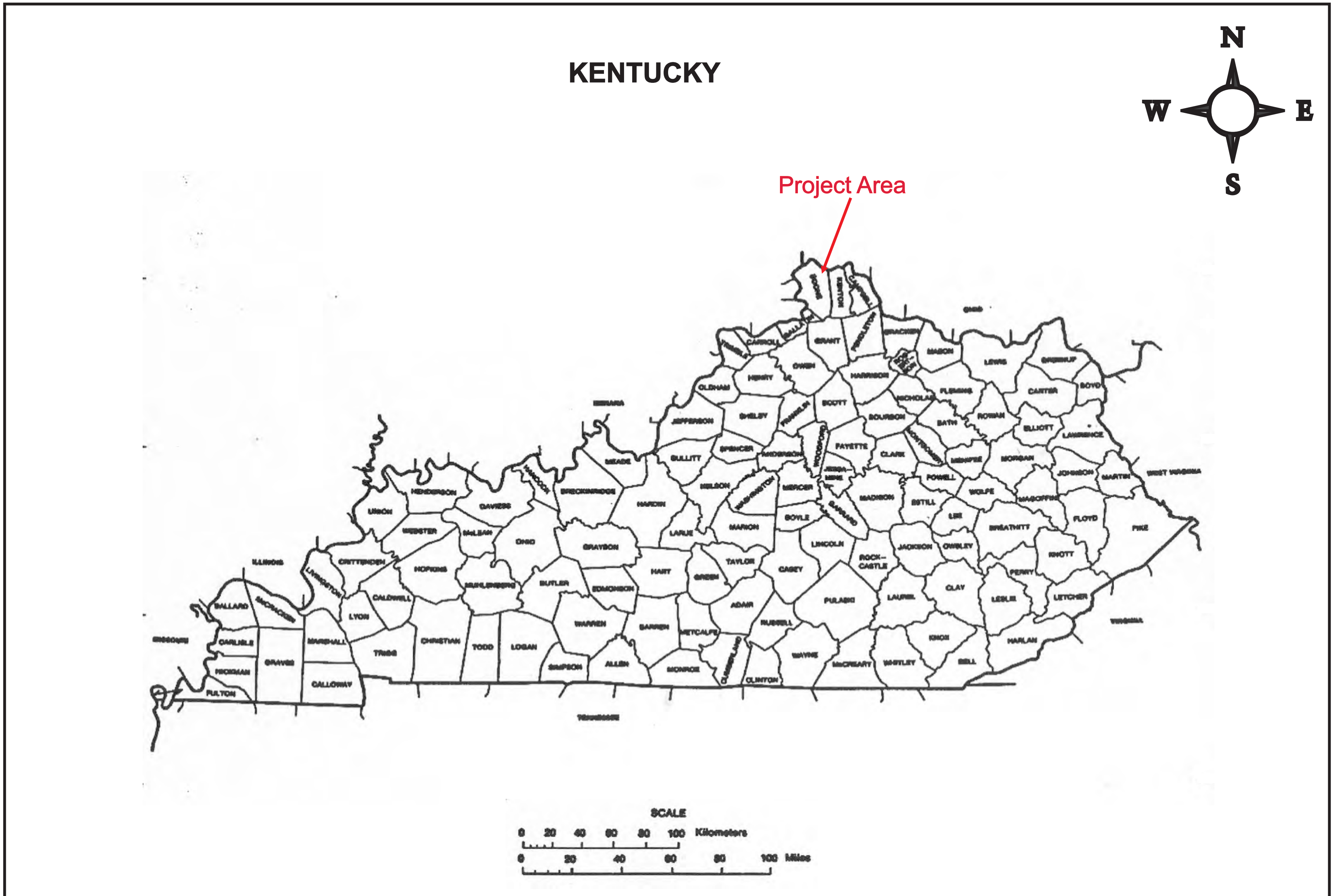

Figure 1	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project Boone County, Kentucky	State Map of Kentucky Showing Project Location Environment & Archaeology LLC

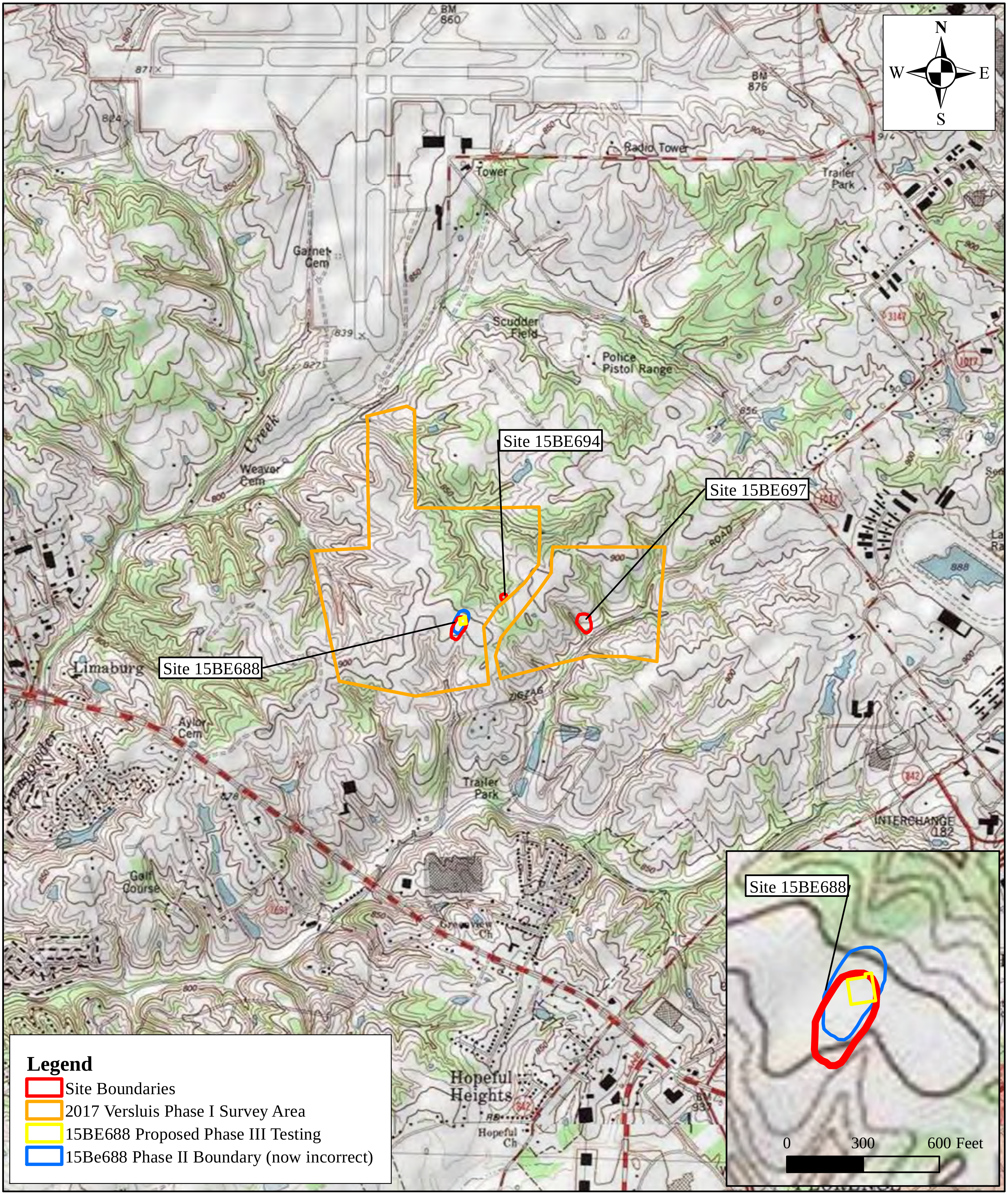

Figure 2	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project Boone County, Kentucky	USGS 7.5-Minute Topographic Map Burlington, KY Quadrangle 0 1,200 2,400 4,800 Feet Environment & Archaeology LLC

SUMMARY OF PREVIOUS WORK

The following is a summary of data concerning Sites 15BE688, 15BE694, and 15BE697 from the Phase I and Phase II Investigations. The Phase I data was is from the report "*Phase I Archaeological Survey of Two Tracts Totaling Approximately 300 Acres for a Proposed Development at the Cincinnati/Northern Kentucky International Airport, Boone County, Kentucky*" prepared by Vincent Versluis of Great Rivers Archaeological Services, and submitted on February 28, 2017.

SITE 15BE688

15BE688 Phase I Summary [Begin excerpt from Versluis 2017]

<u>Site 15Be688</u>
<u>Components</u>: Historic Middle 19th to Middle 20th Century / Prehistoric Unassigned
<u>Site Type</u>: Historic Residence/Farmstead / Prehistoric Undetermined
<u>Quadrangle</u>: U.S.G.S. 7.5 Minute, Burlington, KY, 1983 (revised 1991)
<u>UTM Coordinates at STP 1</u>: NAD 1983, Zone 16, Northing: 4321780, Easting: 702290
<u>Site Size</u>: 100m x 60m (6000 square meters)
<u>Topography</u>: Ridge top
<u>Soil Series</u>: Rossmoyne silt loam, 0 to 6 percent slopes (RsB)
<u>Ground Cover</u>: Pasture grass
<u>Surface Visibility</u>: Less than 10%
<u>Previous Disturbance</u>: Agriculture

Site 15Be688 is primarily an historic farmstead/residence, with a small prehistoric component. Archival and archaeological data indicate that the historic component dates to at least the middle nineteenth century to middle twentieth century. The prehistoric component is represented by three chert flakes and one nodule of white quartz of unidentified temporal/cultural affiliation. The site is situated on the level ridge top of a southwest/northeast trending ridge system and lies approximately 150m south of an intermittent tributary of Gunpowder Creek. Artifacts were found in an area measuring about 100m x 60m (Figure 8) (Plates 21-22).

No standing structures or buildings remain at the site but a concentration of artifacts, including some intact deposits and an earthen depression, were identified in an area measuring about 40m x 30m in the northern part of the site. The depression in the ground, which measures about 2m x 2m and 40cm deep, may represent a well or privy although no brick or limestone was observed at this feature. Two of the shovel test pits, STP 26 and STP 27, in the artifact concentration contained intact cultural deposits including a layer of limestone slabs at 45cm below ground surface in STP 26.

A house is shown in the site area on the 1912 U.S.G.S. 15' West Cincinnati, OH-KY topographic map and on the 1883 Atlas of Boone, Kenton and Campbell Counties, Kentucky (Lake 1883), where it is listed as owned by Nancy Conrad. The house is also shown on the 1938 aerial map, but is not on the 1951 U.S.G.S. 7.5' Burlington, KY topographic map (Figures 9-12).

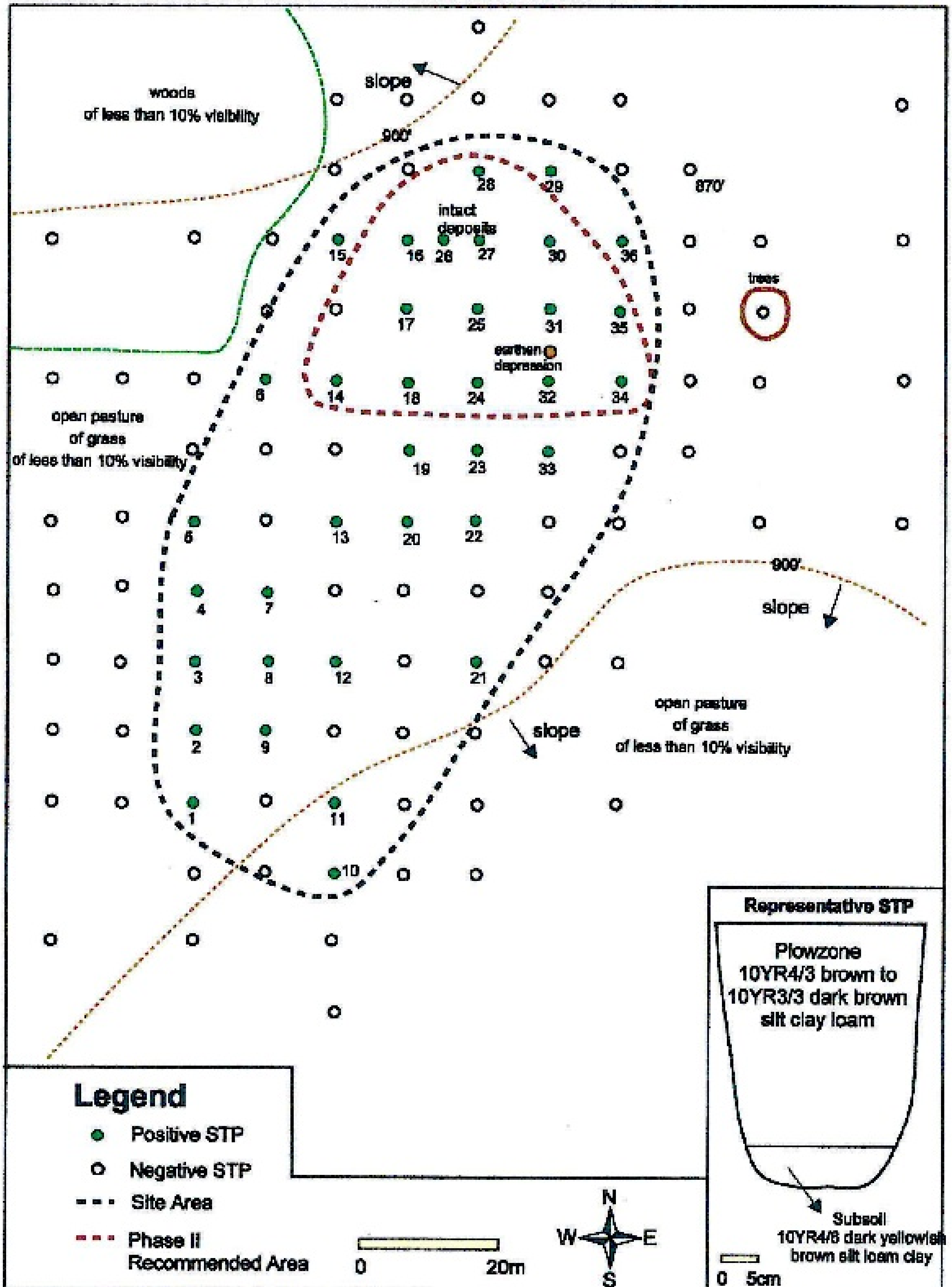

Figure 8. Site Plan Map of Site 15Be688.


Plate 21. Site 15Be688, Shovel at STP 26: View to SE.


Plate 22. Site 15Be688, Shovel at STP 2: View to NE.

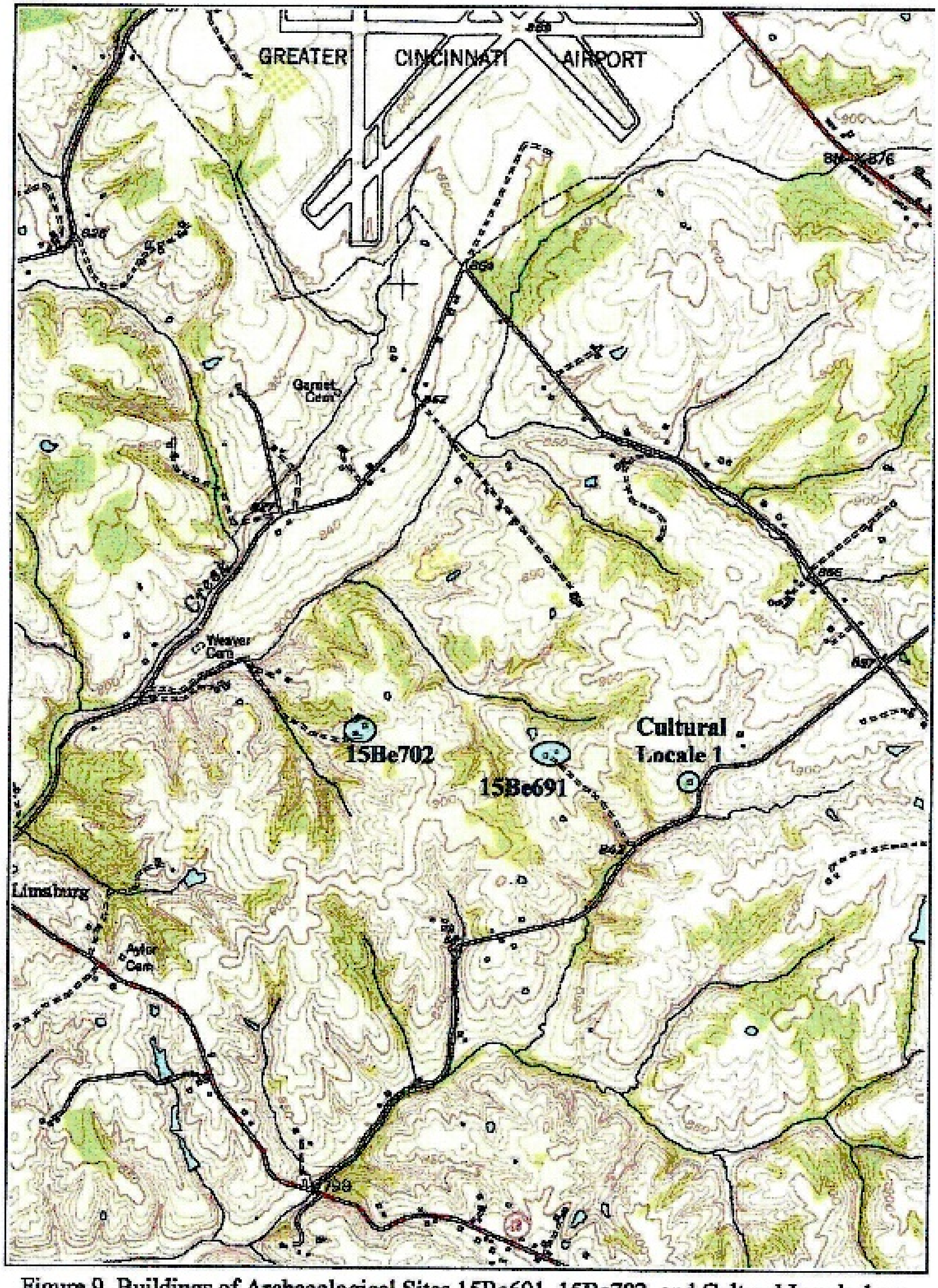

Figure 9. Buildings of Archaeological Sites 15Be691, 15Be702, and Cultural Locale 1 on the 1951 U.S.G.S. 7.5' Burlington, KY Topographic Quadrangle Map.

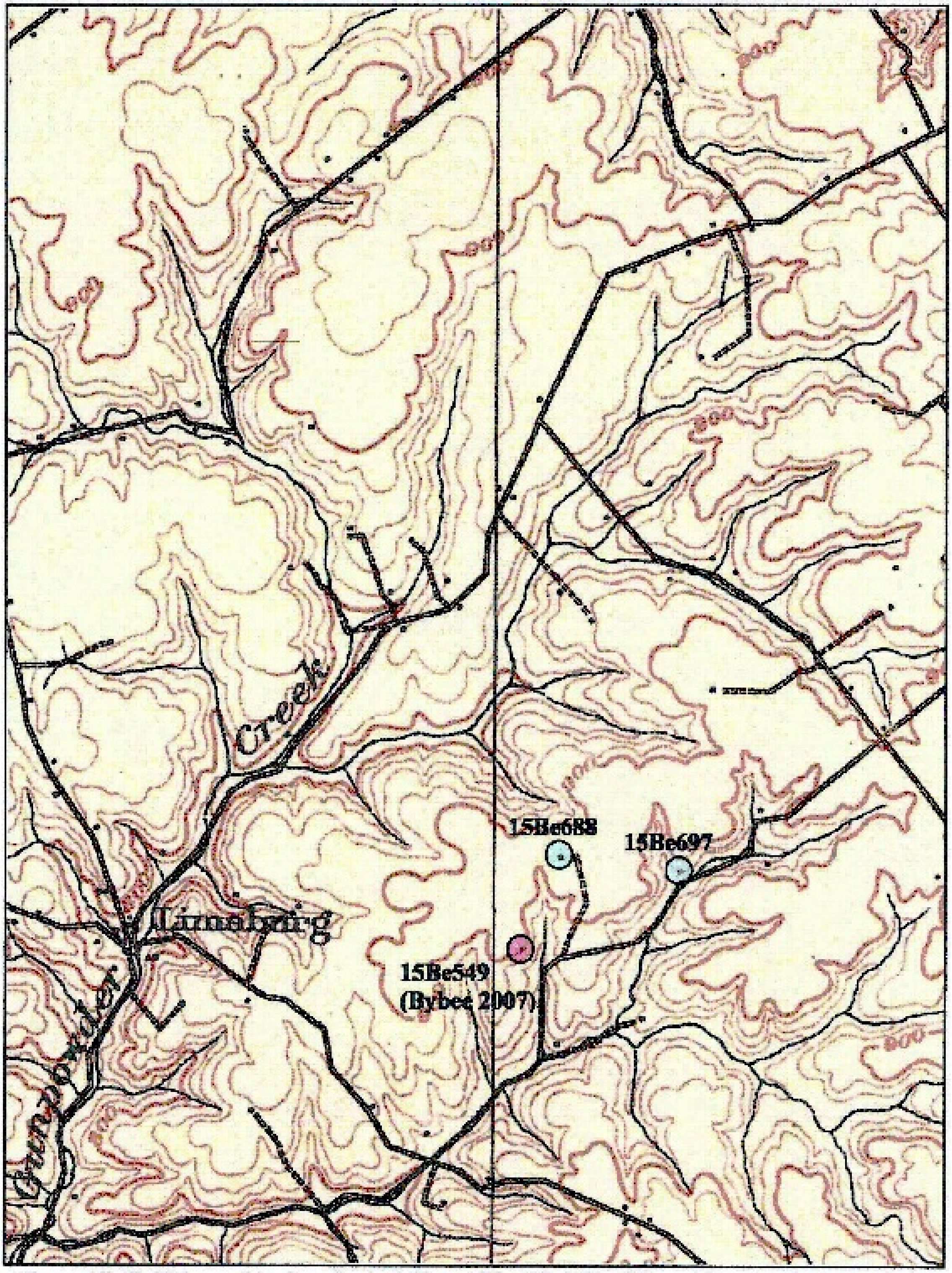

Figure 10. Buildings of Archaeological Sites 15Be688, 15Be697, and Previously Recorded 15Be549 (Bybee 2007) on the 1912 U.S.G.S. 15' West Cincinnati, OH-KY Topographic Quadrangle Map.

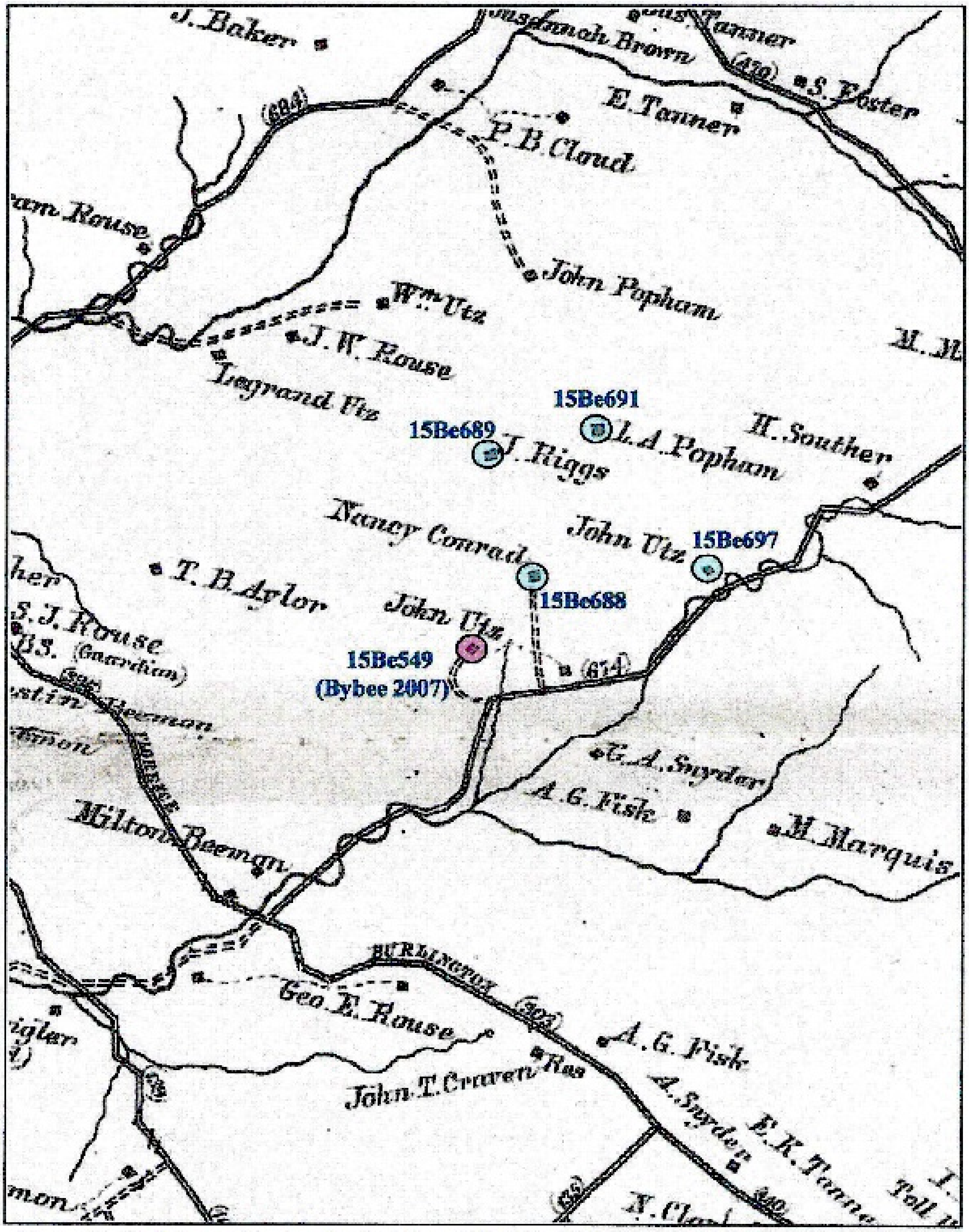

Figure 11. Buildings of Archaeological Sites 15Be688, 15Be689, 15Be691, 15Be697 and Previously Recorded 15Be549 (Bybee 2007) on the 1883 *Atlas of Boone, Kenton and Campbell Counties, Kentucky* (Lake 1883).

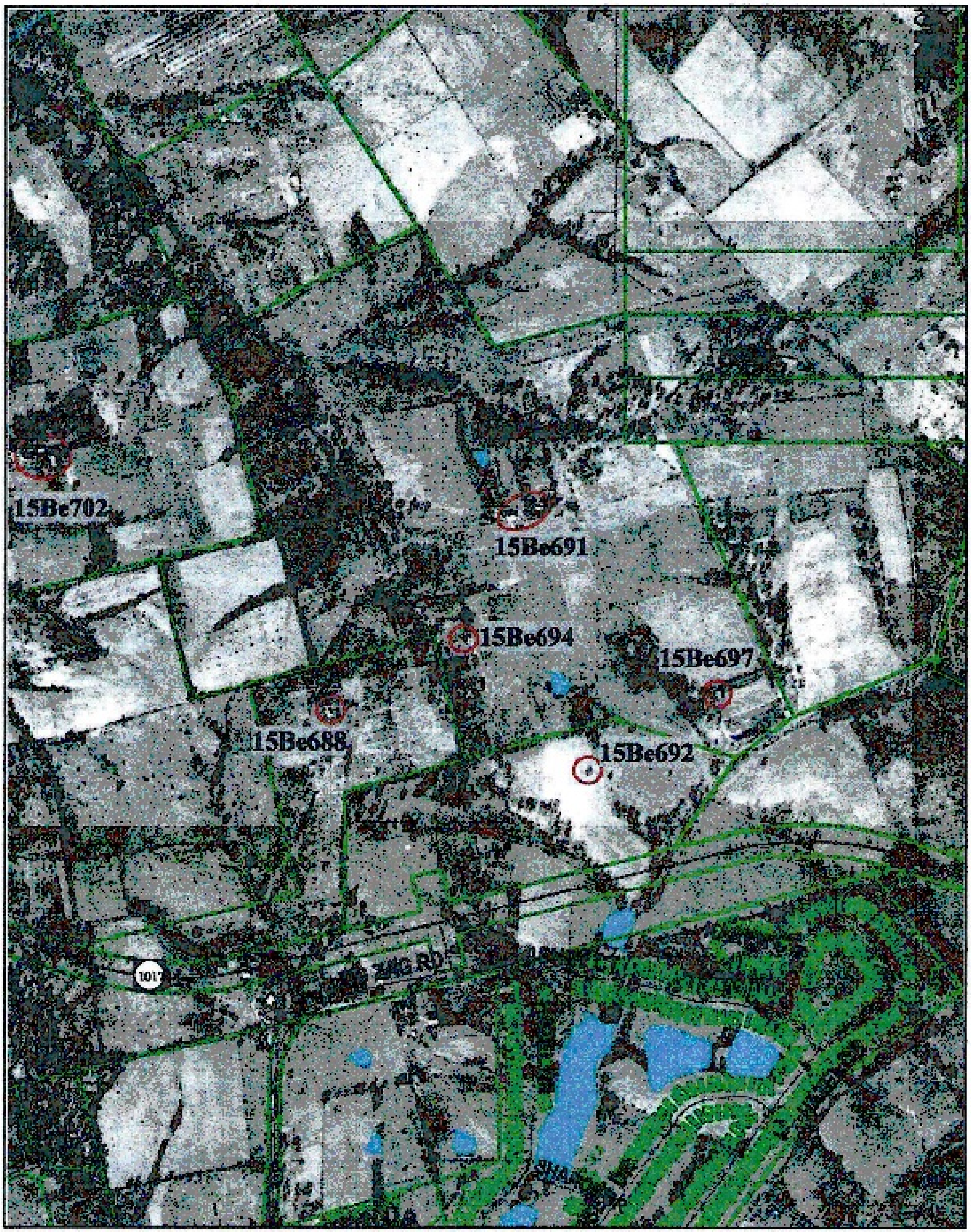

Figure 12. Buildings of Archaeological Sites 15Be688, 15Be691, 15Be692 (Grave Site), 15Be694 and 15Be697 on the 1938 Aerial Map.

The site is also not on the 1983 (revised 1991) U.S.G.S. 7.5’ Burlington, KY topographic map. At the time of survey, the site was situated in cut pasture grass that provided less than 10% ground surface visibility. The site was investigated by shovel testing in generally 10m intervals with shovel test pits screened through a 6.25mm wire mesh. The soil typically consisted of a 30-40cm thick plowzone of 10YR3/4 dark yellowish brown to 10YR3/3 dark brown silt clay loam underlain with a subsoil of 10YR4/6 dark yellowish brown to 10YR5/6 yellowish brown silt loam clay (Munsell 1994). The layer of limestone slabs in STP 26 was exposed at 45cm below the ground surface. The intact cultural deposit in STP 27 extended to 45cm below ground surface and the subsoil was not encountered in this shovel test pit.

A total of 93 shovel test pits were excavated into the site and 36 of these were positive for cultural material including mostly historic but also prehistoric artifacts in two of the shovel tests. These two shovel test pits containing prehistoric material, STP 1 and STP 4, are located in the southern edge of the site and consisted of one retouched secondary flake, two secondary flakes and one cobble of white quartz. The retouched secondary flake and one of the secondary flakes are made of St. Louis Green chert, and the secondary flake as Paoli chert (Table 9).

Artifacts / Provenience	Retouched Secondary Flake	Secondary Flake	Quartz	Total
STP 1	1			**1**
STP 4		2	1	**3**
Total	**1**	**2**	**1**	**4**

Table 9. Provenience and Prehistoric Artifacts Identified at Site 15Be688.

A total of 214 historic artifacts were recovered from 34 shovel test pits. These artifacts consist of one red transfer printed whiteware; one blue transfer printed whiteware; two unpainted embossed mold decorated whiteware; one blue and green hand painted whiteware; 34 plain whiteware; three clear lead glazed redware; one plain yellowware; 13 stoneware with Albany slip and/or salt glaze; 64 container glass; one glassware; five milkglass lid liners; 26 window glass; 16 machine cut nails; 21 wire nails; 13 brick fragments; five lamp chimney glass; two buckle frames, one with the hook; three unidentified melted glass fragments; one unidentified copper scrap piece with folds; and one unidentified faunal bone fragment (Table 10).

Some of the more recent artifacts found at the site include two of the container glass fragments with maker marks. One has an embossed “H” over an “A” of the Hazel-Atlas Glass Company that dates from 1923 to about 1982 (Lindsey 2017). The other has an embossed “I” within an “O” with a superimposed diamond that was manufactured by the Owens Illinois Glass Company of Toledo, Ohio. Dates for this particular Owens Illinois makers mark range from 1929-1954 (Toulouse 1971:403; Peterson 1968:49).

The concentration of historic cultural material occurred in the northern part of the site in STP 14, 16, 17, 24-28, 30, 31, 34 and 35. In this artifact concentration, in an area measuring about 40m x 30m, an earthen depression measuring about 2m x 2m and 40cm deep was identified that may represent a filled-in well or privy. All artifacts observed at the site were collected except for the clear container glass in STP 16 and STP 27, in the artifact concentration, of which only a sample was collected.

Artifacts / Pro-venience	Whiteware, Red Transfer Print	Whiteware, Blue Transfer Print	Whiteware, Unpainted Embossed	Whiteware, Blue and Green Hand Pain	Whiteware, Plain	Redware, Clear Lead Glaze	Yellowware, Plain	Stoneware, Salt Glaze and/or Albany Slip	Container Glass	Glassware	Lid Liner	Window Glass	Machine Cut Nail	Wire Nail	Brick	Lamp Chimney Glass	Buckle	Unidentified Glass	Unidentified Copper	Unidentified Faunal Bone	Total
STP 2														1							1
STP 3									4			3		4							11
STP 5														1							1
STP 6												1									1
STP 7									2					1							3
STP 8									1		1	1					1				4
STP 9									1			1		1							3
STP 10									1						1			1			3
STP 11														1							1
STP 12									1												1
STP 13									1												1
STP 14					1		1		2			1									5
STP 15			1		1																2
STP 16								1	15		3				4						23
STP 17						3			2												5
STP 18					1				2			1									4
STP 19												1			1						2
STP 20															1						1
STP 21											1										1
STP 22									2												2
STP 23								4						1							5
STP 24									1			5		2							8
STP 25			1		4				13			2	5	3			1	2			31
STP 26	1	1			7			7	2			3	1								22
STP 27					4				1			2	2			1					10
STP 28					2				4							1					7
STP 29					1																1
STP 30				1	9			1		1		2	4	1		2			1		22
STP 31					2				1				3	5						1	12
STP 32												1									1
STP 33					2				1			1									4
STP 34									2			1			5	1					9
STP 35									4				1								5
STP 36									1						1						2
Total	**1**	**1**	**2**	**1**	**34**	**3**	**1**	**13**	**64**	**1**	**5**	**26**	**16**	**21**	**13**	**5**	**2**	**3**	**1**	**1**	**214**

Table 10. Provenience of Historic Artifacts Identified at Site 15Be688.

The conveyance records for the area containing site 15Be688 were traced back to the early nineteenth century (Table 9). The site and encompassing land, consisting of Tract 1 and Tract 2, is currently owned by Cincinnati/Northern Kentucky International Airport with the Kenton County Airport Board acquiring the two tracts in 1965 from Dorothy W. Haller (Deed Book 169:211). Tract 1 is composed of 99 acres, excepting 68 acres, and is the tract on which John E. Utz resided in the nineteenth century, south of the Nancy Conrad's house, as shown on the 1883 map. This John E. Utz farmstead was previously recorded as site 15Be549 by Alexandra Bybee (2007) during her survey for the proposed South Airfield Road. Site 15Be549, which was not viewed as eligible for the National Register, no longer exists due to the construction of the Aero Parkway that borders the southern edge of the present project area.

Site 15Be688, which is located about 400m north of 15Be549, is situated in the 16 acres of Tract 2. In 1955, these 16 acres were acquired by Dorothy Winifred Haller from Albert Sharp, Sr. but with the clause that he could keep "a life estate in the home, but not the farm, for so long as he shall live or until such time as he abandons said home" (Deed Book 169:211). In 1936, Albert Sharp, Sr. purchased the 16 acres from Albert Cain and his wife Willie Mae (Deed Book 73:246) who acquired the 16 acres in 1934 from heirs of the estate of Otis Rouse including Lizzie Rouse, widow, Claude Rouse, Melia Grimsley and husband Joseph Grimsley, Gertrude Wuestner and husband Richard Wuestner, Maude Stewart and husband R. E. Stewart, Sterling Rouse, W. H. Rouse and wife Artie, and J. B. Rouse and wife Annie (Deed Book 71:624).

In 1919, Otis Rouse received the 16 acres from John B. and Nancy Conrad and others including Arch Q. and Ada Rouse, Harry and Ella Rouse, and Ora B. Rouse (Deed Book 61:187). At this point, a deed index search was completed, but no deeds were found of when the 16 acres were conveyed to John B. and Nancy Jane Conrad. Since John B. and Nancy Jane Conrad were not married until 1891 (Family Tree Search 2017), the Nancy Conrad that owned the site in 1883, as shown on the 1883 map, is his mother Nancy (Hoover) Conrad, widow of John C. Conrad who died in 1850 (Family Tree Search 2017).

The deed records show that a John Conrad, probably John C. Conrad, acquired several tracts of land in the early 1850s including the 33+/- acre tract that Phebe (Crisler) Taylor inherited from her father David Crisler, Sr. (Deed Book R:123). Another tract acquired by John C. Conrad was a four-acre tract from John J. Weldon in 1855 (Deed Book R:618). One other tract acquired by John C. Conrad, in 1853 and 1854, appears to be the site on which his parents, John and Nancy (Crisler) Conrad lived. This tract of 42 acres John C. Conrad acquired in 1854 from William S. Weldon and Mary L. Weldon, a descendant of Nancy Conrad (i.e., daughter) (Deed Book S:576). This 42 acre tract was also acquired by John C. Conrad from heirs of Joseph Conrad including Maria L. Conrad, Nancy Jane Conrad, Thomas M. Conrad, Vilinta Conrad, Josephine Conrad, Samuel J. Conrad, and Sarah Conrad. The 42 acres are described as a "certain tract of land…on the waters of Gunpowder Creek…formerly owned and occupied by Nancy Conrad, deceased" (Deed Book S:264).

This tract of 42 acres, where the John and Nancy (Crisler) Conrad may have resided, presumably is part of the 33 5/7 acres inherited by Nancy (Crisler) Conrad and her husband John Conrad from

Nancy's father David Crisler, Sr. in 1825 (Deed Book F:445). These 33 acres were one tract of the divided land of David Crisler, Sr., situated on the waters of Gunpowder Creek, and distributed to his sons and daughters following his death in 1823. This land distribution is seen in the following conveyance taken from Deed Book F:447:

- 33 5/7 acres to daughter Fanny Crisler
- 33 5/7 acres to daughter Rhoda Crisler (wife of Daniel Barlow)
- 33 5/7 acres to daughter Phebe Crisler
- 33 5/7 acres to daughter Caty Mitchell (wife of Washington Mitchell)
- 33 5/7 acres to daughter Rebecca Crisler
- 33 5/7 acres to daughter Nancy Conrad (wife of John Conrad)
- 50 acres to son David Crisler, Jr.
- 50 acres to son John Crisler
- 33 5/7 acres to daughter Polly Feather, infant orphan of Anna Feather, deceased daughter of David Crisler, Sr.

Year of Transaction	Grantor	Grantee	Tract Size	Reference
1825	David Crisler, Sr.	John and Nancy (Crisler) Conrad	33 acres	Deed Book F:445
1853	Joseph Conrad heirs	John C. Conrad	42 acres	Deed Book S:264
1854	William S. and Mary L. Weldon	John C. Conrad	42 acres	Deed Book S:576
Post-1883	Nancy (Hoover) Conrad	John B. and Nancy Jane (Hodges) Conrad	?	?
1919	John B. and Nancy Conrad and others	Otis Rouse	16 acres	Deed Book 61:187
1934	Otis Rouse heirs	Albert and Willie Mae Cain	16 acres	Deed Book 71:624
1936	Albert and Willie Mae Cain	Albert Sharp, Sr.	16 acres	Deed Book 73:246
1955	Albert Sharp, Sr.	Dorothy W. Haller	16 acres	Deed Book 119:51
1965	Dorothy W. Haller	Kenton County Airport Board	16 acres	Deed Book 169:211

Table 11. Chain of Title for Property Containing Site 15Be688.

David Theobold Crisler was born in Virginia and is one of the children of Johann Theobald Fawatt Crisler and Rosina Gaar. The year of David's birth is not clear from the records searched for this study but the dates range from 1742 to 1755 (Family Tree Search 2017). Elizabeth Wayland, the daughter of John Wayland and Catherine Broyles, was born in about 1757 in Culpeper County Virginia. David Crisler, Sr. and Elizabeth Wayland were married in about 1780 in Culpeper County, Virginia (Lythgoe 2017). They had several children born between about 1780 and 1806, all of whom were born in Virginia, including Nancy, Phebe, David, Jr., Margaret, John, Fannie, Anna, Rhoda, Rebecca, and Caty (Lythgoe 2017; Deed Book F:445).

David Crisler (also Christler or Chrisler) served in the American Revolutionary War before and after his marriage to Elizabeth Wayland. In the pension application submitted by Elizabeth (File # W.8596) and granted in 1839 (U.S. Revolutionary War Pension and Bounty- Land Warrant Application 2017), Elizabeth testified that David was a "Private on the Virginia or Continental State line during the War of the Revolution under the command of Major Ellet Rucker and other officers" whose names she could not recollect. Elizabeth further recalls that David was engaged in the militia during the Revolutionary War having served a tour for three months before they were married, another time of three months and another of six weeks after they were married. She also remembered David stating that he was "engaged in one battle" but she doesn't recollect where it was. Elizabeth also testified that she and David were married on October 12, 1779.

After the war, and following the births of their children, David, Nancy and their children moved to Kentucky in the early 1800s and settled in Boone County. David Crisler is not listed in the 1800 Boone County census, but he is listed in the 1810 census (as David Chrisler) where he heads a household of ten including one male over age 45 (David, Sr.), one female over age 45 (Elizabeth), one male between age 16-25, two females under age 10, two females age 10-15, two females age 16-25. One slave is also listed in the household (U.S. Census 1810). By 1820, the Boone County census has David's household as a total of eight individuals including one slave, age 26-44. Two individuals are listed as engaged in agriculture (U.S. Census 1820). The 1830 census of Boone County no longer lists David, Sr., who died in 1823, but Elizabeth (Eliz) is shown as the head of a household of six including one female age 70-79 (Elizabeth), one male between age 5-9, one female age 10-14, two females age 30-39, and one slave age 24-35 (U.S. Census 1830).

Elizabeth is not listed in the 1840 census of Boone County, and she probably died shortly after she gave her testimony for the war pension in 1839, when she was 78 years old. Most records reviewed show David Crisler, Sr. as having died in 1823 in Boone County. In the Revolutionary War pension application, Elizabeth recalled her husband's death to have occurred in December 6, 1824. However, Nancy (Crisler) Conrad (daughter of David, Sr. and Elizabeth) and Allen Barlow (son-in-law of David, Sr. and Elizabeth) testified that David "died at or about the time stated" by Elizabeth, suggesting this date of 1824 might not be completely correct. The inventory and appraisal of the estate of David Crisler, Sr., with David Crisler, Jr. as administrator of the estate, is dated January of 1824 (Will Book B:127), which confirms that David Crisler Sr. did not die on December 6, 1824, but perhaps he died on December 6, 1823.

Nancy Crisler was born in 1780 in Virginia and is one of the daughters of David and Elizabeth Crisler. John Conrad was born in 1779 in Pennsylvania. No records were found of his mother, but at least one record lists his father as Joseph Conrad who died in 1795 at the age of 35 (Family Tree Search 2017). John Conrad and Nancy Crisler were married in 1802 in Madison, Virginia and they had at least three children: John born in 1821, Lucinda, born in 1830 and Mary L. born in 1831. John Conrad died at age 71 in 1850 (Family Tree Search 2017), and Nancy passed away in around 1853 based in part on one deed that recorded her as being deceased by 1853 (Deed Book S:264).

The 1830 Boone County census lists John Conrad's household of twelve including John and six other males, and Nancy and four other females (U.S. Census 1830). By 1840, John C. Conrad (which is probably the father although his son goes by the name of John C.) is listed in Boone County with a household of nine white people including four persons employed in agriculture (U.S. Census 1840). The 1850 census no longer lists John Conrad, who died in 1850, but his wife Nancy (Crisler) is still listed as living in District 2 of Boone County where she is 72 years of age and living with her children, Lucinda and Mary L., and two other younger Conrad children, Melian and Samuel (U.S. Census 1850). Nancy's son, John C. Conrad, is no longer living in her household in the 1850 census. By 1860, Nancy (Crisler) Conrad is no longer found in the Boone County census which is consistent with her death occurring in about 1853.

John C. Conrad, son of John and Nancy (Crisler) Conrad, was born in Kentucky in 1821. In 1848, he married Nancy Hoover in Boone County and they had at least three children including Louisa Francis, Mary, and John B. Conrad. John C. Conrad died in 1870, but his wife Nancy lived until 1917 (Family Tree Search 2017). The 1850 census lists John and Nancy (Hoover) Conrad as residing in District 2 of Boone County where John is a 29 year old farmer and Nancy is 21 years old. Three other individuals are in their household: James M. Conrad, less than one year of age; Dorcas J. Conrad, age 10; and William Weldon, age 23 (U.S. Census 1850). By 1860 the census lists John and Nancy Conrad in Boone County with Angelina, age 9, Arminta, age 6, Louisa F. age 4, and Mary E., age 1. Samuel Weldon is listed as a 25 year old farm hand (U.S. Census 1860). John C. Conrad is no longer present in the 1870 census, having died in this year of 1870, but Nancy is still listed in 1870 and in her household were Angline, Arminie, Louisa, and Mary E.; and now also in her household were Virginie age 8, Bertha age 7, and son John B., who was just 3 months old (U.S. Census 1870).

John B. Conrad, son of John and Nancy (Hoover) Conrad, was born in Kentucky in 1870 and was married to Nancy Jane Hodges. They had several children as seen in the census data. The 1880 census lists John B. living with his mother Nancy in the Florence District of Boone County with other Conrads still in the household including Angeline and Araminta, now in their 20s, and Emma and Bertha (U.S. Census 1880). The 1900 Boone County census no longer lists mother Nancy but shows John B., now 30 years old, living with his wife Nancy Jane and children Stanley E. age 6, Hildreth H., Ivan N. age 2, and Ross 2 months old (U.S. Census 1900). The 1910 census lists John B. as a general farmer, and wife Nancy with their children Stanley, Hildreth, Ivan, Ross and now John P. H. age 4 (U.S. Census 1910). John B. Conrad died in 1950 at the age of 80, and his wife passed away eleven years earlier in 1939 (Family Tree Search 2017).

The house of site 15Be688 was constructed at some point before 1883, as it is shown on the 1883 map. Based on these dates, and some of the artifacts found at the site, the site's house was possibly built in the early to middle nineteenth century by John and Nancy (Crisler) Conrad after the land was given to them by David Crisler, Sr. in 1825. Alternatively, the site might not be that of the elder John and Nancy Conrad, but might have been constructed by their son John C. and his wife Nancy (Hoover) Conrad after their marriage in 1848. The 1850 census no longer lists John C. as living with his widowed mother, suggesting that he may have built his own house, unless he and his wife moved back into the house formerly occupied by his mother, after she died in about 1853.

The deed records show that John C. acquired the 42 acre tract on which his parents John and Nancy (Crisler) Conrad lived. What is not clear is whether the house at site 15Be688 was where his parents lived into which he moved after his mother's death, or if the site is where he and his wife Nancy (Hoover) Conrad built their own house. Whatever the case, site 15Be688 represents the farmstead where John C. and his wife Nancy and family lived in the middle to late nineteenth century. After John C. Conrad's death in 1870, the site appears to have been occupied by his widowed wife Nancy, and son John B. and his siblings, as seen on the 1883 map where "Nancy Conrad" is marked at the site. In the early 1900s, the site was likely still the residence of John B. and his wife Nancy and their children until they sold the 16 acres to Otis Rouse in 1919.

The house is still shown as standing on the 1912 map and 1938 aerial map. Based on some of the more recent artifacts found at the site (e.g., the glass bottles with makers marks), the house appears to have been occupied in the early to middle twentieth century. After John B. and Nancy Conrad, Otis Rouse owned the site, but it is not clear if he resided there as he is not listed in the vicinity in the 1920 Boone County census. The census does list a William C. Rouse, a 71 year old farm operator of a general farm, married to Elizabeth but living in Constance, Kentucky. Their children in the household are Sterling, Otis and Claude (U.S. Census 1920).

By 1936, Albert Sharp, Sr. owned the land and apparently resided at the site as indicated in the clause that he was to keep "a life estate in the home, but not the farm, for so long as he shall live or until such time as he abandons said home" (Deed Book 169:211). After his death in 1965 the land was purchased by the Kenton County Airport Board.

Archival and archaeological data indicate that this historic farmstead/residence site dates to at least the middle nineteenth century to the middle twentieth century. The site also has a small prehistoric component of unidentified temporal/cultural affiliation. No standing structures or buildings remain at the site, however, a concentration of historic artifacts including some intact deposits and an earthen depression were identified in an area measuring about 40m x 30m. The prehistoric component is small and occurs in agriculturally disturbed contexts and is not considered eligible for listing in the National Register. This historic component's area of concentrated and intact archaeological deposits could yield information important to the history of the region and is considered potentially eligible for listing in the National Register of Historic Places under Criterion D of 36 CFR Part 63. It is recommended that Phase II archaeological testing be conducted at this portion of the site or that this portion of the site be avoided and protected with a 100 foot buffer zone.

[End excerpt from Versluis 2017]

15BE688 Phase II Summary

The information presented here regarding the Phase II work is from the Phase II Management Summary submitted by *Environment & Archaeology, LLC* to the KHC (Erickson 2018). Mr. Erickson was the Principal Investigator for the Phase II work. Either Mr. Erickson or Courtney Stoll will be the Principal Investigator for the proposed Phase III work.

Environment & Archaeology, LLC of Florence, Kentucky, prepared a Phase II Eligibility Testing Plan that was approved by the KHC on May 10, 2018, provided some revisions to the Scope of Work were implemented. This plan detailed the Phase II excavation plans for Site 15BE688. Field excavations specified in this plan were conducted in June and July of 2018 in Boone County, Kentucky. Mr. R. Vincent Whitlatch was the Field Director for the Phase II excavations. The site as defined during the Phase I survey was approximately 5,525 square meters in size. Based on the Phase II testing, and through discussions with Chris Gunn of the KHC, it was determined that during the Phase II work, the overlay of the site as defined by Versluis in the Phase I was inaccurate. The location of the site for Phase II excavations was determined by Phase I mapping and UTM coordinates provided (Versluis 2017). Based on discussions with Chris Gunn, it is believed that the location of Test Unit 5 excavated during the Phase II was likely the location of the earthen depression noted in the Phase I. Realigning the site based on this detail, along with tree lines sketched on the Phase I map, resulted in an offset of the site 38.5 meters to the southwest (Figure 3). This meant that testing during the Phase II work did not adequately test the areas of highest probability that the KHC requested. Chris Gunn stated that despite this placement error, it was his opinion that based on the Phase II findings that Site 15BE688 was eligible for the *National Register of Historic Places* based on Criterion D.

The Phase II investigations resulted in a 26 square meter sampling. Based on conversations with Chris Gunn of the KHC, the replotting of this site to the southwest indicates that only 17 square meters of that excavated was within the site boundaries. Of the six one-meter by one-meter test units excavated, four were within the site boundaries. Test Unit 5 would have been near the depression indicated during the Phase I, and Test Unit 6 should be the location of intact deposits from the Phase I. A 20-meter trench that was one meter wide was plowzone stripped, of which a total of 13 meters is within the relocation of the site. This trench was requested by KHC between the Phase I intact deposits and earthen depression, however it was excavated further north than the areas ultimately determined to be these locations. Two features were uncovered during the excavations, both from test units. In Test Unit 4, a historic plow scar was uncovered (Feature 1). In Test Unit 5, now believed to be the location of the Phase I earthen depression, evidence of a foundation and associated elements were identified (Feature 2).

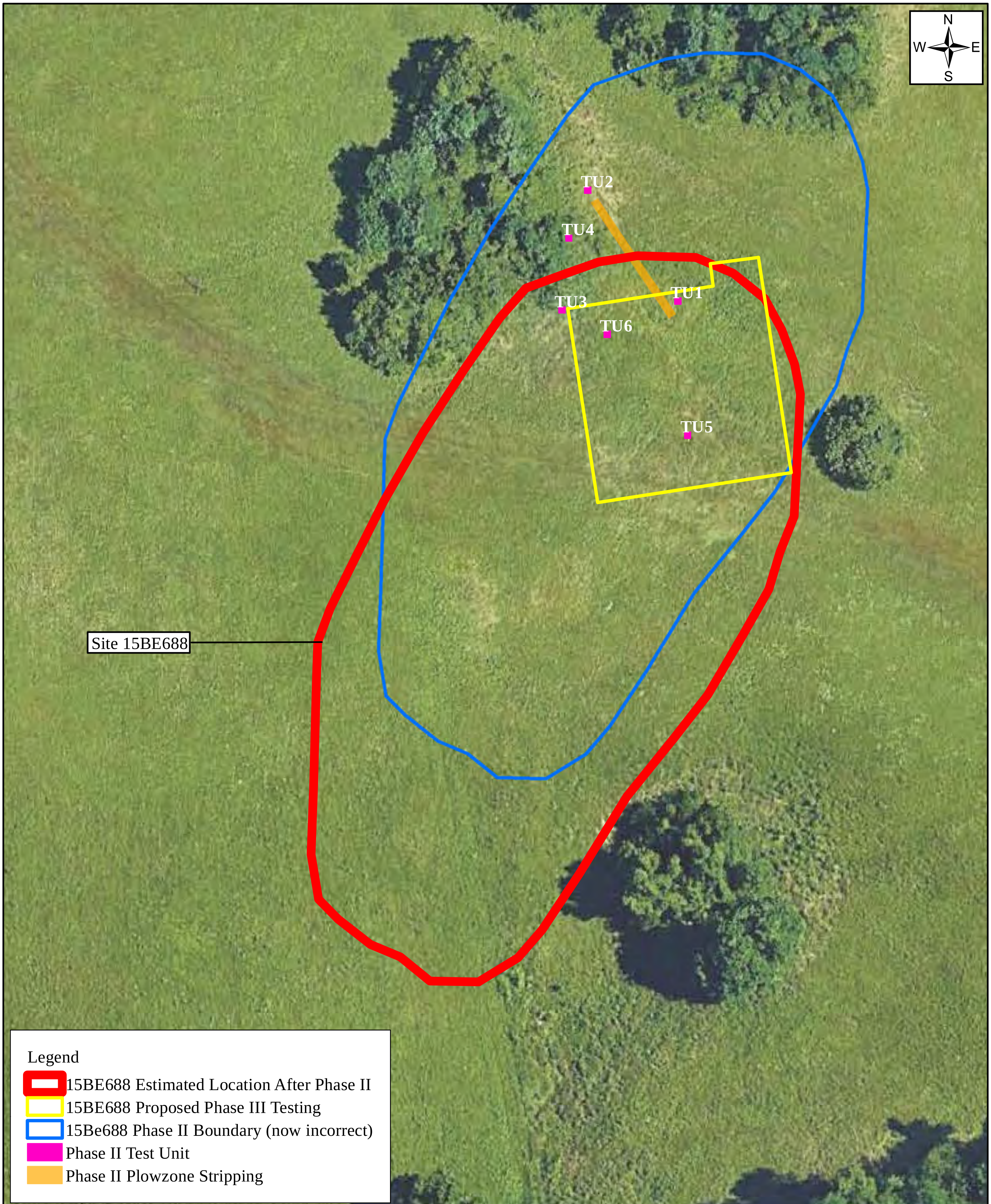

Figure 3	Kenton ounty Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project Boone County, Kentucky	Aerial Map of Site 15BE688 Phase II Excavations Aerial Provided by Google Map Services 0 62.5 125 Feet Environment & Archaeology LLC

A total of 8,075 definitive historic artifacts were recovered during the Phase II investigation, along with additional items that could be associated with the historic occupation, but due to the material could not be definitively classified as historic (e.g. rock, bone). One prehistoric artifact was recovered along with the historic material, but this was likely incidental. The prehistoric material was too sparse to be considered a component of the site. Feature 2 located in Test Unit 5 appears to have been plow truncated. However, beneath the plow depth, the materials appeared to be *in situ*. Due to the presence of this intact feature, and that the excavations did not test all of the areas with the highest potential, it is believed that further investigations will uncover additional plow-truncated intact features.

Analysis of the cultural material recovered from the Phase II investigation indicated that Site 15BE688 was a historic farmstead/residence that was occupied from the mid-19th to the mid-20th century. This dates the site to the Postbellum Industrialism Period (1866-1914) and Industrial and Commercial Consolidation Period (1915-1945) in Kentucky. These dates were based on diagnostic artifacts recovered at the site, including ceramics, glass, nails, and bullet casings.

Two potential features were identified during the Phase I survey: an earthen depression and an area of intact deposits (Versluis 2017). Test Unit 5 excavated during the Phase II appears to be the location of the identified earthen depression. Based on the layover of the Phase I work, Test Unit 6 should have been within the area of intact deposits, but the fieldwork did not indicate intact deposits were found at this location. However, as the Phase II work was conducted at an apparent off-set of the actual location of the site, it is possible that these intact deposits have not yet been accurately located. The excavations showed that the disturbance to the site was the result of historic agricultural plowing. The features were plow-truncated to an approximate depth of 23 centimeters below the surface (cmbs). Below this depth, the feature was found to be intact.

The key questions that guided the evaluation of Site 15BE688 for inclusion in the NRHP during the Phase II investigations were as follow, with brief answers to each based on the Phase II findings.

- Can the site size estimated during the Phase I analysis be confirmed or refuted during systematic Phase II investigation?
    - Due to the mapping errors identified after the Phase II fieldwork, the Phase II work was not sufficient to make this determination. However, artifacts were found in areas that based on the current site boundary understanding, would expand those boundaries.

- Does the historic component possess structural characteristics that could contribute new information to the study of ethnicity, gender, or economic status? This will provide a good opportunity to look at a broad range of ethnicity and economic issues.
    - While extensive material remains relating to this question were not recovered during the testing, it did appear that the foundation of a structure was still present and *in situ* at the site. Further excavations in this area and analysis of ceramic type and decor,

along with other cultural deposit characteristics could provide significant insights into details of ethnicity and economics at this site.

- Does the site contain discrete activity areas which may assist in the determination of site function and duration of occupation?
  - The Phase II excavations did indicate a location of a residence, which definitively showed that discrete activity areas are present at this site. Further excavation is necessary to determine if other discrete activity areas are present, but it is likely that they are based on Feature 2, and have not yet been identified.

- Is the historic cultural material recovered temporally diagnostic and can it assist in identifying the age of construction on any building foundations that may be encountered?
  - The cultural material was temporally diagnostic. Regarding architectural material, wire nails greatly outnumbered any other kind of nail found at the site (n=701), but a significant number of cut nails were recovered as well (n=288). This likely reflects the history of the property identified during deed research which indicated that inhabitation of this site spanned from the mid-19th to mid-20th century. Test Unit 5, Feature 2 appeared to be part of the foundation of the a residence. The Phase II report noted that only four wire nails and three cut nails were recovered from this feature. However these numbers can be misleading. A great number of nails were recovered from Test Unit 5 overall. The top stratum was rich with nails, and while disturbed from plowing, chronologically they likely represent a burn episode. The meeting of Stratum I and II within the unit is likely a layer of mostly undisturbed material, while the intact feature was predominantly stone. In the rest of the unit, there were 268 cut nails and 691 wire nails. This is nearly the entirety of the cut and wire nail assemblage recovered at 15BE688 and supports that Test Unit 5 is on the location of the former residence. Builders trenches and foundation remains could provide additional information regarding building methods.

- Have deeds and other archival materials been researched in order to place the site within a more specific historic context?
  - Based on the historic research conducted to date, it is hypothesized that this was the residence of several different families since the mid-19th century. Further research into deeds, particularly if several building episodes or even residence locations are identified, could aid in making a further determination of what occupation was associated with which family.

- Within the context of regional farmstead/homestead archaeological studies, will the site's historic component contribute new information concerning the processes and patterns of land use changes relevant to agricultural development through the nineteenth and into the twentieth century?
  - Yes, the historic component appears to be from a several occupations that fit into the Postbellum Industrialism Period and the Industrial and Commercial Consolidation

Period in Kentucky. This site can provide new information into how rural person(s) of moderate means, lived and worked the land during these periods, and possibly how modes of life changed between these periods

Based on the synthesis of the data collected during the Phase II of Site 15BE688, *Environment & Archaeology, LLC* recommended that Site 15BE688 was not eligible. However, Chris Gunn of the KHC ascertained that certain locational information provided during the Phase I may not have been correct, and thus the areas of highest probability were likely not tested. This was expressed in a letter from Mr. Gunn dates November 9, 2018. Through this letter, along with telephone communication, Mr. Gunn expressed that despite the errors in locating the site, that he felt Site 15BE688 still showed significant integrity and significance to be eligible under Criterion D for the NRHP. Chris Gunn requested a Phase III Plan be submitted to the KHC.

SITE 15BE694

15BE694 Phase I Summary [Begin excerpt from Versluis 2017]

Site 15Be694
Components: Historic Middle 19th to Early 20th Century
Site Type: Residence/Farmstead
Quadrangle: U.S.G.S. 7.5 Minute, Burlington, KY, 1983 (revised 1991)
UTM Coordinates at STP 7: NAD 1983, Zone 16, Northing: 4321942, Easting: 702534
Site Size: 30m x 30m (900 square meters)
Topography: Ridge top
Soil Series: Rossmoyne silt loam, 6 to 12 percent slopes (RsC)
Ground Cover: Deciduous trees and secondary growth
Surface Visibility: Less than 10%
Previous Disturbance: Agriculture

Site 15Be694 is an historic farmstead/residence dating to at least the middle nineteenth century to early twentieth century based on archival and archaeological data. The site is situated on the level top and edge of a south/north trending ridge and overlooks an intermittent tributary of Gunpowder Creek that lies about 40m west of the site. The site is represented by historic material found in shovel test pits in an area measuring 30m x 30m. No standing structures or buildings remain at the site but a concentration of artifacts was identified around an intact limestone well and intact earthen depression lined with bricks underlain with a sandstone slab. This circular depression may represent a privy and measures approximately 2m x 2m and 50cm deep. The artifact concentration occurs in the center of the site and covers an area measuring about 10m x 10m (Figure 19) (Plates 41-45).

The house is not depicted on any of the topographic maps including the 1951 and 1983 (revised 1991) U.S.G.S. 7.5' Burlington, KY topographic maps, and the 1912 U.S.G.S. 15' West Cincinnati, OH-KY topographic map. The site is also not shown on the 1883 Atlas of Boone, Kenton and Campbell Counties, Kentucky. The site's house does appear to still be standing on the 1938 aerial map. As was the case for site 15Be689, the 1951 map shows the site as situated in open farmland and not covered in woods in the middle twentieth century (see Figures 9-12).

At the time of survey, the site was situated in deciduous woods and secondary growth that provided less than 10% ground surface visibility. The site was investigated by shovel testing in generally 10m intervals with shovel test pits screened through a 6.25mm wire mesh. The soil typically consisted of a 30-40cm thick plowzone of 10YR3/3 dark brown to 10YR3/4 dark yellowish brown silt clay loam underlain with a subsoil of 10YR4/6 dark yellowish brown to 10YR5/6 yellowish brown silt loam clay (Munsell 1994). One shovel test pit, STP 14, was placed in the western interior edge of the privy feature (Plate 46).

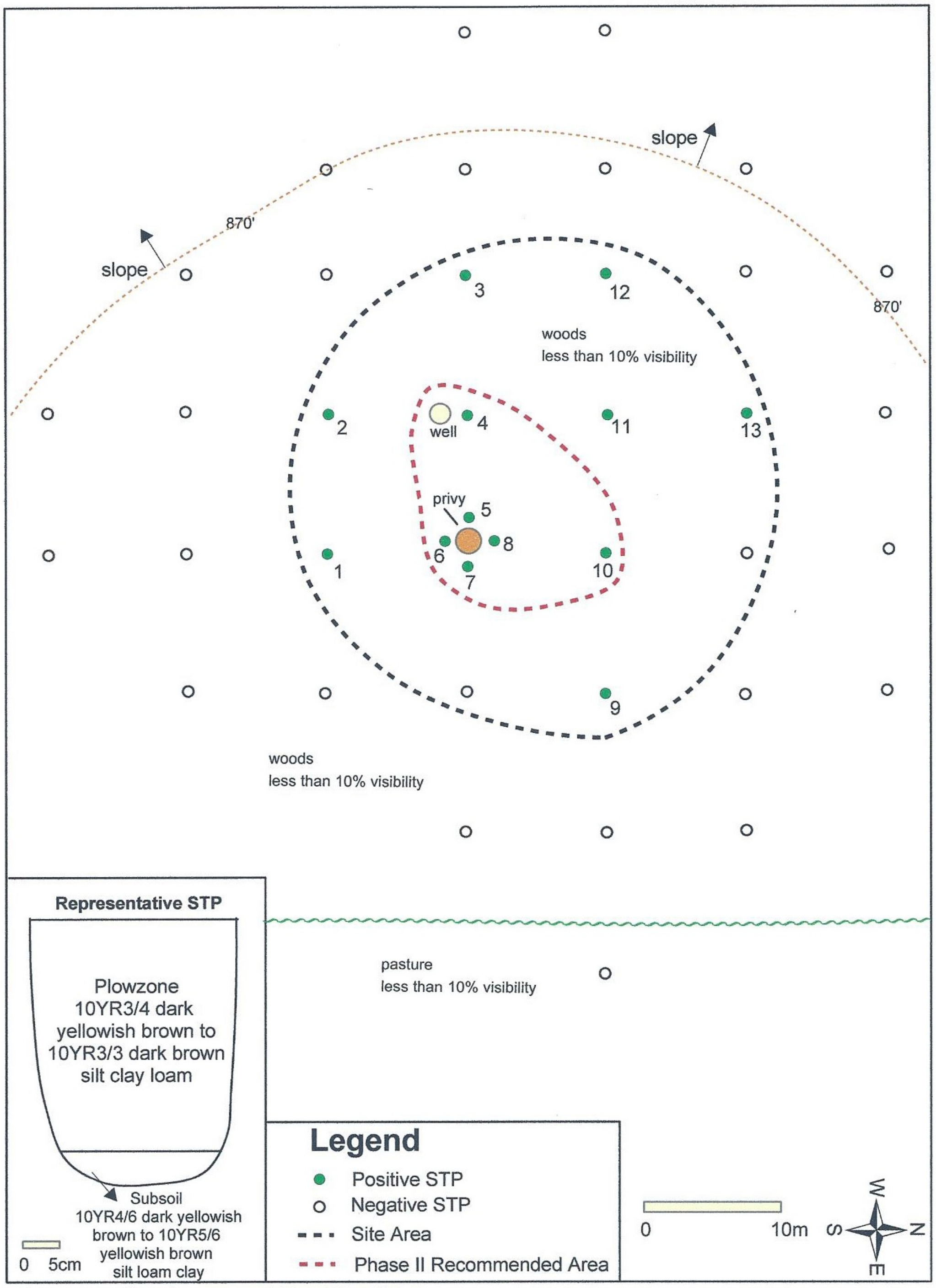

Figure 19. Site Plan Map of Site 15Be694. From Versluis 2017: 99

Plate 41. Site 15Be694, Shovel at STP 6: View to NW.

Plate 42. Site 15Be694, Shovel at STP 6 – Privy Depression to Right of Shovel: View to SW.
From Versluis 2017:100

Plate 43. Site 15Be694, Pin Flag at STP 4 with Well (background) and Metal Bucket (right): View to South.

Plate 44. Site 15Be694, Limestone Well. From Versluis 2017:101

Plate 45. Site 15Be694, Brick-Lined Privy (Trowel facing West): View to West.

Plate 46. Site 15Be694, STP 14 in Interior of Privy – Bricks Underlain with Sandstone Slab (Trowel facing West): View to West.

From Versluis 2017:102

This shovel pit revealed a 50cm thick layer of mottled 10YR4/3 brown and 7.5YR3/3 dark brown silt clay loam to a subsoil of mottled 10YR5/6 yellowish brown and 7.5YR4/6 strong brown silt loam clay. The bricks lining the feature are set on a sandstone slab encircling the feature.

A total of 40 shovel test pits were excavated into the site and 14 of these were positive for cultural material. A total of 91 historic artifacts were recovered from these 14 shovel probes and consisted of one blue sponge decorated whiteware; one polychrome hand painted whiteware; one unpainted embossed molded edge decorated whiteware; eight plain whiteware; one plain pearlware; one plain porcelain; one unglazed redware; one blue hand painted decoration on white glaze/Albany slip stoneware; one glassware with embossed leaf decoration; 19 window glass; four wire nails; 16 machine cut nails; 22 brick fragments; one lamp chimney glass; one cartridge case; and one unidentified faunal bone (Table 19). The cartridge case is stamped with a U, which is a type manufactured by Union Metallic Cartridge Co. that dates from 1867-1902 (IMACS 1992). The concentration of artifacts were found around the limestone-lined well and brick- and sandstone-lined privy in the center of the site in STP 4, 5, 7, 10 and 14. All artifacts observed at the site were collected except for the bricks and sandstone lining the privy and limestone lining the well.

Artifacts / Provenience	Whiteware, Blue Sponge	Whiteware, Polychrome Hand Painted	Whiteware, Unpainted Embossed Edge	Whiteware, Plain	Pearlware, Plain	Porcelain, Plain	Redware, Unglazed	Container Glass	Stoneware, Blue Hand Painted on White Glaze/Albany Slip	Glassware, Embossed Leaf Decoration	Window Glass	Wire Nail	Machine Cut Nail	Brick	Lamp Chimney Glass	Cartridge Case	Unidentified Faunal Bone	Total
STP 1														1				1
STP 2											3		1					4
STP 3				1				1						1				3
STP 4	1			2		1		7			1		3	1		1		17
STP 5							1				7		1	4			1	14
STP 6											1		1	2				4
STP 7				1							1		1	4	1			8
STP 8													1					1
STP 9								1										1
STP 10		1	1	1	1			1	1	1	3	1	3					14
STP 11				1														1
STP 12				2				1						1				4
STP 13														2				2
STP 14											3	3	5	6				17
Total	1	1	1	8	1	1	1	11	1	1	19	4	16	22	1	1	1	91

Table 19. Provenience of Historic Artifacts Identified at Site 15Be694.

From Versluis 2017:103

The conveyance records for the area containing site 15Be694 were traced back to the early nineteenth century (Table 20). This site, situated on the same 115 acre tract of land as sites 15Be689 and 15Be691, is currently owned by Cincinnati/Northern Kentucky International Airport with the Kenton

County Airport Board having acquired the tract in 1968 from heirs of the Thomas Coyne (Deed Book 180:464). In 1933, the 120 acres was purchased by Thomas Coyne from Omer Macrander and wife Theresa (Deed Book 71:448) who acquired the 120 acres in the same year from William K. Thomas and Ruth Thomas (Deed Book 71:442). Also in 1933, William and Ruth Thomas acquired the 120 acres from George G. Tupman (Deed Book 71:372).

William and Ruth Thomas acquired the 120 acres from George G. Tupman (Deed Book 71:372). In 1932, George Tupman received what was now two parcels of land including Parcel 1 of 41 acres, and Parcel 2 of 162 acres from Thyrza T. Wilson (Deed Book 70:524). The Parcel 2 is composed of five tracts including Tract 1 of 84 acres; Tract 2 of nine acres; Tract 3 of 43 acres; Tract 4 of 19 acres; and Tract 5 of five acres (Deed Book 70:524). Thyrza Wilson acquired this Parcel 2 of five tracts from William E. Popham, R. L Brown and wife Mattie L., C. L. Popham and wife Erma, Clifford T. Tanner and wife Ada, and W. A. Waters and wife Stella in 1928 (Deed Book 67:78).

Based on the deed descriptions, site 15Be694 is likely situated in the nine acre Tract 2 of Parcel 2. These nine acres were inherited by W. A. Waters and his wife Stella in 1919 from William E. Popham, Virginia Popham, widow of L. A. Popham, and other heirs of L. A. Popham who died in 1918 (Deed Book 60:577). In 1910, a tract of 35 acres, of which the nine acres was a part, was acquired by W. E. Popham from John R. Popham (deceased), L. A. Popham and his wife Virginia Frances, and W. E. Rouse and his wife Lizzie (Deed Book 53:197). In 1902, William E. Popham and other heirs of L. A. Popham inherited the nine acres from Virginia Popham (Deed Book 46:111), which is listed as Lot #3 and Lot #4 of the Rebecca Crisler divided land of 1866. In 1884, Lewis A. Popham inherited the nine acres from his brother John R. Popham (Deed Book 34:491).

Lot #3, being four of the nine acres, was conveyed to John R. Popham from Catherine Mitchell in 1870 (Deed Book 25:543). Lot #4, consisting of five of the nine acres, was conveyed to John R. Popham in 1872 from William Taylor, Robert Taylor and Francis Ann Taylor of Pendleton County, Kentucky (Deed Book 26:489). Lot #4 was also conveyed to John R. Popham from Samuel Eggleston and his wife Nancy in 1871 (Deed Book 26:409); and from Lucy Crisler also in 1871 (Deed Book 26:224). All of these grantors are apparently heirs of David Crisler, since it was to David's heirs that Lot #4 was given in 1866. Based on the probable location of site 15Be689 on the Rebecca Crisler divided land map in Lot #2 (see Figure 14), site 15Be694 is more likely situated in Lot #4, as opposed to Lot #3 that does not appear to be far enough south from site 15Be689 for site 15Be694 to be located in it.

As mentioned for sites 15Be689 and 15Be691, in 1866 the land of Rebecca Crisler was divided and distributed to heirs of David Crisler, Sr. (Will Book H:633; Deed Book 23:219). From this division of land, Catherine Mitchell received Lot #3 of four acres, and David Crisler heirs received Lot #4 of five acres in 1866 (Deed Book 23:219). Also, as discussed for sites 15Be688, 15Be689 and 15Be691, the Rebecca Crisler land was one of the 335/7 acre tracts of the divided land of David Crisler, Sr., who died in 1823. His land was distributed in 1825 to Rebecca and her siblings including Fanny Crisler, Rhoda (Crisler) Barlow, Phebe Crisler, Caty (Crisler) Mitchell, Nancy

(Crisler) Conrad, David Crisler, Jr., John Crisler and Polly Feather (orphan of Anna Feather, deceased daughter of David Crisler, Sr.) (Deed Book F:443-447).

Year of Transaction	Grantor	Grantee	Tract Size	Reference
1825	David Crisler, Sr.	Rebecca Crisler	33 acres	Deed Book F:445
1866	Rebecca Crisler	David Crisler heirs	5 acres Lot #4	Deed Book 23:219
1871	Lucy Crisler	John R. Popham	5 acres Lot #4	Deed Book 26:224
1871	Samuel and Nancy Eggleston	John R. Popham	5 acres Lot #4	Deed Book 26:409
1872	William Taylor and others	John R. Popham	5 acres Lot #4	Deed Book 26:489
1884	John R. Popham	Lewis A. Popham	5 acres Lot #4	Deed Book 34:491
1902	Virginia Popham	William E. Popham	5 acres Lot #4	Deed Book 46:111
1910	William E. Popham	John R. Popham, Lewis A. and Virginia Popham, and W. E. and Lizzie Rouse	part of 35 acres	Deed Book 53:197
1919	William E. Popham and other heirs of Lewis A. Popham	W. A. and Stella Waters	5 acres Lot #4	Deed Book 60:577
1928	W. A. and Stella Waters and other heirs of Lewis A. Popham	Thyrza T. Wilson	5 acres Lot #4	Deed Book 67:78
1932	Thyrza T. Wilson	George G. Tupman	5 acres Lot #4	Deed Book 70:524
1933	George G. Tupman	William K. and Ruth Thomas	120 acres	Deed Book 71:372
1933	William K. and Ruth Thomas	Omer and Theresa Macrander	120 acres	Deed Book 71:442
1933	Omer and Theresa Macrander	Thomas Coyne	120 acres	Deed Book 71:448
1968	Thomas Coyne heirs	Kenton County Airport Board	115 acres	Deed Book 180:464

Table 20. Chain of Title for Property Containing Site 15Be694.

From Versluis 2017: 105

For the background of David Crisler, Sr., see site 15Be688. For the background of Rebecca Crisler, refer to site 15Be689.

The five-acre Lot #4 from the divided Rebecca Crisler land went to the heirs of David Crisler. The individuals who John R. Popham acquired the lot in 1871 and 1872 are likely some of these heirs and include, William Taylor, Robert Taylor and Francis Ann Taylor, Samuel Eggleston and wife Nancy, and Lucy Crisler. This Lucy Crisler might be Lucy Ann Crisler who is living with her parents Smith and Amanda Crisler in the 1860 census in the Florence District of Boone County with such neighbors as Daniel and Rhoda Barlow (U.S. Census 1860). Lucy Ann was born in 1850 in Boone County to Abraham Smith Crisler and Amanda Clore, and died in about 1920. Amanda Clore is the sister of Judith Clore who is wife of John E. Utz. Another possibility is that this Lucy Crisler is the Lucy Crisler who was born in about 1796 to Elias Crisler and Eleanor Blankenbaker. Elias Crisler is the son of Henry Crisler and Rosina Garr, and the brother of David Crisler, Sr. (Family Tree Search 2017).

The house of site 15Be694 is not shown on the 1883 map, 1912 or 1951 maps. Based on the presence of some early nineteenth century type artifacts found at the site (e.g., pearlware), the site very possibly was occupied before John R. Popham acquired it. The site might have been the residence of Rebecca Crisler prior to her division of land in 1866 (if site 15Be689 or another place was not Rebecca's residence). As discussed for site 15Be689, Rebecca is not listed in any of the censuses prior to 1850 and may have been living with one of her siblings up until this time. In the 1850 census, Rebecca is residing in District 2 of Boone County with her 50 year old sister Fanny Blake, and Eli Crisler, age 29, whose occupation was a farmer (U.S. Census 1850). Fanny (or Fannie) Blake was born in about 1795 and married Charles Blake in 1826 (Family Tree Search 2017; see also Deed Book K:115). Charles (or Charlie) Blake died before 1850 which is consistent with Fanny moving in with Rebecca (Family Tree Search 2017).

The 1860 census of Boone County shows Rebecca, age 60, now living with some of her younger relatives including William S. Weldon, age 32, Mary L. Weldon, age 26, Mary F. Weldon, age 12, Josophine Conrad, age 19, and Samuel J. Conrad (U.S. Census 1860). Mary L. Weldon is the daughter of John and Nancy (Crisler) Conrad (see Deed Book S:576). Following the division and distribution of her 29 acres of land in 1866, Rebecca Crisler is no longer listed in the 1870 census of Boone County.

If Rebecca did not live at site 15Be694, the site's house was likely built at least as early as the early 1870s when John R. Popham acquired the lot from the heirs of David Crisler. John Richard Popham was born in about 1847 to John Popham and Elizabeth Conrad, who was John's second wife. Lewis A. Popham, discussed in site 15Be691, is John R. Popham's half-brother. John R. is listed in the 1850, 1860 and 1870 censuses of Boone County as living with his parents, John and Elizabeth, and siblings, Lewis A. and Sarah E., and Elizabeth (in 1860 and 1870) (Family Tree Search 2017). In the 1880 Boone County census, John R. (listed as John A.) is a 33 year old farmer living with his father John, sister Elizabeth, and Jane B. Conrad, his 17 year old cousin. His father, now 81 years old, is marked as temporarily disabled or sick, as is John R. on the day of the enumerator's visit (U.S. Census 1880).

While it is possible that the house in which John Popham lived with his son John R. in the 1880 census was that of John (the father), the purchase of the site 15Be694 tract by John R. in the early 1870's suggests that the residence listed in the 1880 census may be that of John R. Popham, and not of his father. John Popham, the father, died shortly after the census was taken in 1880 at the age of 82 (Family Tree Search 2017).

In 1884, Lewis A. Popham acquired from his brother John R. the five acre Lot #4 containing the site (or perhaps just interest in it) as seen in Deed Book 34:491. The 1900 census of Boone County, lists John R. Popham (transcribed as John P) as a 52 year old farmer living in a farmhouse with his cousin Mary Conrad, age 75. His neighbors include Lewis A. Popham's family, who resided in nearby site 15Be691 (U.S. Census 1900). This residence where John R. Popham lived, as recorded in these censuses, may represent site 15Be694. If site 15Be694 is not the John R. Popham residence reported in the 1880, 1900 and 1910 censuses, his father's house, shown on the 1883 map north of the project area, would be the residence referred to in these censuses.

No records were found that John R. Popham was ever married. He died at some point between 1900 and 1910, based on the deed transferring the site to W. E. Popham in 1910 that lists John R. Popham as deceased (see Deed Book 53:197). While the house of 15Be694 does appear to still be standing in 1938 as seen on the 1938 aerial map, the house is not shown on the 1912 and 1951 maps. If the site was the residence of John R., the house was likely abandoned after his death.

William E. Popham, son of Lewis A. Popham, conveyed the nine acre tract containing the five acre lot and site 15Be694, along with the 43 acres containing site 15Be691, to his sister Stella and her husband W. A. Waters in 1919. The site and surrounding land went through several different hands after the Pophams owned the land, including Thomas Coyne who owned the 120 acres from 1933 to 1968 when it was acquired by the Kenton County Airport Board.

Archival and archaeological data indicate that this historic farmstead/residence site dates to at least the middle nineteenth century to early twentieth century. No standing structures or buildings remain at the site but a concentration of artifacts were identified around an intact limestone-lined well and brick- and sandstone-lined privy, in an area measuring about 10m x 10m. This artifact concentration around and including the intact well and privy could yield information important to the history of the region and is considered potentially eligible for listing in the National Register of Historic Places under Criterion D of 36 CFR Part 63. It is recommended that Phase II archaeological testing be conducted at this portion of the site or that this portion of the site be avoided and protected with a 100 foot buffer zone.

[End excerpt from Versluis 2017]

15BE694 Phase II Summary

The information presented here regarding the Phase II work is from the Phase II Management Summary submitted by *Environment & Archaeology, LLC* to the KHC (Stoll 2018). Ms. Stoll was the Principal Investigator for the Phase II work, and will be the Principal Investigator for the proposed Phase III work.

Environment & Archaeology, LLC of Florence, Kentucky, prepared a Phase II Eligibility Testing Plan that was approved by the KHC on May 10, 2018, pending revisions to the Scope of Work which were coordinated with the KHC. This plan detailed the Phase II excavation plans for Site 15BE694. Field excavations specified in this plan were conducted in May and June of 2018 in Boone County, Kentucky. Mr. R. Vincent Whitlatch was the Field Director for the Phase II excavations. The site, as defined during the Phase I survey, was approximately 743 square meters in size. Based on an intact feature that appeared to continue beyond these boundaries on historic aerials, it is believed that the site likely expands further to the west (Figure 4 and 5). The following is a summary of the

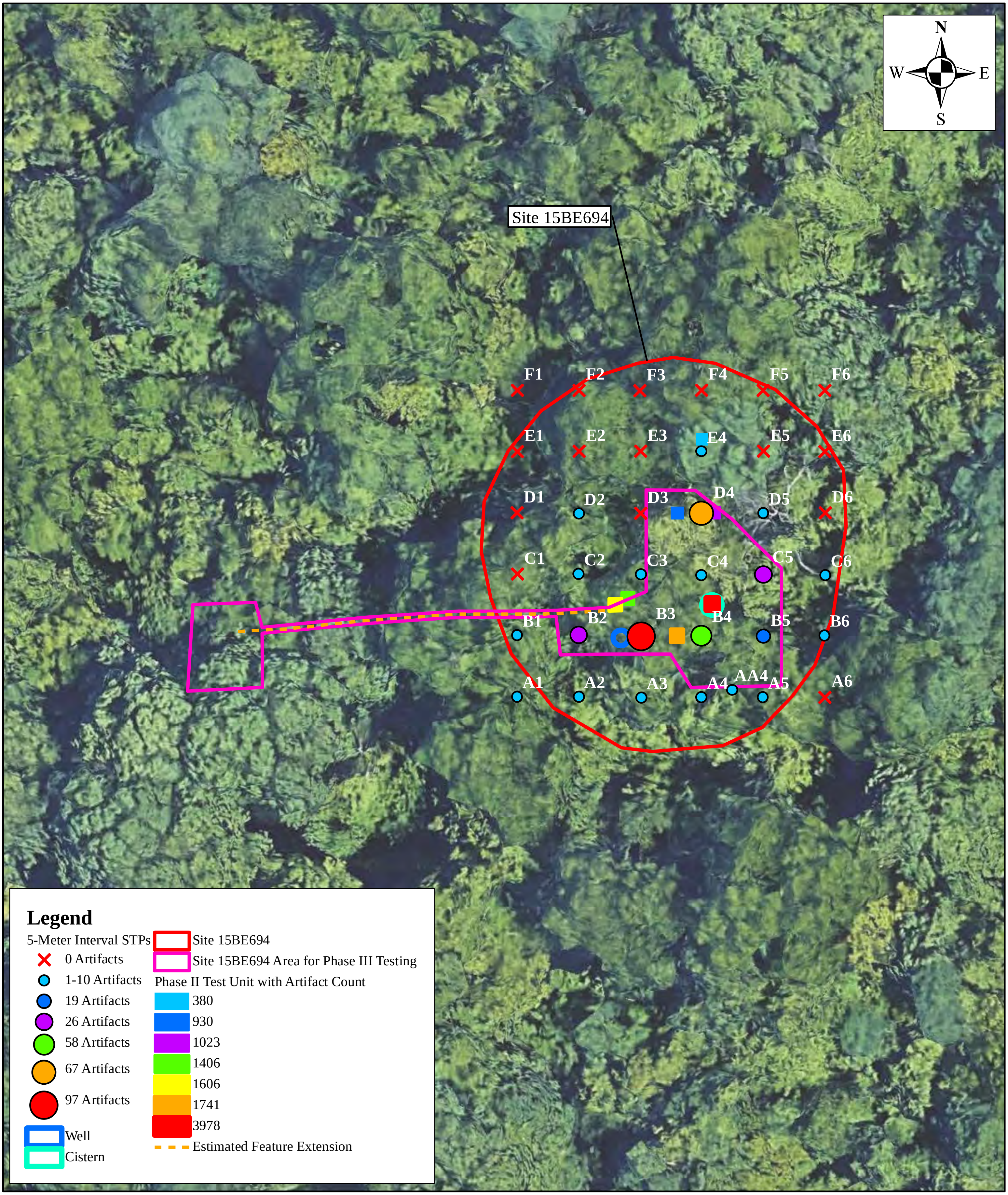

Figure 4	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project Boone County, Kentucky	Aerial Map of Site 15BE694 Phase II Excavations Aerial Provided by Google Earth 0 20 40 80 Feet Environment & Archaeology LLC

Figure 5	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project Boone County, Kentucky	1938 Aerial Map of Site 15BE694 Aerial Provided by Boone County GIS 0 50 100 200 Feet Environment & Archaeology LLC

Phase II data for Site 15BE694. Based on the Phase II testing, Site 15BE694 was recommended as eligible for listing in the *National Register of Historic Places* based on Criterion D.

The Phase II investigations resulted in a 1.3-percent (9.6 square meters) sampling of the site as defined during the Phase I survey. A total of 37 five-meter interval shovel tests and seven one-meter by one-meter test units were excavated at the site. Plowzone stripping was not a feasible option at this site due to dense tree cover.

A total of 11,406 historic artifacts were recovered during the Phase II investigation, along with 1,136 items that could be associated with the historic occupation, but due to the material could not be definitively classified as historic (e.g. rock, bone). Some prehistoric material (n=2) was recovered along with the historic material, but this was likely incidental. The prehistoric material was too sparse to be considered a component of the site. An intact cultural horizon with *in situ* deposits was present. It appears that after the occupation of the site, this area was allowed to reforest, with no plowing occurring on the site that would disturb deposits. Thus Site 15BE694 appeared to be intact.

Preliminary analysis of the cultural material recovered from the Phase II investigation indicated that Site 15BE694 was a historic farmstead/residence that was occupied circa 1870 to 1915. This dates the site to the Postbellum Industrialism Period (1866-1914) in Kentucky. These dates were based on diagnostic artifacts recovered at the site, including ceramics, glass, nails, and coins.

Two above-ground features had been identified in the Phase I survey: a well and a privy (Versluis 2017). Excavation of the "privy" feature determined that it was not a privy, but a cistern. The provenience of the cistern directly upslope from the well, and the soils and material within it, contributed to this reassignment of the feature as a cistern. The Phase II investigations also uncovered several below ground features: a pit feature (Test Unit 6), a burn layer feature (Test Units 2 and 5), and a buried line of stoneware jars (Test Units 2 and 5). Based on excavations and historic aerials, it was believed that the stoneware jar feature continued to the west, likely extending outside the current site boundaries, to an outbuilding that can be seen on the 1938 aerial along the creek. The potential reasons that the site was not defined further to the west during the Phase I survey are that the area is of slope greater than 15 percent, so no shovel tests were excavated; and the potential outbuilding location is covered in felled in trees so it was not accessible. The excavations showed that the only disturbance to the site has been the demolition of the structure, with material apparently not removed from the site, and bioturbation.

The key questions that guided the evaluation of Site 15BE694 for inclusion in the NRHP during the Phase II investigations were as follows, with brief answers to each based on the Phase II findings.

- Can the site size estimated during the Phase I analysis be confirmed or refuted during systematic Phase II investigation?
    - While excavations did not occur outside of the previously established boundaries of the site, the discovery of the stoneware jar feature, and the evidence on historic

aerials of an outbuilding and possible "path" following the stoneware jar feature, indicates that this site extends to the west.

- Does the historic component possess structural characteristics that could contribute new information to the study of ethnicity, gender, or economic status? This will provide a good opportunity to look at a broad range of ethnicity and economic issues.
    - Based on the ceramic types and decor found at the site, and the types of building materials, it appears that those living at this location were not wealthy. Historic research indicated it was possible that this was the residence of John R. Popham, a single, never married, man. He occasionally had other family living with him. While this could not be definitively proven with the material collected so far, further work may reveal evidence of this occupation, which would provide a unique look into a single man's life in the late 19th to early 20th century.

- Does the site contain discrete activity areas which may assist in the determination of site function and duration of occupation?
    - The Phase II excavations definitively showed that discrete activity areas were present at this site. Based on preliminary analysis and historic maps, it appears that the location of the house activities, the location of some thermal activities, and the location of depositional activities are intact. Also included is the stoneware feature which may have been related to drainage. The site function was confirmed to be a rural domestic farmstead from the late 19th to early 20th century.

- Is the historic cultural material recovered temporally diagnostic and can it assist in identifying the age of construction on any building foundations that may be encountered?
    - The cultural material was temporally diagnostic. Regarding architectural material, cut nails greatly outnumbered any other kind of nail found at the site, indicating a construction date in the latter part of the 19th century. Building material indicated the extensive use of chinking or mortar, brick, along with several types of building stone. It would appear that several different methods of construction were utilized at this site.

- Have deeds and other archival materials been researched in order to place the site within a more specific historic context?
    - Based on the historic research conducted to date, it is hypothesized that this was the residence of John R. Popham. Further research into deeds, particularly if parcels can be recreated from written descriptions, could aid in making a further determination.

- Within the context of regional farmstead/homestead archaeological studies, will the site's historic component contribute new information concerning the processes and patterns of land use changes relevant to agricultural development through the nineteenth and into the twentieth century?

- Yes, the historic component appears to be from a single occupation that fits into the Postbellum Industrialism Period in Kentucky. This site can provide new information into how a rural person(s) of relatively sparse means, lived and worked the land during this period.

Based on the synthesis of the data collected for this site, *Environment & Archaeology, LLC* recommended that Site 15BE694 was eligible under Criterion D for the NRHP. Chris Gunn concurred with this recommendation in a letter dated August 29, 2018, and requested a Phase III Plan be submitted to the KHC.

SITE 15BE697

15BE697 Phase I Summary [Begin excerpt from Versluis 2017]

Site 15Be697
Components: Historic Late 19th to Early 20th Century
Site Type: Historic Residence/Farmstead
Quadrangle: U.S.G.S. 7.5 Minute, Burlington, KY, 1983 (revised 1991)
UTM Coordinates at STP 34: NAD 1983, Zone 16, Northing: 4321872, Easting: 702894
Site Size: 90m x 60m (5400 square meters)
Topography: Ridge top
Soil Series: Rossmoyne silt loam, 6 to 12 percent slopes (RsC)
Ground Cover: Mostly pasture grass with edge in deciduous trees and secondary growth
Surface Visibility: Less than 10%
Previous Disturbance: Agriculture

Site 15Be697 is an historic farmstead/residence site dating to at least the late nineteenth century to early twentieth century based on archival and archaeological data. The site is situated on the level top a southeast/northwest trending ridge and lies approximately 20m east of an intermittent tributary of Gunpowder Creek. The site lies immediately north of what was Zig Zag Road prior to construction of the present day Aero Parkway located further south of the site. The site is represented by historic material found in shovel test pits in an area measuring about 90m x 60m (Figure 22) (Plates 51-52).

No standing structures or buildings remain at the site but a concentration of artifacts, including intact deposits in one shovel test pit (STP 34), were identified in an area measuring about 50m x 30m in the northern part of the site. A house is shown in the site area on the 1912 U.S.G.S. 15’ West Cincinnati, OH-KY topographic map and on the 1883 Atlas of Boone, Kenton and Campbell Counties, Kentucky, where it is listed as owned by John Utz. The house still appears on the 1938 aerial map, but is not depicted on the 1951 U.S.G.S. 7.5’ Burlington, KY topographic map (see Figures 9-12). The site is also not shown on the 1981 (revised 1995) U.S.G.S. 7.5’ Burlington, KY topographic map.

At the time of survey, the site was situated mostly in cut pasture grass with the western edge situated on a wooded slope edge, all of which provided less than 10% ground surface visibility. The site was investigated by shovel testing in generally 10m intervals with shovel test pits screened through a 6.25mm wire mesh. The soil typically consisted of a 35-40cm thick plowzone of 10YR4/3 brown

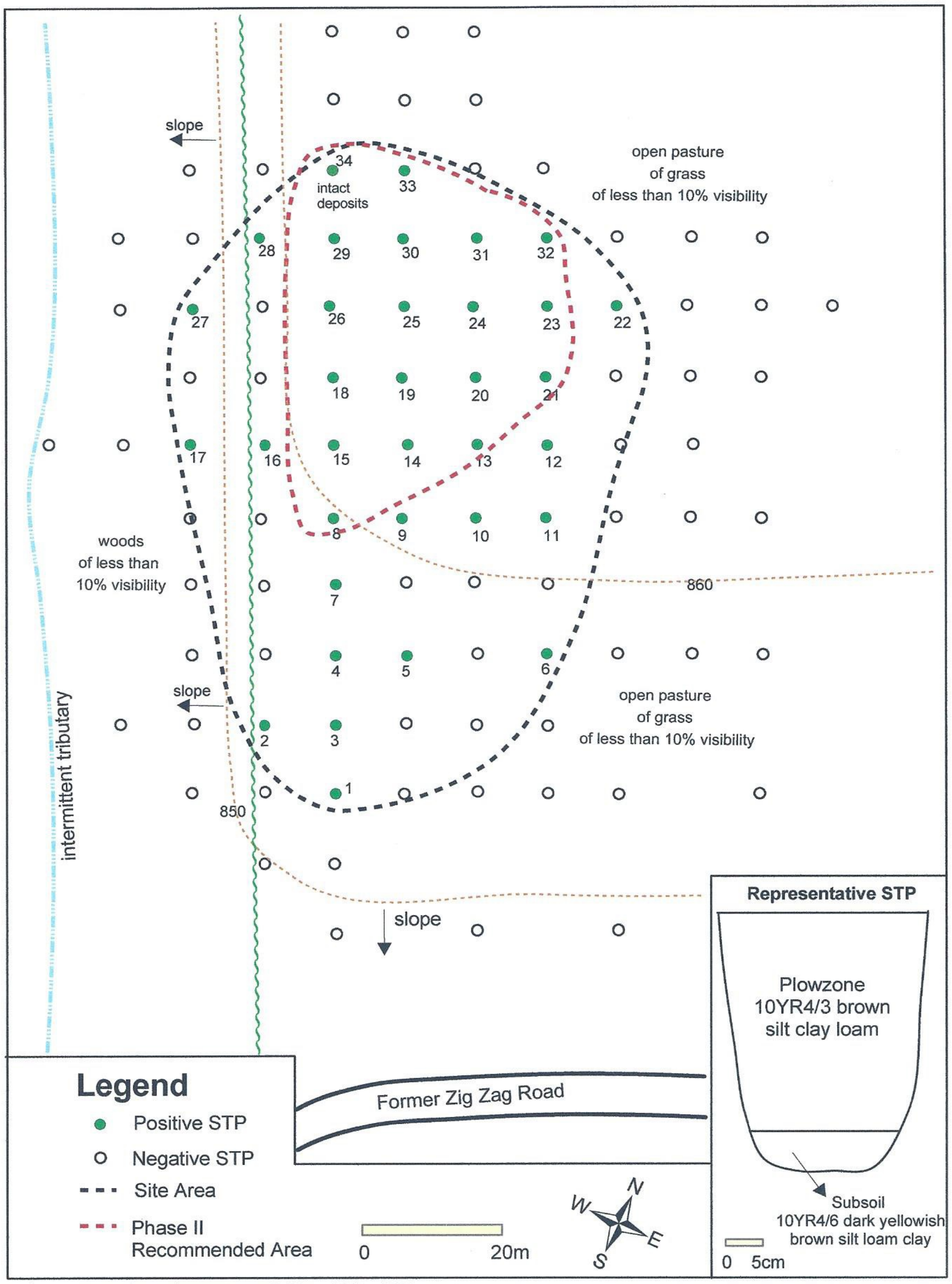

Figure 22. Site Plan Map of Site 15Be697.

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From Versluis 2017: 115

Plate 51. Site 15Be697, Shovel at STP 34: View to SE.

Plate 52. Site 15Be697, Shovel at STP 6: View to NW.

silt clay loam underlain with a subsoil of 10YR4/6 dark yellowish brown silt loam clay (Munsell 1994). Intact archaeological deposits were found in STP 34 in a soil matrix of 10YR4/3 brown and 10YR4/4 dark yellowish brown silt clay loam. This intact deposit extended to 60cm below the ground surface where the subsoil was encountered of 10YR4/6 dark yellowish brown silt loam clay.

A total of 87 shovel test pits were excavated into the site and 34 of these were positive for cultural material. A total of 110 historic artifacts were found consisting of one purple transfer printed whiteware; one green unidentified edge decorated whiteware; 28 plain whiteware; one clear lead glazed redware; one manganese lead glazed redware; one unglazed redware; one unidentified redware; one plain porcelain; six stoneware with Albany slip and/or salt glaze; 14 container glass; two milkglass lid liners; 14 window glass; 14 machine cut nails; one unidentified nail; 21 brick fragments; one shotgun shell base, and one piece of slate used as a shingle or board piece (Table 23).

The shotgun shell was a 12 gauge with a headstamp marked with "WESTERN XPERT" which was manufactured between about 1924 to 1932 by the Western Cartridge Company (Budd 2016). One of the container glass pieces is a bottle base marked with an embossed ship anchor with a superimposed "H". This is the makers mark of the Anchor Hocking Glass Corporation of Lancaster, Ohio, which dates from 1938-ca. 1980 (Peterson 1968:49). The concentration of historic cultural material, measuring about 50m x 30m, occurred in the northern part of the site in STP 8, 19, 20, 23, 25, 26, 30, and 34. All artifacts observed at the site were collected.

The conveyance records for the area containing site 15Be697 were traced back to the early twentieth century (Table 24). The site and encompassing 115 acres is currently owned by Cincinnati/Northern Kentucky International Airport with the Kenton County Airport Board acquiring the tract in 1968 from heirs of Thomas Coyne (Deed Book 180:464). In 1933, this same tract, of what is at this time 120 acres, was received by Thomas Coyne from Omer Macrander and wife Theresa (Deed Book 71:448) who acquired the 120 acres in the same year from William K. Thomas and Ruth Thomas (Deed Book 71:442). Also in 1933, William and Ruth Thomas acquired the 120 acres from George G. Tupman (Deed Book 71:372).

In 1932, George Tupman received what was now two parcels of land including Parcel 1 of 41 acres, and Parcel 2 of 162 acres from Thyrza T. Wilson (Deed Book 70:524). The Parcel 2 is composed of five tracts including Tract 1 of 84 acres; Tract 2 of nine acres; Tract 3 of 43 acres; Tract 4 of 19 acres; and Tract 5 of five acres (Deed Book 70:524). Thyrza Wilson acquired this Parcel 2 of five tracts from William E. Popham, R. L Brown and wife Mattie L., C. L. Popham and wife Erma, Clifford T. Tanner and wife Ada, and W. A. Waters and wife Stella in 1928. These heirs acquired the land from Virginia F. Popham, widow of Lewis A. Popham, who died in 1926 (Deed Book 67:78).

As discussed earlier, site 15Be689 is likely situated in Parcel 2, Tract 5; site 15Be691 in Parcel 2, Tract 3; and site 15Be694 in Parcel 2, Tract 2. Based on the deed descriptions, site 15Be697 is most likely situated in the 84 acres of Parcel 2, Tract 1, or the 19 acres of Parcel 2, Tract 4. A deed index

Artifacts / Pro-venience	Whiteware, Purple Transfer Print	Whiteware, Green Edge	Whiteware, Plain	Redware, Clear Lead Glaze	Redware, Manganese Lead Glaze	Redware, Unglazed	Redware, Unidentified	Porcelain, Plain	Stoneware, Salt Glaze and/or Albany Slip	Container Glass	Milkglass Lid Liners	Window Glass	Unidentified Nail	Machine Cut Nail	Brick	Shotgun Shell Base	Slate Shingle/Board Piece	Total
STP 1	1																	1
STP 2										1								1
STP 3															1			1
STP 4									1									1
STP 5			1															1
STP 6																	1	1
STP 7			1					1										2
STP 8			1			1			1	2		1	1		3			10
STP 9					1							1			1			3
STP 10			1						1	1								3
STP 11			1															1
STP 12										1								1
STP 13			1															1
STP 14			2												1			3
STP 15															1			1
STP 16										2					1			3
STP 17			1															1
STP 18												1		2	1			4
STP 19			1											1	2	1		5
STP 20			5				1											6
STP 21															1			1
STP 22									1									1
STP 23			1					1				2		1	1			6
STP 24				1						1		1						3
STP 25										1		2		3	1			7
STP 26			4							1		1		1				7
STP 27										1								1
STP 28															5			5
STP 29										1		2						3
STP 30			4						1			1		1	1			8
STP 31			1											1				2
STP 32												1						1
STP 33										1	2			1				4
STP 34		1	3						1	1		1		3	1			11
Total	**1**	**1**	**28**	**1**	**1**	**1**	**1**	**2**	**6**	**14**	**2**	**14**	**1**	**14**	**21**	**1**	**1**	**110**

Table 23. Provenience of Historic Artifacts Identified at Site 15Be697.

From Versluis 2017:117

search was completed, but no deeds were found of when the 84 acres and 19 acres were conveyed to Lewis A. Popham, whose widow Virginia F. Popham owned the tracts before her death in 1926.

Since the site is shown on the 1883 map as owned by John Utz, an index deed search was performed for John Utz and three tracts were found on which site 15Be697 is most likely to have been situated. All three of these tracts were acquired by John E. Utz from Allen Barlow in 1857 and included two tracts of 33 acres each, and one tract of 50 acres, all on the waters of Gunpowder Creek (Deed Book U:67).

The 50 acre tract Allen Barlow acquired from David Crisler, Jr. in 1830 (Deed Book H:124). This tract had excepted from it the four acres that Joshua Souther had received from Allen Barlow in 1843 (Deed Book N:501). Joshua Souther is the father of Hiram Souther, as seen for example in the 1850 Boone County census (U.S. Census 1850). Hiram lived northeast of site 15Be697 and just outside of the project area as shown on the 1883 map. Hiram Souther is the father of Virginia F. Popham who lived at site 15Be691 with her husband Lewis A. Popham.

One of the 33 acre tracts Allen Barlow acquired from his parents, Daniel and Rhoda Barlow, in 1835. This 33 acres was the same land conveyed to Daniel Barlow from Charles Blake and his wife Fanny, who was Rhoda's sister and daughter of David Crisler, Sr. (Deed Book K:115). The other 33 acre tract was acquired by Allen Barlow in 1842 from William Steers and his wife Polly (Mary), the child of Anna Feather, and granddaughter of David Crisler, Sr. All three of these tracts represent part of the divided land of David Crisler, Sr., that was distributed in 1825 to his children including Fanny Crisler, Rhoda (Crisler) Barlow, Phebe Crisler, Caty (Crisler) Mitchell, Nancy (Crisler) Conrad, David Crisler, Jr., John Crisler and Polly Feather (orphan of Anna Feather, deceased daughter of David Crisler, Sr.) (Deed Book F:443-447).

The site of 15Be697 could have been situated on any one of these tracts, but perhaps most likely it was located on the 50 acre tract which is described as being on the waters of Gunpowder Creek and being the "same land upon which Allen Barlow now lives" (Deed Book H:124). An 1893 deed (Deed Book 40:203) also places the "old Barlow house" near the land on which the grave site of 15Be692 is situated, "on the western side of a small hollow." Site 15Be697, which is the closest historic site to the 15Be692 grave site, exists on the other side of a small hollow next to Gunpowder Creek and may represent the site where Allen Barlow lived in 1830.

For the background of David Crisler, Sr. and his wife Elizabeth, refer to site 15Be688. One of their sons, David Theobold Crisler, Jr., was born in about 1787 in Culpeper, Virginia. David Crisler, Jr. was married to Nancy Bemond in 1809 in Boone County, Kentucky (Northern Kentucky Marriages 2017). They had at least one child, Elvena (Crisler) Stephens, who was born in 1828 and who died in 1855 (Kentucky Death Records 2017).

As mentioned above, David Crisler, Jr. conveyed the 50 acres, inherited from his father in 1825, to Allen Barlow in 1830. At around this time David, Jr. and Nancy moved to Campbell County, Kentucky, as seen in the 1830 Campbell County census where he heads a household of nine individuals (U.S. Census 1830). In 1840, David Conrad, Jr. is shown living in Kenton County (which had been formed out of Campbell County in 1840) in a household of seven (U.S. Census 1840). David Crisler, Jr. passed away in 1842 in Kenton County, Kentucky (Kentucky Wills and Probate Records 2017)

Year of Transaction	Grantor	Grantee	Tract Size	Reference
1825	David Crisler, Sr.	David Crisler, Jr.	50 acres	Deed Book F:445
1830	David Crisler, Jr.	Allen Barlow	50 acres	Deed Book H:124
1857	Allen Barlow	John E. Utz	50 acres	Deed Book U:67
Post 1883	Possibly John E. Utz	Lewis A. Popham	possibly 84+/- acres	?
Around 1926	Virginia Popham	William E. Popham and other heirs of Lewis A. Popham	84 acres	Deed Book 67:78
1928	W. E. Popham and other heirs of Lewis A. Popham	Thyrza T. Wilson	84 acres	Deed Book 67:78
1932	Thyrza T. Wilson	George G. Tupman	43 acres	Deed Book 70:524
1933	George G. Tupman	William K. and Ruth Thomas	120 acres	Deed Book 71:372
1933	William K. and Ruth Thomas	Omer and Theresa Macrander	120 acres	Deed Book 71:442
1933	Omer and Theresa Macrander	Thomas Coyne	120 acres	Deed Book 71:448
1968	Thomas Coyne heirs	Kenton County Airport Board	115 acres	Deed Book 180:464

Table 24. Chain of Title for Property Containing Site 15Be697.

This 50 acre tract on which site 15Be697 was possibly situated is described as the “same land upon which Allen Barlow now lives” (Deed Book H:124). Apparently David Crisler, Jr. allowed Allen to build the house on his 50 acre tract on Gunpowder Creek before Allen took legal ownership of it. While some of the artifacts found at site 15Be697 date to the early nineteenth century (e.g., green edge decorated whiteware and machine cut nails), it is not clear whether the site’s house was the same one in which Allen Barlow resided, or represents a house built on the site at a later date.

Allen Barlow was born in 1802 in Virginia to Daniel Barlow and his first wife, Susannah Beemon. Daniel was married to Susannah Beemon in 1797 in Virginia and they had at least five children including Nancy, Mary B., Allen, Mildred M., and Elizabeth before Susannah died at the young age of 23 in about 1820. Their son, Allen, was married to Elizabeth Utz in 1827 in Boone County, Kentucky. Elizabeth Utz was born in 1811 in Boone County to John E. Utz and Judith Clore. Allen and Elizabeth Barlow had several children as shown below in the census records. Elizabeth died in 1854, the birth year of her last child, Missouri D. Allen Barlow died in 1881 (Family Tree Search 2017).

The 1830 census of Boone County lists the Allen Barlow household as consisting of three members including one female under five who likely was their daughter Sarah A. (U.S. Census 1830). By 1840, Allen Barlow is listed in the Boone County census with a household of nine including, in addition to Allen and Elizabeth, three males, and three females. Also listed is one male slave, age 36-54, Four persons are listed as employed in agriculture (U.S. Census 1840). The 1850 census lists Allen, a 48 year old farmer, and his wife Elizabeth, age 39 in District 2 of Boone County and with them are their children Sarah A., age 22, George W., age 20, Albert M., age 17, Ann E., age 14, Noah E., age 13, Louisa, age 8, James M., age 6, and Mary F., age 3 (U.S. Census 1850). Shortly after Elizabeth died in 1854, John E. Utz acquired the 50 acres from Allen Barlow in 1857. Allen Barlow and some of his children moved to Johnson County, Missouri where he is listed in the 1860 census as a 50 (?) year old farmer, living with his children George W., Albert M., Noah E., Lewis F (Louisa ?), James, and Missouri D. (Mary F. ?) (U.S. Census 1860).

John Ephraim Utz, sister of Elizabeth Utz, was born in 1809 in Virginia to Aaron Utz and Mary Fray. John was married to Judith Clore in 1833 in Boone County, Kentucky. Judith Clore was born in Virginia in 1807 to Ephraim Clore and Amy Weaver. John and Judith Utz had three children, Elizabeth Frances, Martha Jane, and Ephraim Johnson (Family Tree Search 2017).

When John E. Utz acquired the 50 acres from Allen Barlow in 1857, it is not clear if the house was abandoned, and if it wasn't, it is not clear who lived in the old Barlow house after Allen and his children left for Missouri. John E. Utz now owned the land but apparently did not live in Allen Barlow's house. Site 15Be697 is shown on the 1883 map as owned by John Utz, but he apparently did not live at the site. As reported by Alexandra Bybee (2007), John E. Utz's place of residence is the house shown on the 1883 map, west of 15Be694, which Bybee recorded as site 15Be549. This site 15Be549, which was part of 120 acres inherited from Ephraim Clore (father of Judith Utz), was where John E. Utz resided from the 1850s to 1890s. His son, Ephraim also lived at this residence which he inherited from his father in 1893 (Bybee 2007).

The depiction of a house on the 1883 map at the location of site 15Be697, however suggests that someone was living at the site. The most logical possibility is that someone from John Utz's family lived at the site he owned, perhaps someone in his immediate family. As mentioned, John Utz's son Ephraim was living at site 15Be549 with his father, so he was not a resident of 15Be697. John Utz's daughter, Martha Jane, is also living elsewhere. Martha Jane was married to Hiram Souther in 1854, and their residence is shown northwest of site 15Be697 on the 1883 map where it is marked as "H. Souther."

One possibility was that John Utz's other daughter, Elizabeth Frances, lived at the site with her husband Absolom Aylor. Elizabeth F. was married to Absolom Aylor in 1848 when she was just 14 years old (Family Tree Search 2017). As discussed for site 15Be694, the deed records show that the tract on which the 15Be692 grave site is located is "near the old Barlow House"…on the western side of a small hollow." This tract of 41 acres containing site 15Be692, was inherited by Elizabeth Aylor from her father John Utz in 1893. It is possible, then, that Elizabeth F. also inherited the adjoining tract containing site 15Be697 at some point after John acquired it in 1857. After further review, however, the 1883 Atlas of Boone, Kenton and Campbell Counties, Kentucky, shows Absolom Aylor located about 4km northwest of the site in the Burlington Precinct.

So, while it is known that John E. Utz owned the property containing site 15Be697, at least in the late nineteenth century, it is not presently clear who lived in the house at site 15Be697. The house is shown on the 1912 topographic map, and appears to be still standing on the 1938 aerial map. Based on some of the more recent artifacts found at the site, such as the shotgun shell and the bottle base that each bear a makers mark dating from the early twentieth century, the site's house was likely occupied in the early twentieth century. The site probably was not occupied in the middle twentieth century as no house is shown on 1951 topographic map. Following Thyrza Wilson's purchase of the land from the heirs of Lewis A. and Virginia Popham in 1928, the site changed through several owners until the Kenton County Airport Board acquired it in 1968.

Archival and archaeological data indicate that this historic farmstead/residence dates to at least the late nineteenth century to early twentieth century. No standing structures or buildings remain at the site but a concentration of artifacts, including some intact deposits, were identified in an area measuring about 50m x 30m. This site's artifact concentration and intact archaeological deposits, could yield information important to the history of the region and are considered possibly eligible for listing in the National Register of Historic Places under Criterion D of 36 CFR Part 63. It is recommended that Phase II archaeological testing be conducted at this portion of the site or that this part of the site be avoided and protected with a 100 foot buffer zone.

[End excerpt from Versluis 2017]

15BE697 Phase II Summary

The information presented here regarding the Phase II work is from the Phase II Management Summary submitted by *Environment & Archaeology, LLC* to the KHC (Stoll 2018). Ms. Stoll was the Principal Investigator for the Phase II work, and will be the Principal Investigator for the proposed Phase III work.

Environment & Archaeology, LLC of Florence, Kentucky, prepared a Phase II Eligibility Testing Plan that was approved by the KHC on May 10, 2018, provided some revisions to the Scope of Work were implemented. This plan detailed the Phase II excavation plans for Site 15BE697. Field excavations specified in this plan were conducted in June and July of 2018 in Boone County, Kentucky. Mr. R. Vincent Whitlatch was the Field Director for the Phase II excavations. The site as defined during the Phase I survey was approximately 4,863 square meters in size. Based on the Phase II testing, these boundaries appear to be accurate (Figure 6 and 7). The following is a summary of the Phase II data for Site 15BE697. Based on the Phase II testing, Site 15BE697 was recommended as eligible for listing in the *National Register of Historic Places* based on Criterion D.

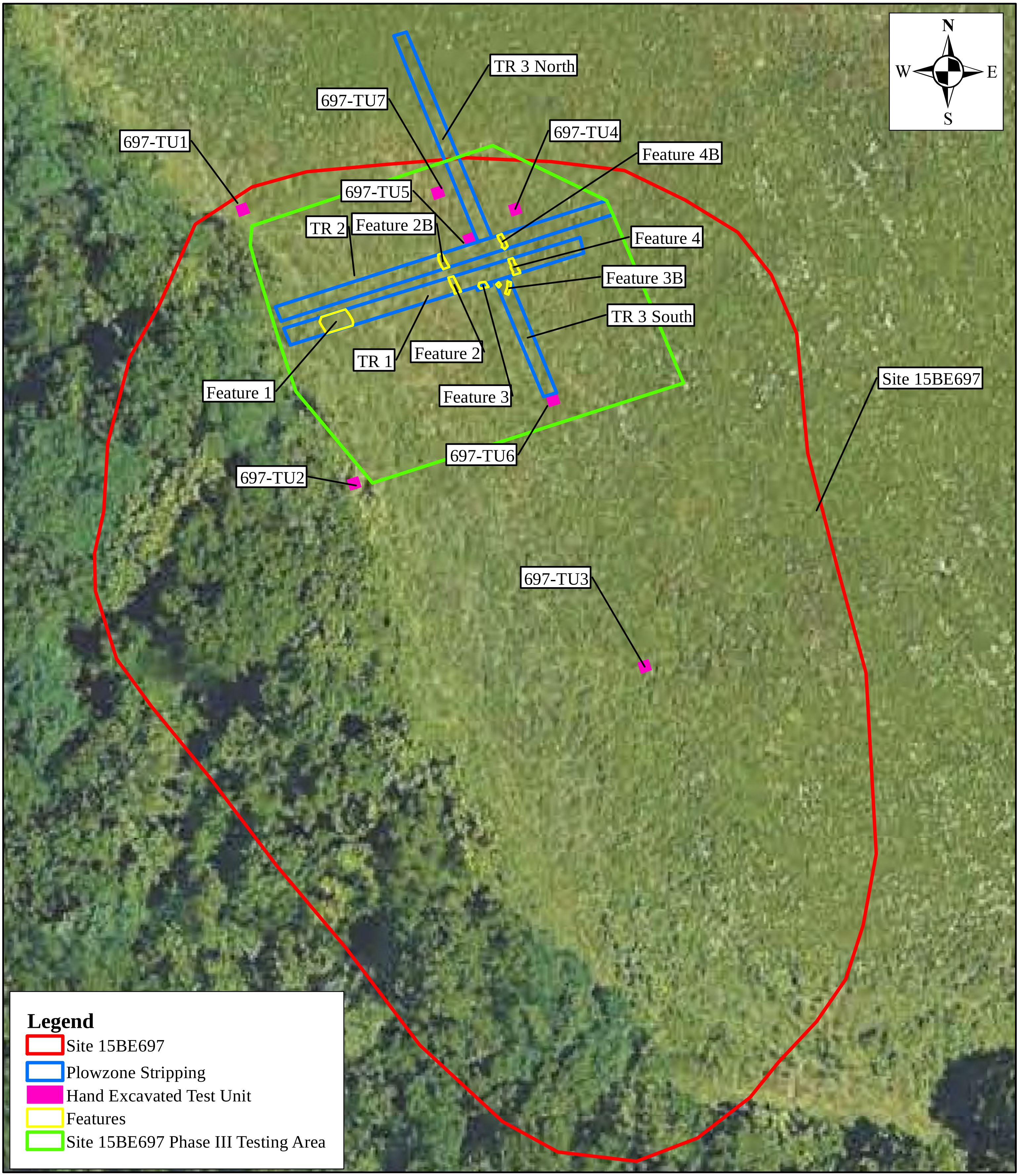


Figure 6	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project Boone County, Kentucky	Aerial Map of Site 15BE697 Phase II Excavations Aerial Provided by Google Earth 0 15 30 60 Feet Environment & Archaeology LLC

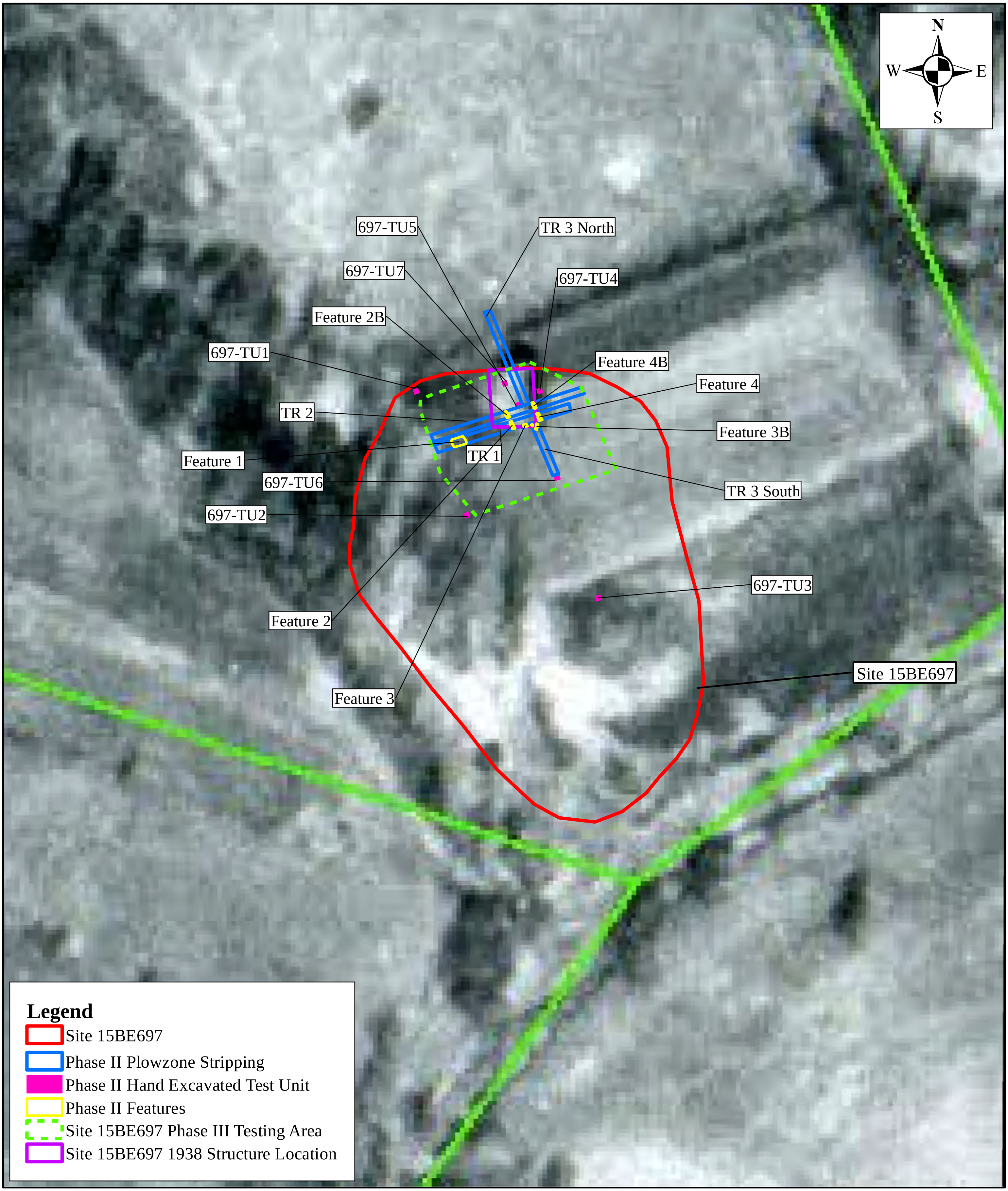


Figure 7	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project Boone County, Kentucky	1938 Aerial Map of Site 15BE697 Aerial Provided by Boone County GIS 0 50 100 200 Feet Environment & Archaeology LLC

The Phase II investigations resulted in a 3.0-percent (143.5 square meters) sampling of the site as defined during the Phase I survey. A total of seven one-meter by one-meter test units, and 91 meters linear feet of 1.5 meter wide plowzone stripping trenches were excavated at the site. All but one feature in Test Unit 3, were uncovered during plowzone stripping at this site.

A total of 19,147 historic artifacts were recovered during the Phase II investigation, along with additional items that could be associated with the historic occupation, but due to the material could not be definitively classified as historic (e.g. rock, bone). Some prehistoric material (n=4) was recovered along with the historic material, but this was likely incidental. The prehistoric material was too sparse to be considered a component of the site. An intact buried historic cultural horizon with *in situ* deposits was present. It appears that after the occupation of the site, this area was plowed, which did disturb some deposits. However excavation revealed that the plowing did not reach through the entire historic occupation depositional layer, and had truncated some features, but had not completely destroyed them. These intact plow-truncated features appear to be *in situ*.

Preliminary analysis of the cultural material recovered from the Phase II investigation indicated that Site 15BE697 was a historic farmstead/residence that was occupied circa 1860 to 1900. This dates the site to the Postbellum Industrialism Period (1866-1914) in Kentucky. These dates were based on diagnostic artifacts recovered at the site, including ceramics, glass, nails, and coins.

No features had been identified in the Phase I survey (Versluis 2017). Excavation during the Phase II survey uncovered several below ground features: a pit dump/midden feature (Trench 1, Feature 1), the western foundation and building trench of a residence (Trench 1 and 2, Feature 2 and 2b), the eastern foundation and building trench of a residence (Trench 1 and 2, Feature 4 and 4b), a likely limestone pier of the residence (Trench 1 and 3, Feature 3 and 3b), and a historic post feature (Test Unit 3 Feature). The excavations showed that the disturbance to the site was the result of historic agricultural plowing. The features were plow-truncated to an approximate depth of 20 to 30 centimeters below the surface (cmbs). Below this depth, features were found to be intact.

The key questions that guided the evaluation of Site 15BE697 for inclusion in the NRHP during the Phase II investigations were as follow, with brief answers to each based on the Phase II findings.

- Can the site size estimated during the Phase I analysis be confirmed or refuted during systematic Phase II investigation?
    - Some plowzone stripping did occur outside of the previously established boundaries of the site. This trench began within the area of greater concentrations of artifacts, and extended to the north beyond the boundaries. There was no indication that the site extended beyond the previously established Phase I boundaries. The Phase I survey methods for this area were sufficient to uncover deposits had they been present.

- Does the historic component possess structural characteristics that could contribute new information to the study of ethnicity, gender, or economic status? This will provide a good opportunity to look at a broad range of ethnicity and economic issues.
  - Based on the ceramic types and decor found at the site, and the types of building materials, it appears that those living at this location were of moderate means. Historic research indicated it was possible that this was the residence of John Utz, his wife, son, and daughter-in-law. While this could not be definitively proven with the material collected so far, further work may reveal evidence of this occupation, which would provide a unique look into multi-generation household life in the late 19th to early 20th century.

- Does the site contain discrete activity areas which may assist in the determination of site function and duration of occupation?
  - The Phase II excavations definitively showed that discrete activity areas were present at this site. Based on preliminary analysis and historic maps, it appears that the location of the house activities, the location of the house, and the location of depositional activities are intact. The site function was confirmed to be a rural domestic farmstead from the late 19th to early 20th century.

- Is the historic cultural material recovered temporally diagnostic and can it assist in identifying the age of construction on any building foundations that may be encountered?
  - The cultural material was temporally diagnostic. Regarding architectural material, cut nails greatly outnumbered any other kind of nail found at the site, indicating a construction date in the latter part of the 19th century. Builders trenches and foundation remains were intact, and could provide additional information regarding building methods.

- Have deeds and other archival materials been researched in order to place the site within a more specific historic context?
  - Based on the historic research conducted to date, it is hypothesized that this was the residence of the John Utz Family. Further research into deeds, particularly if parcels can be recreated from written descriptions, could aid in making a further determination.

- Within the context of regional farmstead/homestead archaeological studies, will the site's historic component contribute new information concerning the processes and patterns of land use changes relevant to agricultural development through the nineteenth and into the twentieth century?
  - Yes, the historic component appears to be from a single occupation that fits into the Postbellum Industrialism Period in Kentucky. This site can provide new information into how rural person(s) of moderate means, lived and worked the land during this period.

Based on the synthesis of the data collected for this site, *Environment & Archaeology, LLC* recommended that Site 15BE697 was eligible under Criterion D for the NRHP. Chris Gunn concurred with this recommendation in a letter dated September 24, 2018, and requested a Phase III Plan be submitted to the KHC.

PHASE III DATA RECOVERY RESEARCH QUESTIONS

Sites 15BE688, 15BE694, and 15BE697 are located relatively centrally to the proposed project area. Avoidance cannot be achieved by relocating any of the facilities. On behalf of the Kenton County Airport Board, Landrum & Brown, Inc. contracted *Environment & Archaeology, LLC* to coordinate with the KHC to design a Data Recovery Plan for Sites 15BE688, 15BE694, and 15BE697. The goal of this Data Recovery Plan is to apply principles of scientific inquiry to the recovery, analysis, and interpretation of the data recovered from Sites 15BE688, 15BE694, and 15BE697.

Research Question Considerations for All Sites

From the Phase I Surveys and the Phase II Investigations, evidence for occupation during the Postbellum Industrialism Period (1866-1914) in Kentucky was found at all three sites. This information comes from the recovery of diagnostic historic material including ceramics, glass, nails, and coins. The diagnostic material indicates that occupation occurred at Site 15BE688 during the Industrial and Commercial Consolidation Period (1915-1945) as well. The Phase III Data Recovery conducted at these three sites that appear to have been occupied concurrently could provide valuable comparable research data regarding different lifeways during the same time period. Some of the site occupants were likely Germanna Colonists or their direct descendants. Some surnames associated with the Germanna Colonies are associated with these sites per previously conducted historic research: Utz, Crisler/Crigler, Clore, Beemon, and Aylor (Site 15BE697); Crisler/Crigler (Site 15BE694) Crisler/Crigler, Utz, and Rouse (Site 15BE688) (Boone Germanna 2019). Surnames are also associated with these sites that currently are not associated with the Germanna Colonies: Barlow, Popham, and Wilson (Site 15BE697); Popham, Weldon, and Taylor (Site 15BE694); and Conrad and Weldon (Site 15BE688). Research into the occupations of these sites could provide insight into any differences in lifeways between those descended from the Germanna Colonies versus those who did not. Portions of the sites might be attributable to specific individuals, giving a rich history for these persons.

In order to better ascertain the persons who might have occupied these sites, a thorough examination of census data will be conducted for the immediate region. The census records combined with historic atlases may allow for a reconstruction of the routes which census workers traveled during their surveys, and thus the persons living at each location along the route.

To derive information relevant to research questions and themes in Kentucky history, analyses will be directed towards the following: identifying individuals who occupied these sites, what can be learned about the rural peoples of the Postbellum Industrialism Period, what the data can tell us about the economic status of the individuals, what the subsistence strategy of these peoples was, and how their lifeways were similar or different when compared to other sites from the same time frame.

Research questions were developed for the Phase III Investigations in consultation with the KHC. These research questions were designed based on the materials recovered during the Phase II investigations, and the information they potentially could provide. The research questions follow below.

Site 15BE688

Research indicates that possible residents at Site 15BE688 include John and Nancy (Crisler) Conrad, followed by their son John and Nancy Jane (Hodges) Conrad, then by Otis Rouse, Albert and Willie Mae Cain, Albert Sharp, and Dorothy Haller. This occupation occurred over an expanded period of time, covering two distinct historic Periods in Kentucky (Postbellum Industrial and Industrial and Commercial Consolidation Periods) which can be compared and contrasted (circa 1825 to 1970). Potential research questions for the Phase III Data Recovery at this site include:

- Can it be determined, through both archaeological excavation and historic research, whether there were areas used during different periods of the occupation of this site? What subsistence strategies, such as crops and livestock, were used at the site, did it change over time, and what can this tell us about the occupants?

- What can the deposits at the site tell us about lifeways, consumer practices, and other details of the periods of occupation, and how did they change or not change? The site was occupied during the Postbellum Industrialism Period (1866-1914) and the Industrial and Commercial Consolidation Period (1915-1945) in Kentucky (KHC 2014). Analysis of kitchen ceramics, kitchen glass, personal items, and faunal deposits can help answer these questions.

- Are there any features or deposits that are specific to those of the Germanna Colony that can be identified at this site? How are these similar or different to other deposits in the region? An overall comparison of assemblages between the deposits of 15BE688 with other regional farm sites from the same time period will provide information on this research topic.

- How did the consumer practices evident at Site 15BE688 change or not change over time, how to do they compare with other sites in the region and what can this tell us about the economic status of the occupants? What can further excavation of wares, and analysis of their decor and use tell us about the occupants economic status?

- Are there unique activity areas or artifacts that can be attributed to specific habitation episodes? The deposits and the historic research indicate occupation by several persons over the course of approximately a century. Can deposits be identified that would give insight into possible gender spheres of work and consumption?

- To what extent is the evidence of a residence at this location, and was there perhaps more than one residence at different time periods on the property? Are any residences indicative of a tradition specific to those of the Germanna Colony? Do deposits indicate Upland South tradition usage patterns, or do they indicate a different pattern? Houses during this time period tend to be similar to those of the areas from which families migrated from (KHC

2014). Patterns of deposits from all of the functional groups and intact features will provide insight into this research topic.

- What can further investigations tell us about house type? Can the location of chimneys be identified? What can the identified builders trenches tell about the method of construction? What floor plan was present? The patterns of building material, and the architectural material recovered will contribute to answering this question. Comparing the material to other sites where the building type was known will be greatly beneficial.

- Are there remnants of outbuildings or other features within the site that have not yet been uncovered? If so, what are there function? Can a privy be located at the site? What does the evidence of other features or outbuildings indicate regarding the past vernacular agricultural landscape?

Site 15BE694

Historic documentation suggests that John R. Popham was possibly the resident at Site 15BE694. Material recovered indicates that there was only one occupational period for a relatively brief amount of time (circa 1870 to 1915). The stoneware jar line feature at Site 15BE694 indicates that there is information to be gleaned about the lifeways of persons in this time period that were previously unknown, as this type of feature has not been uncovered in this area before. Potential research questions for the Phase III Data Recovery at this site include:

- Can it be determined definitively, through both archaeological excavation and historic deed research, who the occupant of the site was? The most likely candidate appears to be John R. Popham, a single, never married, farmer. Can it be determined whether the deposits at the site support a single individual rather than a family?

- What can the deposits at the site tell us about lifeways, consumer practices, and other details of the occupational period? The period during which the site was occupied (c.1870-1915) is squarely within the period of Postbellum Industrialism (1866-1914) in Kentucky (KHC 2014). Analysis of kitchen ceramics, kitchen glass, personal items, and faunal deposits can help answer these questions.

- How did the consumer practices evident at Site 15BE694 compare with other sites in the region and what can this tell us about the economic status of the occupants? For example, the amount of decorated wares in the kitchen assemblage was very low, and represented only a few decoration types. What can further excavation of wares, and analysis of their decor and use tell us about this person's economic status?

- Is there evidence in the deposits that this site represents a tenant farming family and/or an African-American family? The historical documents such as maps, census records, and deeds, suggested that John R. Popham was a likely candidate to have occupied this site.

However, historic documents under-represent those of lower economic status and minorities. Comparison of this site to other sites in the region will be used to answer this question.

- Are there unique activity areas or artifacts that can be attributed to specific individuals? The deposits at the site strongly suggest a single occupation at this residence due to the tight time frame in which the diagnostic artifacts appear to fall, and from the depositional patterns. Artifacts recovered included ceramic dolls and clothing items that would be typically attributed to women. Can these and other deposits be attributed to a specific woman that would give insight into possible gender spheres of work and consumption?

- Is the stoneware jar feature indicative of a tradition from another region of the country? Are the other features present at the site that indicate practices that may have migrated from the same region? Do deposits indicate Upland South tradition usage patterns, or do they indicate a different pattern? Houses during this time period tend to be similar to those of the areas from which families migrated from (KHC 2014). Patterns of deposits from all of the functional groups and intact features will provide insight into this research topic.

- What can further investigations tell us about the house type? Can the location of chimneys be identified? Is there an existing building trench that would indicate construction method and materials? What floor plan was present? The house at this location was either constructed of log, natural stone, or both. The patterns of building material, and the architectural material recovered will contribute to answering this question. Comparing the material to other sites where the building type was known will be greatly beneficial.

- Is there remnants of an outbuilding along the creek as indicated by historic aerials? If so, what was its function? Can a privy be located at the site? What does the evidence of other features or outbuildings indicate regarding the past vernacular agricultural landscape? The intact well and cistern at the site indicates that there may be other intact associated features, or portions of them.

Site 15BE697

Historic documentation suggests that John Utz, his wife, his son, and his daughter-in-law were the occupants at Site 15BE697 within a relatively brief time frame (circa 1860 to 1920). Further work at these sites has the potential to provide valuable information about the lifeways of persons during this time period. Potential research questions for the Phase III Data Recovery at this site include:

- Can it be determined definitively, through both archaeological excavation and historic research, who the occupants of the site were? What subsistence strategies, such as crops and livestock, were used at the site and what can this tell us about the occupants? The artifacts indicate that this site was occupied post 1865, and based on property ownership, it would seem that Ephraim and Delilah Utz are the most likely occupants at this site. Analysis of historic documents and a thorough faunal and floral analysis can assist in answering these questions.

- What can the deposits at the site tell us about lifeways, consumer practices, and other details of the period of occupation? The period during which the site was occupied (c.1860-1920) is within the period of Postbellum Industrialism (1866-1914) in Kentucky (KHC 2014). Analysis of kitchen ceramics, kitchen glass, personal items, and faunal deposits can help answer these questions.

- Are there any features or deposits that are specific to those of the Germanna Colony that can be identified at this site? How are these similar or different to other deposits in the region? The most likely occupants of the site were the Utz family, who were part of the Germanna Colony that settled much of Boone County. An overall comparison of assemblages between the deposits of 15BE697 with other regional farm sites from the same time period will provide information on this research topic.

- How did the consumer practices evident at Site 15BE697 compare with other sites in the region and what can this tell us about the economic status of the occupants? For example, the amount of decorated wares in the kitchen assemblage was diverse, and suggested the presence of special occasion wares along with utilitarian wares. What can further excavation of wares, and analysis of their decor and use tell us about the occupants economic status?

- Are there unique activity areas or artifacts that can be attributed to specific individuals? The deposits at the site strongly suggest a single occupation at this residence due to the tight time frame in which the diagnostic artifacts appear to fall, and from the depositional patterns. Artifacts recovered included ceramic dolls and clothing items that would be typically attributed to women. Can these and other deposits be attributed to a specific woman that would give insight into possible gender spheres of work and consumption?

- Are the builder's trenches, other features, or other aspects of the residence indicative of a tradition specific to those of the Germanna Colony? Do deposits indicate Upland South tradition usage patterns, or do they indicate a different pattern? Houses during this time period tend to be similar to those of the areas from which families migrated from (KHC 2014). Patterns of deposits from all of the functional groups and intact features will provide insight into this research topic.

- What can further investigations tell us about the house type? Can the location of chimneys be identified? What can the identified builders trenches tell about the method of construction? What floor plan was present? The house at this location was either constructed of log, natural stone, or both. The patterns of building material, and the architectural material recovered will contribute to answering this question. Comparing the material to other sites where the building type was known will be greatly beneficial.

- Are there remnants of outbuildings or other features within the site that have not yet been uncovered? If so, what are there function? Can a privy be located at the site? What does the evidence of other features or outbuildings indicate regarding the past vernacular agricultural landscape?

As Phase III investigations are undertaken, additional potential research questions may arise for these sites based on deposits and features. Any additional research that these sites are able to contribute information to will also be analyzed and presented.

Data that is relevant to answer these research questions include: Function Groups of artifacts found at the site, the material and/or decor of the artifacts, diagnostic artifacts from all groups, and provenience of all material collected and features identified. This will then need to be compared to the existing literature and other sites in the region that have undergone archaeological investigation.

PHASE III DATA RECOVERY METHODOLOGY

Historic Research

In order to fulfill the goals of the Data Recovery Plan, it will be imperative to retrieve as much existing literature on the peoples and land of the locations of Sites 15BE688, 15BE694 and 15BE697. This will include deed research, will and probate records, census research, local histories, and the contact of potential informants. Census record analyses of the region will be conducted in order to attempt to construct the routes taken during census surveys, which will allow for a better construction of the living location of individuals during the sites' occupations. There are a number of Cultural Resource Management (CRM) reports, unpublished manuscripts, regional journals, and other research available for the project region that will provide data that will be used to compare Sites 15BE688, 15BE694, and 15BE697 with similar occupations.

Field Methods

Sites 15BE688, 15BE694, and 15BE697 are in different vegetative areas, which require different methods of investigation. Site 15BE694 is in a wooded area that was never plowed after the end of the occupation, while Sites 15BE688 and 15BE697 are primarily in open field currently used for hay that has been plowed many times since the end of the occupation. Thus portions of the field methods for the sites will differ.

The Data Recovery at Site 15BE688 will focus on close interval shovel testing and plowzone stripping (Figure 8). The excavation will begin with close interval shovel testing at two-meter intervals within a 900 square meter area of the site that appears to have been the original farmyard with the residence and outbuildings. This will help establish artifact distribution in the area of highest potential. The plowzone stripping will be conducted across this 900 square meter area after shovel testing, along with an additional 25 square meters on the northeastern portion of the site. The additional area is to test for a potential outbuilding seen on the 1938 historic aerial. All features identified will be excavated as per the feature excavation methods discussed in this report.

The Data Recovery at Site 15BE694 will first focus on shovel testing at one-meter intervals in the location of the suspected outbuilding to the west of the current established outbuildings (Figure 9). This outbuilding can be seen on the 1938 aerial (Figure 5), on the banks of the drainage. It is hypothesized based on the Phase II findings, that the intact jar feature extends to this outbuilding. It is recommended that this feature be followed with 50 centimeter wide and 2 meter long shovel trenches, at approximately 5 meter intervals, along the length of the suspected continued location of this feature. This will result in the excavation of approximately seven square meters along this feature. Within the area of the residence, two above ground features were identified: a well and a cistern. Both of these features had a large amount of associated artifacts. It is recommended that a series of one by one meter units be excavated around these features, around Feature 1 found in Test Unit 6 during the Phase II survey, and around the house area. The placement of these units may be

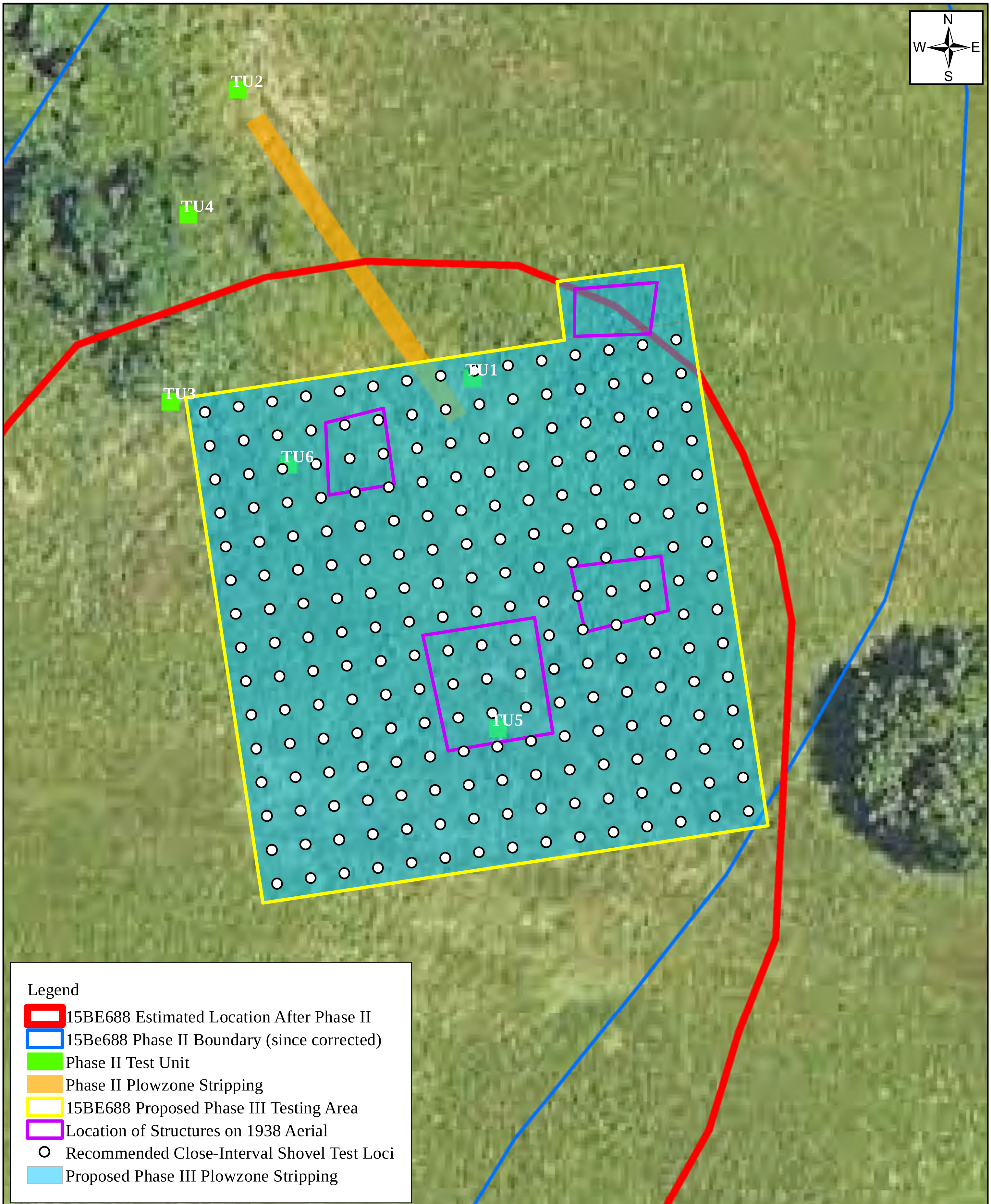


Figure 8	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project Boone County, Kentucky	Aerial Map with Proposed Phase III Methods at Site 15BE688 Aerial Provided by Google Map Services

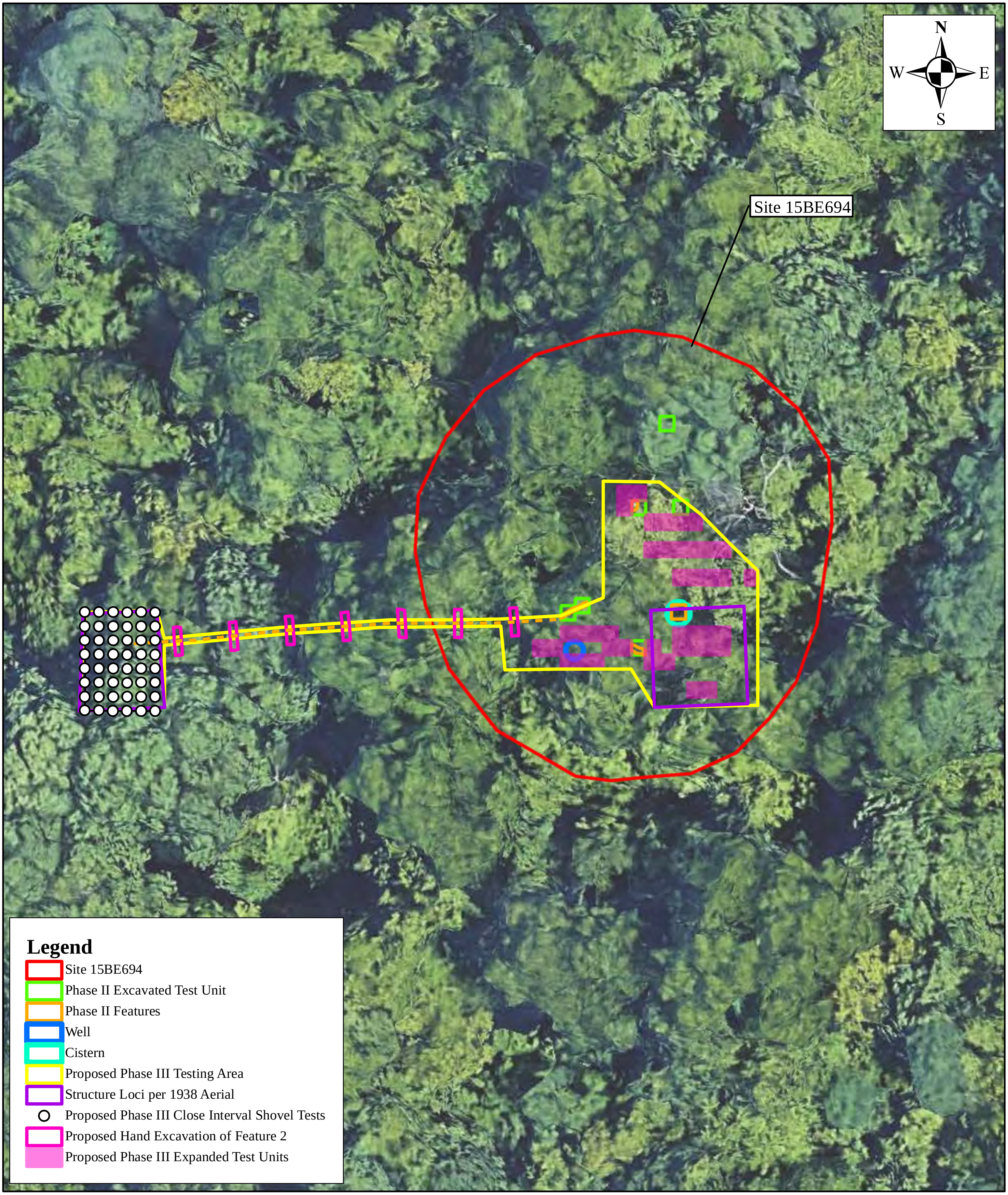


Figure 9	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project Boone County, Kentucky	Aerial Map with Proposed Phase III Methods of Site 15BE694 Aerial Provided by Google Earth 0 15 30 60 Feet Environment & Archaeology LLC

altered or expanded during the survey based on findings. The goal will be to uncover features and activity areas that will provide information regarding the household activities. All features identified will be excavated as per the feature excavation methods discussed in this report.

The Data Recovery at Site 15BE697 will focus on plowzone stripping (Figure 10). The plowzone will be stripped down approximately 20 to 30 cmbs as per the findings of soil deposition during the Phase II survey. As features and deposits were concentrated in the northern part of the site, the plowzone stripping will focus on this area. Per historic aerials, the southern part of the site was predominantly agricultural land, and has a low potential for significant features. Approximately 397 square meters (8 percent) of the site is recommended for plowzone stripping, but this may be expanded based on findings. The goal will be to locate additional features for excavation. All features identified will be excavated as per the feature excavation methods discussed in this report.

Site 15BE688 Field Methods

Three methods are proposed for use in the Data Recovery of 15BE688: close-interval shovel testing, backhoe plowzone stripping, and hand excavation of features (Figure 8). The plowzone stripping will be conducted with a backhoe to removed the plowed soils, and reveal intact features. These features will then be hand-excavated.

<u>Close-Interval Shovel Testing</u>

Site 15BE688 is within a hay-covered field which has been plowed since the time of the historic occupation. The Data Recovery will begin with close-interval shovel testing of a 30 by 30 meter area of the site that per historic aerials, was the former farmyard with the residence and associated outbuildings. This will result in the excavation of 225 shovel tests which will generate data regarding the spatial distribution of artifacts across the farmyard.

<u>Backhoe Plowzone Stripping</u>

Following the close-interval shovel testing, backhoe stripping of the plowzone will be conducted over the same 30 by 30 meter area, to a depth of approximately 20 to 30 cmbs. An additional area at the northeast of the farmyard, measuring approximately 3.5 by 7.5 meters, will also be stripped, as it is the potential location of an outbuilding. The deposits within the plowzone are no longer in situ, and thus their removal by plow will not effect the quality of the data recovery. The area recommended for stripping is approximately 925 square meters in size. No plowzone stripping or other further work is recommended within the wooded portions of the site, or at the portions of the site on slope or in historically agricultural field. Additional areas may be stripped if deposits uncover features that extend beyond the initial plowzone stripping.

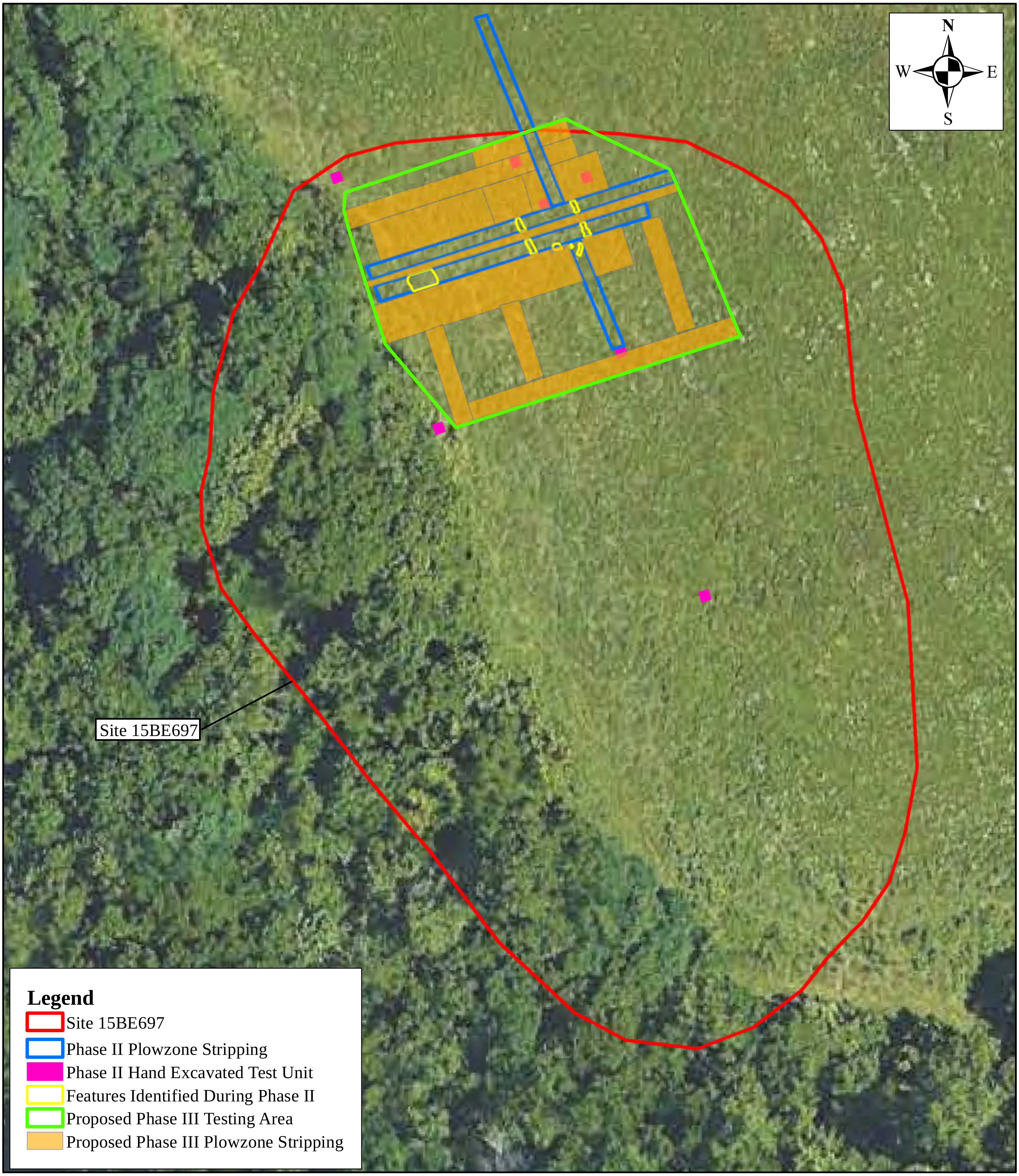


Figure 10	Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project Boone County, Kentucky	Aerial Map with Proposed Phase III Methods of Site 15BE697 Aerial Provided by Google Earth 0 20 40 80 Feet Environment & Archaeology LLC

Site 15BE694 Field Methods

Three methods are proposed for use in the Data Recovery of 15BE694: shovel testing, unit hand excavation, and hand excavation of features (Figure 9). Shovel testing should be conducted first. The purpose of the shovel testing will be to determine whether or not the remains of an outbuilding are present on the creek bank as seen on historic aerials, in an area where no shovel testing was conducted during the Phase I survey by Versluis (2017). No plowzone stripping is recommended for the Data Recovery of 15BE694 as the area is heavily wooded, and stripping would cause damage to the intact deposits below the surface. Rather, it is recommended that test units be excavated in the areas of highest probability in order to reveal features. These features will then be hand-excavated to their full extent. Additional hand excavation of 50 cm wide and two meter long trenches is recommended at five meter intervals along the area where Feature 2, the line of stoneware jars, is thought to extend to the west.

Close-Interval Shovel Testing

Environment & Archaeology, LLC will perform close-interval shovel testing at one-meter intervals across the area believed to have once been the location of an outbuilding along the creek per historic aerials. This area is approximately five meters east to west, and seven meters north to south, for a total of 48 shovel tests. Additional shovel tests will be added to this excavation if needed to ensure a negative shovel test to define the boundary of the outbuilding feature.

Test Unit Hand Excavation

Site 15BE694 is within a heavily wooded area with a dense root mat. Prior to test unit excavation, the area will be cleared of all brush. Removal of the trees within the area would disturb the intact subsurface deposits, thus they will be left in place. During the Phase II survey, it was found that no plowzone existed across the site. It is recommended that no plow stripping be conducted as it would be difficult to avoid trees which could disturb the deposits. Instead, it is recommended that a series of one-meter by one-meter test units be excavated. The results of the Phase II excavations demonstrated that features were visible at a shallow depth below the foliage. The test units will be excavated in the areas of highest probability for features such as artifact deposits and structures. When features are encountered, the excavation will be expanded to expose the entirety of features. The test units are recommended to be located in areas adjacent to previously identified features and artifact deposits, following the previously established grid of the Phase II survey. Approximately 42 test units (42 square meters) are currently recommended for the areas of greatest probability. The locations of these units may change based on field findings during the Phase III data recovery in order to follow features as they are uncovered. Additional areas may be excavated should deposits or features be located.

Hand excavation will also be conducted along Feature 2, the stoneware jar feature, identified during the Phase II excavations. Based on historic aerials and previous findings, it is theorized that the feature continues to the west, extending to the former outbuilding. Hand excavated test unit/trenches approximately 50 cm in width and two meters in length are recommended along this potential feature location at five meter intervals. This will result in an additional seven square meters of hand excavation at the site.

Site 15BE697 Field Methods

Two methods are proposed for use in the Data Recovery of 15BE697: backhoe plowzone stripping, and hand excavation of features (Figure 10). The plowzone stripping will be conducted with a backhoe to removed the plowed soils, and reveal intact features. These features will then be hand-excavated.

<u>Backhoe Plowzone Stripping</u>

Site 15BE697 is within a hay-covered field which has been plowed since the time of the historic occupation. The Data Recovery will begin with backhoe stripping of the plowzone, approximately 20 to 30 cmbs. The deposits within the plowzone are no longer in situ, and thus their removal by plow will not effect the quality of the data recovery. This stripping is recommended in the northern portion of the site that has the greatest potential for features associated with the historic occupation, following the previously established grid of the Phase II survey. The wooded areas in the western portion of the site, and the open agricultural field that was historically agricultural field in the south portion, are not recommended for plowzone stripping. The stripping is recommended for an area approximately 397 square meters in size. It is recommended that these strips cover the entirety of the suspected location of the residence, and other areas of high probability. Additional areas may be stripped if deposits uncover features that extend beyond the initial plowzone strips.

Feature Excavations

All cultural features encountered during the Phase III Testing at Sites 15BE688, 15BE694, and 15BE697 will be excavated. Features will be trowel scraped until fully exposed, and will be mapped and photographed in planview. If the feature extends beyond the area that has been exposed, additional excavation will be conducted until the entire feature is visible in planview. The amount of feature excavated will depend on the potential of the feature to show different deposits. Relatively large, uniform features that demonstrate a homogeneous artifact deposit will be roughly bisected and excavated. Large features that show potential for different artifact depositional zones (e.g. house foundations) and all smaller features, will be excavated in their entirety. Features will be excavated in stages using bisection and other methods in order to reveal profiles that will be mapped and photographed. Technical drawings will be made and photographs will be taken of any sections of features exposed, prior and after any exposure of a change in stratigraphy, and after excavation is complete.

If features are observed to be or are believed to be stratified, they will be excavated in natural levels or cultural fill episodes. If no stratification is believed to be present, or if a strata is greater than 10 centimeters in depth, excavation will be conducted at 10 centimeter levels. At least 25 percent, or not less than 3 liters, of feature fill will be taken as a flotation sample. Features will be individually numbered and recorded in a feature log. Diagnostic artifacts will be mapped when located in situ. Other samples (e.g. charcoal) will be collected in accordance with accepted practices.

Site Mapping

Environment & Archaeology, LLC will re-establish the datum that was used during the Phase II investigation at the sites prior to the beginning of the Data Recovery excavations. The sites will be overlaid with the same grid as was utilized in the Phase II Surveys in order to maintain control of the provenience data for all recovered materials and identified features. Upon completion of this Data Recovery work, *Environment & Archaeology, LLC* will complete a topographic map of the sites showing natural and cultural features. This map will serve as the base map for the sites.

Provenience Control

Provenience control will be maintained using a TOPCON digital ground positioning system (GPS) device. All features and diagnostic artifacts will be mapped with the GPS in order to maintain an accurate geographical reference for findings. Additional provenience information and detail will be recorded on maps in the field using a relational database provided by the grid that will be overlaid on the site. If the weather does not require protective shelters, a laser level will be used to establish elevational controls. This information will be used in a database with artifact analysis for spatial analyses of artifact distributions. When activity areas or spatially discrete loci of artifacts are encountered, this provenience information will be used to develop distribution maps of artifact classes and artifact types.

Sampling Strategy

The Phase II Surveys uncovered a large amount of material, particularly building stone, mortar, and unidentified metal. These nondiagnostic materials, when encountered in large amounts, will not be returned in their entirety to the lab for analysis. If more than one type is encountered (e.g. hand-made versus machine-made brick), they will be accounted for separately. They will be photographed, weighed, counted, and recorded in the field. If any of this material is diagnostic (e.g. stamped brick), those materials will be returned to the lab for analysis. All diagnostic artifacts, regardless of the amount, will be collected and returned to the lab for analysis.

LABORATORY AND ANALYTICAL METHODS

All diagnostic archaeological data and specimens recovered during the project will be transported to the *Environment & Archaeology, LLC* laboratory in Florence, Kentucky. Non-diagnostic material recovered in large amounts (i.e. building stone, mortar, unidentified metal) will be weighed, counted, and recorded in the field. Each artifact returned to the lab will be washed with water and a soft toothbrush, and then air dried. Items considered too unstable for wet washing will be either dry-brushed or left unwashed. After processing the assemblage, stylistic attributes will be described and recorded within a pre-prepared Microsoft Excel spreadsheet with conditional drop-down options in order to maintain consistency of record. For all artifacts recovered, both count and weight will be recorded, as will any analytically significant measurements such as thickness. Further analysis will be conducted of the material collected during the Phase II investigations of each site. Record will be made of any applicable measurements that were made during the Phase II analysis, and the results of this data will be incorporated into the overall analysis of material at each site.

General Analytical and Statistical Considerations

This discussion is based predominantly on the work of VanPool and Leonard (2011) in regards to the proper application of statistical analysis in archaeology. Much of this discussion is in reference to the artifacts as a whole, although specific artifact considerations will be discussed below within specific artifact groups.

Sample size must be considered for every artifact type before a statistically significant conclusion can be drawn from comparisons. Based on the material recovered, and on inferences from previous archaeological investigations, a minimum sample size must be established for each artifact type before it can be evaluated. This sample size can be based on either count or weight depending on the applicable measurement (see below). For instance, a significant comparison could not be drawn between a sample of five nails at one feature and 500 nails at another feature. The sample of five nails is so low, that it could be the result of a single episode of deposition, or of secondary deposition. However, a sample of 100 nails against a sample of 500 nails would be statistically viable.

The analysis of archaeological data will provide insight into the distribution, use, and manufacture of various materials throughout the occupation. However, in order for the analysis to have any true application, it must first be established what analytical attributes are relevant, and then what modes of statistical analysis are the most likely to produce viable results. Artifact analysis involves measurements of many aspects of artifacts, some vary depending on the artifact, and not all numbers and measurements are equally applicable. It is common to record both the count and the weight of artifacts, but the count of artifacts may be analyzed in some ways, but not others. For this example, brick can be found in nearly whole pieces or in extremely fragmented pieces. The comparison of the count of brick between sites or between two locations within one site is not a good indicator of the amount of brick that was present at that location. In order to establish the commonality of brick at a location, a comparison of weights would be necessary. However, the count in relation to weight of brick will also be a useful factor for comparison. If two areas have similar weights of brick present, but one area has very few brick pieces, while another has pieces numbering in the hundreds, this will provide insight into the activities occurring at the area. Perhaps the area of larger pieces of brick is part of an intact structure or a brick storage area, whereas brick fragments might represent the dumping location of a demolition.

Measurements of the length, width, and thickness of an artifact may be applicable for analysis, but it will depend on the nature of the artifact as to which of these measurements will contribute informative data. Nails are a good example where length is an applicable measurement for analysis. Lengths of nails was largely standardized, and the length of the nail is known to vary for different uses, but the width and the thickness of the nail are not known to correlate directly with any activities. In addition, only the length of a nail that is whole will give applicable data for comparison. Ceramic sherds can have length, width, thickness, and weight measured. Weight will be applicable in a similar circumstances as brick, as a count does not give comparable data for the frequency of a ware in a location. The amount of fragmentation of a ware could produce high counts of a ware in one location, and low amounts in other location, while the weights are similar. Another measurement of ceramics will be useful in determining the ceramic's use: the diameter of the whole piece. Whole ceramics are rarely recovered from a site, but if the piece is clearly circular in nature, and a rim sherd with an adequate rim length is found, it can be compared to curvature charts to determine the diameter of the whole piece.

In order to establish whether further statistical methods are applicable to the data collected, the whole of the data must first be evaluated. First, a visualization of the data will be completed. This will be accomplished through histograms, distribution curves, bar charts, or other methods. The visualization will be dependent on the type of data collected, for instance whether or not the information is ordinal, interval, or a ratio. Visualizations such as histograms and distribution curves will establish the frequency distribution curve of a measurement, and determine whether or not there is one single mode that is common, or whether the data shows bimodal or multimodal tendencies. These evaluations will not be solely conducted on material from the site as a whole. Rather, viable samples will be compared to one another, and to the site as a whole, in order to draw conclusions about activity areas and where different temporal indications are be present. The data will then be compared between sites to determine whether there are differences between the sites.

Once the data has been visualized, it can then be established which statistical method will provide meaningful data. Methods will include comparisons of modes, means, and medians; standard deviation; box plots; regression models; and chi square tests. Some of these methods are routinely used for certain types of data. For instance, regression models are frequently utilized in the evaluation of window glass thickness, but visualizing the data first could reveal that a regression model should not be the starting method. If the distribution shows that a better analysis would be a comparison between features, the stratigraphy, or other locational data, then the data will be evaluated accordingly. A visualization of the data will also indicate important outliers that either are not window glass (e.g. plate glass), or are evidence of later occupation repairs or additions.

Prehistoric Artifacts

Lithic Artifact Analysis

Lithic artifacts will be analyzed using the following methods structured on an analysis developed by Andrefsky (2005). The data will provide information on the range of materials present at the site. Specific methods and procedures used to analyze lithic artifacts collected during the project are discussed below. During the Phase I and Phase II surveys of Sites 15BE688, 15BE694, and 15BE697, minimal amounts of prehistoric material was identified, and the sites are eligible based on the historic deposits. Thus, currently no advanced methods of analyses (e.g. carbon dating, thermoluminesence) is advised for prehistoric material recovered. Should unexpected intact deposits of prehistoric material be uncovered during excavation, the KHC will be contacted to determine whether more advanced methods of analyses are warranted.

Raw Materials

Raw materials will be identified on the basis of macroscopic characteristics: color, texture, hardness, and inclusions. Magnification with a 10X hand lens will be used to identify inclusions and to evaluate texture and structure. Several raw material types are likely to be identified during the analysis. Various raw material types are listed below, followed by a brief description of its physical properties. Descriptive properties were taken from Taylor et al. 1996.

Chert is cryptocrystalline quartz. Unlike vein quartz and rock quartz crystal, chert tends to occur within sedimentary rock formations. In general, most varieties of chert are amenable to flaking because they are homogeneous or isotropic materials that fracture in a clear conchoidal pattern.

Quartz is one of the most common minerals found on earth. It is formed from igneous magma and hydrothermal veins. Quartz is fairly conducive to knapping due to a conchoidal fracture pattern, but due its many fractures planes, breakage often happens during knapping. It is also very hard making it difficult in the reduction process. The material was most likely derived from a local source.

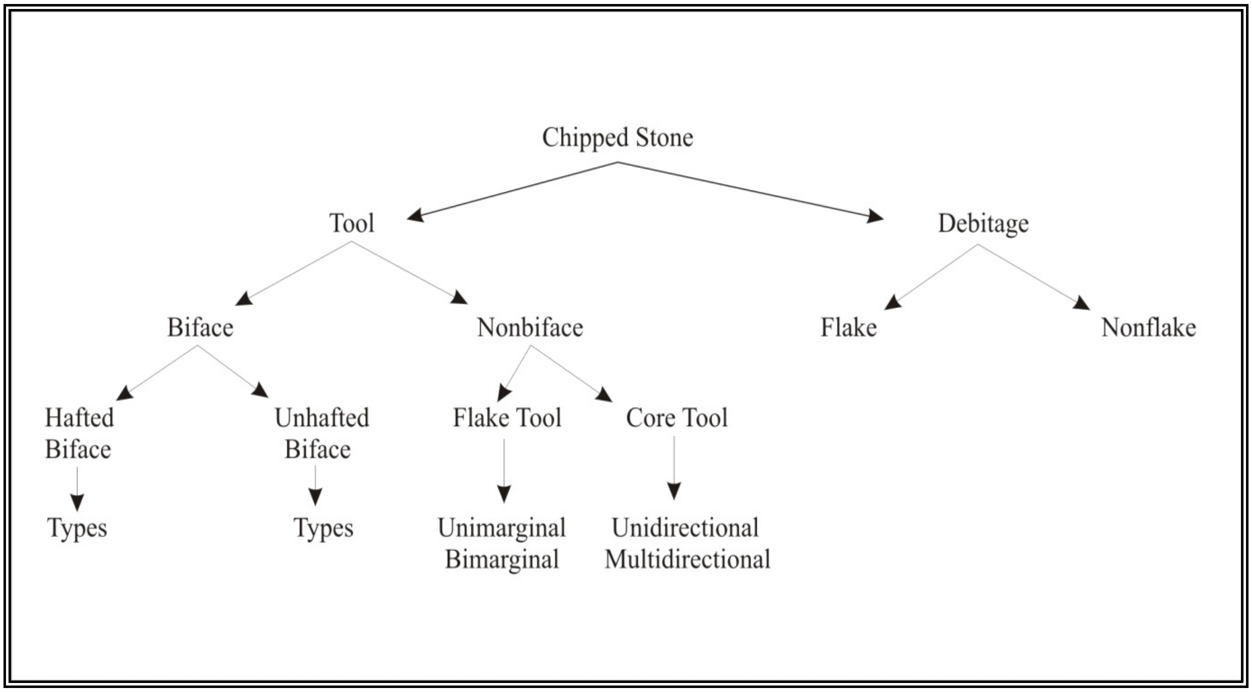
Quartzite, like quartz, exhibits a conchoidal fracture pattern. Quartzite has been traditionally considered a metamorphosed sandstone. Heat and/or pressure transform the sandstone into a more homogeneous matrix, which more readily transmits fractures through individual sand grains rather than around them. The material was most likely derived from local material found in and around the Project Area.

Chalcedony, like chert, is from a form of cryptocrystalline quartz. The term chalcedony is applied to a specific type of fine-grained raw material.

Sandstone is composed of bonded sand grains.

Tool Analysis

Identification of lithic types within the chipped stone assemblage will be accomplished through the use of a standardized morphological typology as presented in Andrefsky (2005). This typology divides the lithic assemblage into categories that are discussed below. The typology is based upon the morphology of chipped stone artifacts and is not intended to suggest function nor chronology. These categories are based on the presence or absence of particular attributes on a specimen.



Morphological Typology of Chipped Stone Tools and Debitage (After Andrefsky 2005: Figure 4.7).

The chipped lithic assemblage will be initially classified into two groups: tools and debitage. Tools will be separated by the presence of known attributes attributed to human behavior. Patterns of flaking indicating intentional modification (flaking) and/or utilization (use-wear) defined a tool. All tools will be recorded using standardized metric spatial dimensions including length, width, thickness, and weight. Tools will then be divided into two groups; bifaces and nonbifaces. Bifaces are defined as objective pieces that have been extensively modified, and have two sides or faces that meet to form a single edge that circumscribes the entire artifact. Both faces show evidence of previous flake removals. If evidence of bifacial flaking is absent, the artifact will be included with the non-bifacial tools (flake or core tools). Debitage was defined as the materials removed from tools in their shaping process.

Bifacial Tools. Bifaces will be divided into categories of hafted or unhafted bifaces. Hafting elements are recognized on bifaces by the presence of notches or shoulders, or by the presence of wear along the edges of the biface. These include ground or dulled edges. However, certain points have less obvious hafting elements, and it must be inferred that they were meant to be hafted. Hafting can be inferred for small triangular types such as the Madison and Ft. Ancient from cumulative knowledge of associated hafting technology, frequency of impact fractures, microwear patterns, symmetry, and patterns of retouch. Hafted bifaces will be further identified as projectile point, knives, drills etc. in order to encompass the common technological traditions of the region and distinguish subcategories of bifacial chipped technologies and their temporal and cultural affiliations. Unhafted bifaces are bifaces that conform to the category of biface, but lacked a recognizable or inferred hafting element.

Identification of diagnostic lithic artifacts will be made by consulting existing comparative collections and available regional literature. The analysis of hafted biface typologies will be aided by reference works such as *Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States* (Justice 1987) and *New York Projectile Points* (Ritchie 1971).

<u>Nonbiface Tools</u>. Non-bifaces will be divided into flake tools and core tools. Flake tools are defined as those tools that are modified, but have a recognizable dorsal and ventral surface. Flake tools are modified by either intentional retouching to form an edge, surface, or shape; or as a result of tool use. Many endscrapers, backed blades, microliths and microblades categories can be fitted into the flake tool typology but unifaces and retouched flakes are the most common types that fit into this morphological typology. The flake tool type is distinguished by the location of the wear or retouch. Unimarginal flake tools exhibit modification on either the ventral or dorsal side. Both sides can be modified if there are in different locations. Bimarginal flakes are modified on both the ventral and dorsal surfaces in the same location. Combination flake tools exhibit both kinds of modification.

A core tool is an objective piece that has had flakes removed from its surface and is best understood as a modified nucleus (sometimes referred to as chunk) or mass of chippable stone rather than a tool with some particular function. The nucleus is not recognizable as a flake or biface. Core tools include formal and informal cores, as well as core fragments. Core tools are then divided into unidirectional and multidirectional core types. Unidirectional cores are defined as a core which has had removals made from one direction, while if the pieces were detached from multiple directions, the core is defined as a multidirectional core.

<u>Debitage</u>

Debitage is defined as flaked debris: lithic waste flakes that exhibit intentional removal from a parent piece and exhibit no further modification or use. Debris occurs in large numbers on most sites, exhibits evidence of the stage of manufacture in which it was produced, and it is usually deposited in the location it was produced. The interpretation of chipped stone debris is important to answering questions regarding site use and function.

Any recovered debitage which passes through a ¼ inch screen will be subjected to counting and weighing only and will not be included in the analysis. As a ¼ inch screen is used during field recovery, smaller flakes, or microdebitage, represent an inconsistent and opportunistic sample and are not included in further analysis. The remaining debitage will then be sorted into flakes and nonflakes. Flakes are defined as having recognizable dorsal and ventral surfaces. Nonflakes do not exhibit flake characteristics and therefore fall into the category of blocky shatter.

Flakes were classified according to the following criteria:

- Primary Flakes are typically thick and have cortex on all or most of their dorsal surfaces. They are identified by one or less dorsal scars.

- Secondary Flakes are generally, relatively thin. They may have some cortex on their dorsal side. Secondary flakes are identified by two or three dorsal scars.

- Tertiary Flakes are small and thin. They were also known as biface finishing flakes and may be the result of producing the edge of a tool. Tertiary flakes have three or more dorsal scars and rarely exhibit cortex.

- Flake Fragments are flakes which lack sufficient features of flake morphology to be included into the above categories. They typically lack platforms, percussion bulbs, or their original edges.

Ground Stone Analysis

Artifacts in this category are produced using one or more techniques, including grinding, abrading, pecking, polishing, and chipping. These implements may have been manufactured for a particular function or used more expediently and thus formed by actual use. Groundstone artifacts are identified by raw material, physical attributes such as size and weight, manufacturing techniques, and /or use wear (Adams 2002). These include artifacts used to alter surfaces (i.e grooved abraders and burnishing stones), those engaged in fatigue wear or abrasion (i.e. manos, metates, mortars, pestles, and pitted stones), stones used to chip or smash away other items (hammerstones), and formal tools exhibiting hafting (adzes, celts, and axes).

Prehistoric Ceramic Analysis

Ceramic assemblages will be sorted by size and surface condition. Since very small and/or eroded sherds seldom contain discernable features such as temper type and size, design technique and motif, and/or surface treatment, sherdlets measuring less than one square centimeter will be counted and excluded from further analysis. Ceramic sherds larger than one square centimeter are first sorted by paste and temper type and size. These three features are the most diagnostic of vessel lots, as well as the most readily identifiable. Next, color, surface treatment and decorative applications are identified and used to further subdivide the ceramic sample. Lastly, the assemblage is sorted by vessel element and, if possible, vessel type. Upon completion of this analysis, current regional literature is searched for ceramic typological sequences and recovered assemblages containing similar attributes.

Historic Artifacts

The historical record can be used to develop expectations which can be tested through archaeological methods. Material culture can be used to discern how patterns in the archaeological record may provide data on cultural patterns including economics, social change, ethnicity, and behavior (Miller 1980; Cheek and Friedlander 1990; Spencer-Wood 1987; Genheimer 1988).

Artifact analysis methods at historic sites will include a variety of techniques designed to meet the particular needs of individual sites and settings. Initially, artifacts are divided into categories based on artifact type. For example, glass, ceramic, and metal are separated and subjected to differing types of analysis. These are then further divided into functional categories, such as Kitchen, Architecture, Tools, etc (see South 1977) which can establish use-patterns within a site. The following is a brief discussion on the techniques and criteria by which each artifact type is typically evaluated.

Kitchen Group

Historic Ceramics

The historical ceramic artifact analysis and categorization conducted by *Environment & Archaeology, LLC* is defined as being a "ware based" system. An initial classification is conducted on historic ceramics based on morphology and decoration. A visual inspection provides information regarding ware type based on attributes such as paste, glaze, and decoration. The most accurate dating method for historic ceramics is through Maker's Marks. The logos of different potters were unique, from form to text, and often changed within a company over the years, allowing greater dating abilities. Several resources exist that classify and order maker's marks for ease of research. The McKinley Tariff Act of 1890 also required that all imported goods name their country of origin, giving additional information about the origin of the piece. Even partial maker's marks are often sufficient for identification purposes.

Nonvitreous white bodied wares, when accurately classified, provide an extremely good indication of the age of some archaeological deposits. Nonvitreous white bodied wares include creamware, pearlware, and whiteware. Semivitreous white ware includes ironstone. These common tablewares are often the most ubiquitous artifacts found on eighteenth through twentieth century historical sites. Several of the historic ceramic ware types are temporally diagnostic through both ware and decoration.

For the purpose of this Data Recovery Plan, further considerations will be made of ceramics, including vessel forms, paste, glaze, and decoration type. Detailed price information on refined ceramics will provide insight into the economic position of the inhabitants (Miller 1980, 1991). Ceramic styles and popularity changed frequently, and the level to which a household followed these trends provides an insight into the "gentility" of the inhabitants, meaning whether the household was acting in regards to genteel middle or upper-middle class norms of behavior, decorating, and consumption (Andrews and Sandefur 2002; Fits 1999; Kasson 1987; Wall 1999). Factors such as transportation, ethnicity, and cultural values also affect the ability or interest in patterns of gentility. George Miller's (1991) ceramic price indexing system places the cheapest, plain, refined earthenware at a value of 1.00, and all other ceramics at a ratio to this value. The ceramics collected during the Data Recovery will be subjected to this index analysis to provide insight into the economic position of the inhabitants.

Vessel Forms

Vessel forms at a site reflect the quality and expense of wares present at a site, which can then be analyzed for a view of price indexing. When sufficient amounts of ceramics are present, a minimum vessel count can be produced that can be combined with the price index analyses for a more accurate analysis. Minimum vessel counts take into consideration that some wares may be more fragmented than others.

The types of vessels present also reflect the culture and economy of the inhabitants. For instance, details such as diameter of the vessel, established using a diameter curve chart, can determine whether the vessel is a dinner plate, a muffin plate, a twiffler, or a soup plate. The greater the variety of vessel types present at the site indicate a greater tendency towards gentility, particularly if a large number of serving vessels are present. The analysis of vessel types also indicates the style of dining that was taking place, which indicates details of the culture of the inhabitants. Some cultural styles tended more towards a family style of meal service, while others tended towards individual service (Sandefur et al 2008).

Ware Types

Porcelain is a vitreous white-paste, usually glazed, ware of a variety of compositions. Due to porcelain's long range of use and manufacture, it can not be used as a temporal indicator based on ware alone. However, decorative techniques can be used as temporal indicators based both on the beginning of their use, and the dates of their popularity.

Porcelain on nineteenth century sites can include pieces made in North America, Great Britain, Continental Europe, China, and Japan. Porcelains are divided into two basic types, hard paste and soft paste, with several varieties of each paste type. The difference between these is body composition and firing temperature. Hard paste porcelains are composed of kaolin and feldspathic clays and are fired at a high temperature. Chinese export porcelain is a hard paste variety that can be readily distinguished from other European and Japanese hard pastes. The major period of Chinese export trade to America was ca 1784 to 1820 and declined sharply after 1830 (Palmer 1983:25). Painted underglaze wares were exported to England until 1840 and painted overglaze enamels were exported into the 1820s (Palmer 1983:16). Bone china is a type of soft paste porcelain that has been continuously produced since 1794. This ware is composed of feldspathic clays and calcined cattle bone fired at a lower temperature than hard paste porcelains. It appears with many decorative preparations including underglaze blue painted, overglaze polychrome painted, gilding, transfer printing, lustre and decals. Because of porcelains long history of manufacture, it has limited potential as a temporal indicator (Majewski and O'Brien 1987:124-127).

Creamware is a non-vitreous white-paste earthenware with a cream colored glaze which was first exported to the United States in 1769 from England (Noel-Hume 1978: 125). By the end of the 18th century, creamware was the dominant ware in much of the American market. However, circa 1810 pearlware began to replace creamware in popularity. Creamware was produced in a variety of decorations, including over and underglaze transfer printing, annular or dipped preparation, over and underglaze hand paint, and molding.

Pearlware is a non-vitreous and semi-vitreous, white-pasted earthenware. The glaze on pearlware has a faint blue-green tint cause by the addition of cobalt to a clear lead glaze. Pearlware was developed in England, and had become the most common tableware in the United States in circa 1810. The popularity of pearlware declined by 1840 (Majewski and O'Brien 1987:118-119, Noel Hume 1978: 128-132; Price 1982:10-11). Pearlware and whiteware are very similar in appearance. One method of distinguishing between the two is to look in places on the ware where the glaze would have pooled, especially in footrings. The cobalt addition in pearlware creates a distinctive blue color with the glaze has accumulated.

Decorative types include over and underglaze transfer printing, over and underglaze hand painting, annular or dipped preparations, edge decorated, and molded varieties. Because of the persistence of pearlware over time and its overall similarity to whiteware, it is more reliable to date sherds based on decorative technique and color. Before 1828, potters were unable to use bright colors under the glaze. Consequently, sherds having pink, red, purple, bright green, light blue, and light yellow date after 1828 and are considered whiteware. The pearlware color palette consisted of autumn colors like olive green, dark yellow, bronze, deep blue, black, and brown.

Whiteware is a non-vitreous and semi-vitreous, white-paste earthenware that usually has a clear, colorless glaze. Whiteware is very similar in appearance to pearlware and ironstone. Whiteware became popular in the United States by 1820, were it was in common use throughout the 1800s, and is still being manufactured today. The era of the greatest popularity of whiteware in the United States was between 1830 and 1890 (Majewski and O'Brien 1987:119-125, Miller 1980:16-17, Noel-Hume 1978:130-131, Price 1982). Whiteware occurs in virtually every decorative type that was available in the nineteenth century and decoration type and style can be used as relative temporal indicators.

Ironstone refers to a semi-vitreous, white-paste ware that contains petunse (china stone). Ironstone was popular in the United States by the 1840s, imported from England. They were often decorated to imitate Chinese porcelain. Post 1850, ironstone was predominantly undecorated, with some occurrences of molded geometric, floral, or foliate motifs. American manufacturers began to produce ironstone during the Civil War. Embossed ironstone was most popular between 1840 and 1907 (Majewski and O'Brien 1987:20-21).

Redwares are non-vitreous wares with a red, buff, or brown paste. While redwares may be unglazed, they are more commonly found with a clear or mottled lead glaze, or a black or brown glaze resulting from iron additions to the glaze. Redware was at the height of its popularity through the mid-1800s.

Stoneware is a semi-vitreous ware, usually glazed and found in thick, utilitarian forms. Stoneware paste can range in color from red to buff to brown, and may turn grey during firing. Stoneware is categorized primarily by its exterior surface treatment, with the most popular being salt glazed. Stoneware was popular in the United States by the mid-1800s and largely replaced redware as the utilitarian ware of choice.

Due to the abundance of domestic stoneware manufacturers and the difficulty in attributing vessels to a particular manufacturer, stoneware is considered a poor chronological indicator on nineteenth century sites. However, two common slips used as glazes, Bristol and Albany, are useful for dating purposes. Albany slip ranges in color from light brown to black, and was ubiquitous in the Midwest from 1830 to 1900 (Phillippe 1990:80). Bristol slip is white and was introduced into the United States by the 1880s, frequently in combination with Albany slip until about 1920. After 1920, Bristol slip generally occurred alone (Lebo 1987:132).

Yellow ware is a semi-vitreous or non-vitreous ware with yellow- or cream- colored paste, which usually have a clear or mottled (Rockingham) lead glaze. The Ohio River Valley is well known for its yellowware potteries (Gates and Ormerod 1982). Yellow ware vessels include utilitarian forms similar to stonewares and redwares, as well as specialty items such as inkwells, footwarmers, etc. Yellowware was popular between about 1830 and the 1920s.

Decoration Types

Albany Slip is a surface treatment produced by natural clays that creates a hard, brown glaze. The slip was mixed as a slurry into which the vessel would be dipped. This treatment could be either on the interior or exterior of a vessel, and frequently would be present at either the interior or exterior, combined with another treatment on the other surface (most commonly Bristol Glaze or Salt Glaze). Albany slip is most commonly found on stoneware. It was popular in the midwest during the last three-quarters of the nineteenth century, and became less common after 1910, with a suggested terminal date of 1940 (Ketchum 1987).

Annular Ware is distinguished by annular glazed bands of white, blue, black, or brown. It is frequently found on yellowwares and pearlwares, and sometimes are accompanied by impressed patterns. When vine-like patterns accompany the colored bands, the treatment is referred to as **mocha ware**. These bands can be pink, blue, or green, but black and brown were the most common (Sonderman 1979:92). Annular decorated yellowwares were popularly produced by American potters from 1840 to 1900 (Ramsay 1939:149). Annular decorated pearlware may have originated circa 1800, but was quickly replaced by whiteware. Annular pearlware has a median production date of 1805 (McCorvie 1987: 203). Whiteware with annular decor was produced until circa 1860, and has a median ceramic date of 1845 (Esarey 1982: 186).

Bristol Glazed wares had a glaze prepared from chemicals that included feldspars and zinc oxide. The resulting glaze was off-white to white in color, with a thick enamel-like texture. Decoration in addition to the glaze was common. It became increasingly common after 1890, and replaced Albany slip in popularity on stonewares in the twentieth century. Common forms with this glaze included jars, crocks and mugs (Mounce 1988). Bristol glaze was frequently used in conjunction with other glazes or slips (most commonly Albany slip and Salt glaze). A frequent form was a jug with Albany slip to the shoulders, and Bristol glaze below on the body. Bristol glaze is most commonly found on stoneware.

Cobalt Blue/Black Underglaze Handpainting is a decor whereby a rich blue or black paint was applied underneath the glazes. A variety of patterns and designs were used, and the decor has a median production date of 1800 for pearlware (McCorvie 1987:203), and was common on whiteware from 1800 to 1825. As this decor was handpainted, research can sometimes identify where the piece was made based on what designs were common with local potters.

Decalware is ware which is decorated through the application of a decal, frequently polychrome, over the glaze. It was first introduced in 1890, was popular through the 1930s, and is still produced today. A median ceramic date of 1910 is given to this decor by Esarey (1982: 186), but this may be early given the continued production of wares with this decor. Decalware is frequently found on whiteware and ironstone.

Embossed Plant Motifs were popular after 1860, with a median ceramic date of 1880. The designs included leaves of oak, maple, grape, and ivy; elements of corn, wheat, oats, and hops; fruits such as grapes, plums, peaches, pears, and berries; and flowers such as clover, lilies of the valley, roses, daisies, and tulips. This decor type is particular to wares of ironstone.

Faience (aka Majolica or Delft) is earthen ware with a tin-enameled glaze that produces an opaque white surface. They are sometimes decorated with hand painted metallic oxides, commonly blue, yellow, orange, and green. The names for this ware are dependent on the country of origin. Faience was produced in France and Italy, Majolica was produced in Spain, and Delft was produced in England and Holland. These wares were common from the sixteenth century to the end of the eighteenth century (Gums 1988:139).

Fiesta ware is a style of decor that uses bright, underglaze monochromes, and became popular in the 1930s. Fiesta ware is still produced today. It first became popular in the 1930s, and is often given the median ceramic date of 1940 (Zilmer 1987:9). This decor is found on both whiteware and ironstone.

Galenaware is a decoration type specific to redwares. It was produced from the 1840s to 1900. The glaze gave the redware a particular lustrous quality through a glaze composed of lead sulfide, alumina, and silica.

Lead Glaze is most commonly found on redware. The glaze created a shine to the surface of the ceramic, and could be clear, to brown or black. Brown or black was the result of the addition of manganese to the glaze. Lead glaze was very common and is not a good temporal indicator.

Luster Banded ware is an edge treatment using luster (typically gold colored) on plain or molded wares. It became increasingly common post 1890, and continued to be produced through the 1930s. The median ceramic date for wares which are luster banded is 1910 (Esarey 1982: 186). Luster bands are frequently found on whiteware and ironstone.

Polychrome Handpainting is a decor using several colors to paint designs that were applied underneath the glaze of the ware. Common colors in polychrome were blue, red, and green, often used to make a "sprig" pattern. These were used through the 1890's, and were at their most popular from 1830 to 1860 (Esary 1982: 185, Miller 1987). As this decor was handpainted, research can sometimes identify where the piece was made based on what designs were common with local potters. This decor type was most common on whitewares.

Rockingham/Bennington is a thick brown, mottled glaze, often found on molded wares, most frequently found on yellowware. It was first introduced from England after 1788, and was predominantly found at this time on teapots (Spargo 1926:170). American potters began producing large quantities of this decor in more extensive ware types by 1830. The yellowware body can be cream to bright yellow. The brown glaze was the result of the addition of manganese and sometimes umber to the glaze, formula varying by factory (Spargo 1926:171). The glaze could be applied by dipping, brushing, sponging, stick, or splashing with a paddle. The latter was the most common technique used from 1847 to 1865. This decor type overall was popular from 1840 to 1900.

Salt Glazed wares are created by throwing common salt into the kiln as the ceramic is being fired. It would vaporize and condense of the ware, creating a surface that is shiny, but textured. The color of the vessel reflects the amount of iron present in the clay and the concentration of oxygen in the kiln. This is commonly an exterior treatment, and can be combined with other types of unglazed or glazed interiors (most commonly Albany Slip or Bristol Glaze). Salt glazing is most frequently encountered on stoneware, and became less common after the 1860s (Zilmer 1987:35).

Shell Edge/Rococo is a decoration treatment by where the edge of the ware was molded in a shell pattern, with decor extending inward on the ware from the irregular edge. Most commonly found is shell edge with blue or green underglaze painting along the edge, with the blue toned gray on wares dating pre 1810 (Sussman 1977:106-8). Post 1810, from approximately 1813 to 1834, the molding and painting from the edge was less linear in form, and more abstract, with the blue now a bright, purple-toned hue (Sussman 1977: 108). From approximately 1840 to 1850, the same molding and coloration was popular, but without the scalloping. Post 1830, the expression of this decor became more increasingly a blue or green edge band, and is most frequently encountered post-1850. This decor is frequently found on pearlware and whiteware.

Sponge/Spatter wares have a distinctive surface treatment whereby a sponge was used the daub or spatter paint on the ware prior to glazing. The decor could either cover the entirety of the vessel, or be limited to a border decor. Colors frequently used in this decoration type included blue, green, red, yellow, brown, black, and polychrome. These wares were common from 1830 to 1860. This decor type is commonly found on whiteware.

Tea Leaf decor incorporated a copper luster glaze, and a distinct tea leaf pattern was present in the center of the vessel. Commonly, a brown band of luster followed the rim as well. The popularity of this decoration type was during the 1860s and 1870s, but production continued into the 1890s, and is given a mean ceramic date of 1880 (Kovel 1973:15). This decoration type is distinctive to ironstone.

Transfer Print wares are some of the most common surface treated wares from the nineteenth centuries. Numerous American potters produced transfer-printed wares. The printing plates used in transfer printing were produced in a separate industry from the potters, and designs were frequently sold to numerous potters or copied between companies (Gurujal 1988:16), thus design is not necessarily a reliable indicator on these wares. However, the potter can sometimes be identified using the border patterns and scenes on wares, as these tended to be more potter specific. The process used the engraved plates to print the design on paper, which was then used to transfer the design to ceramic. Early transfer wares at the beginning of the nineteenth century and prior, used thick paper that resulted in heavy lines on the wares. In the beginning of the nineteenth century, the introduction of tissue paper made graduated designs and fine lines possible. Another method transferred designs using oil and a sheet of glue known as a bat, which characteristically used stippled engravings that produced minute dots.

Work by many have produced ranges of dates of popularity for transfer wares based on the color(s) used in the transfer printing (Esary 1982, Miller 1987, McCorvie 1987, Sonderman 1979). The following table is adapted from Stelle (2011) who used the previously cited authors in order to ascertain date ranges for the colors found in transfer printed wares. The “flow” styles, commonly known as flow blue, are easily distinguished by the spread of the ink throughout the background due to the addition of gases to the firing process.

Victorian Majolica was a resurgence of the forms of majolica produced from the sixteenth to the eighteenth century. Rather than tin-enameled earthenware, Victorian Majolica was a heavily molded whiteware employing brightly colored lead glazes. The popularity for this ware began in the 1850s and continued through the early twentieth century (Kovel 1973:6).

Table 1. Temporal Data for Transfer Printed Wares

Type	Maximum Popularity	Production Range	Median Date
Dark Blue	1820-1830	1820-1860	1845
Light Blue	1827-1828	1826-1831	1829
Blue and Painted	---	1840-1860	1850
Red	1829-1839	1829-1850	1840
Brown	1829-1839	1829-1850	1840
Green	1829-1839	1829-1850	1840
Black	---	1830-1850	1840
Purple	1829-1839	1829-1860	1845
Purple and Painted	---	1840-1860	1850
Gray and Painted	---	1840-1860	1850
Red and Green	1832-1838	---	1835
Scenic Flow (Blue or Black)	1840-1849	1840-1860	1850
Flowery Flow	1870-1879	---	1875

Bottle/Jar Glass

European and American bottles were free blown and shaped to the vessel form, or were blown into simple dip molds. Dip molds are single component iron or wooden molds that give the body of the vessel its shape. These molds can only be square or cylindrical with the basal area being smaller or the same width as the shoulder area. Dip molds continued to be used as late as 1860 (Deiss 1981:12-18). Multipart molds having dip molded bodies (Rickett's molds) were produced into the 1920s, however (Jones and Sullivan 1985). To finish the neck of these early bottles, a glass-tipped rod (pontil) was attached to the bottle base to provide a means of holding it. Early types of finishing included fire-polished, flanged, folded, and applied string. All of these finishes persisted until the 1840s to 1870s, when they were replaced by improved methods (Deiss 1981:18-24; Jones and Sullivan 1985; Jones 1971).

English bottle manufacturers used simple two-piece molds to make proprietary medicine bottles since the mid-1700s, and by 1800, American bottle makers were also using two-piece molds. These molds were hinged at the base or shoulder and may be referred to as open and shut molds. Bottles could be shaped in any form, square, round or multi-sided. Consequently, polygonal bottle forms were very popular in the mid-nineteenth century (Deiss 1981:62).

These molds enabled embossed lettering to be put on the fronts, backs, sides, and shoulders of the bottles (Jones and Sullivan 1985) and Gothic-style lettering was the most common style used until ca. 1850 (Deiss 1981:48-49). Liquor flasks made in two-piece molds were introduced ca. 1810 and were very popular by 1830. Embellished with a wide variety of molded or pictorial images, flasks remained popular until after the mid-1800s (Deiss 1981:62-65). Removable plates or panels that could be inserted into the mold was patented in 1867 (Jones and Sullivan 1985). These panels or plates were often embossed with the manufacturers name, product name, and city of manufacture, and could be used to personalize large shipments of bottles. This became popularly used on pharmaceutical and bitters bottles. Two-piece molds were eventually eclipsed by multipart open and shut molds by 1850. These molds are similar to two-piece molds, but have a separate base plate. During the period 1840 to 1860, the two-piece and multi-part open and shut molds were the most popular mold types (Jones and Sullivan 1985). Vessel finishes (lip and necks) could still be hand formed by applying additional glass to the vessel and hand shaping a lip. By the 1820s, lipping shears were being used to shape the inside of the bottle, producing a standardized form known as an applied-tooled finish, which was most common from about 1840 to 1870. Open and shut molds, dip molds, and multipart dip molds were all popularly used molds in the nineteenth century. Another mold, the turn-mold or turn-paste mold was developed and used in France on wine bottles as early as 1860 (Jones and Sullivan 1985). This mold type leaves no mold seams. In America, this mold type was most frequently used for wine and other beverages from 1870 to the 1920s (Jones and Sullivan 1985).

Even though molds are the most often used method to establish the manufacturing date of glass vessels, changes in the glass formula and innovations in overall glass vessel manufacture can aid in establishing chronology. For example, although the soda-lime formula was in use to make moderately clear glass for many centuries, a modified form of the soda-lime formula was developed in 1864 that revolutionized the glass industry in that it was less brittle and could be molded, cut, and engraved easily (Jones and Sullivan 1985). Because of this new formula, decorated and highly colored glass became cheaper and easier to produce, allowing it to be affordable and subsequently popular after the 1870s (Innes 1976; Jones and Sullivan 1985). By 1880, manganese oxide was used in molten glass as a decolorizer. Glass containers made with manganese oxide turn purple or amethyst when exposed to sunlight. Selenium began replacing manganese oxide as a decolorizer by 1915, and the replacement was complete by 1918 (Deiss 1981:78-83). Selenium glass when exposed to ultraviolet rays becomes a straw yellow color.

Another turning point in the glass industry occurred between 1850 and 1860, with the development of a device called the snap case. This implement held the vessel while the neck and lip were finished. No longer was a pontil rod attached to the base of a glass vessel. Other innovations occurred to revolutionize glass production. By the 1870s, finishes incorporated in the mold had become common. This type, involving the reheating and tooling of the finish to eradicate mold seams on the lip, is referred to as the improved-tooled finish. Improvements in annealing ovens also helped to totally fuse the lip to the neck. Bottle lips were no longer distinctly separate bits of glass. Molds with incorporated finishes predominated until the early twentieth century, when automated glass vessel manufacture replaced less efficient processes (Deiss 1981:54-59).

Crown caps (modem soda bottle tops) were invented in the early 1890s. By 1884 and 1892, semi-automatic manufacture of wide and small mouth containers was possible. The only difference between semi-automatic manufacture and automatic manufacture is the way that the melted glass is passed to the machine. In semi-automatic manufacture, the glass is introduced by skilled laborers and in automatic manufacture, the glass is introduced mechanically to the machine. It was not until the perfection of the Owen's machine in 1903 that fully automatic bottle manufacture was possible. This machine leaves a distinct mark on the base of the vessel. By 1917, 50 percent of glass containers were machine-made using this machine (Miller and Sullivan 1984). Vessels made using the Owen's machine are not found in archaeological contexts after 1970 (Miller and Sullivan 1984). Also, during the late nineteenth and early twentieth centuries, semi-automatic machines continued to be used and modified for automatic manufacture through the development of glass feeding devises like the Peeler Paddle Gob Feeder (Miller and Sullivan 1984). Vessels made by semi-automatic machines are indistinguishable from vessels made on other machines (except the Owen's machine). The precision of automatic manufacturing enabled the standardization of continuous thread finishes, and screw caps replaced other forms of non-pressurized sealing.

Vessel types can provide insight into the consumption pattern and economic standing of the inhabitants as well. Bottle types indicate the material they held, from alcohol, to food/condiments, medicine bottles, and toiletry bottles. The type present in features can also denote activity areas across a site. Many bottles and jars were molded with indicators of the specific item they held, along with a glass maker's mark that can indicate location and time period of production. Unlike ceramics which could be passed down through generations, bottles and jars frequently held material that was used relatively quickly, and while glass was recycled, it more frequently was discarded than ceramics. Thus temporal indicators on glassware can provide a narrower time frame of use than ceramics if identifying markers are present. A minimum vessel count will be conducted for the vessel and jar glass recovered from the site, and when ascertainable, will be analyzed by time period and type of material consumed.

Table Glass

The manufacture of glass tableware is a somewhat problematic area. In many cases, discerning the manufacture type is not helpful in answering questions concerning chronology. Processes used to make tableware were used over long periods of time. These processes include free blowing, press molding, optic molding and pattern molding. Most of these methods are still used to lesser degrees today.

Free blowing is still used today to make tableware. Eighteenth and nineteenth century glass was also formed by hand. Usually these pieces are distinctive to specific glass houses and their age can be determined if the manufacturing house can be ascertained. For instance, table glass produced at the Stiegle glass house had a distinctive smoky color and specific stylistic motifs were patented and developed by glass houses for their use.

Although the process of press molding glass had been used to make door knobs and stemware feet, by the late 1820s, press molding hollowware became possible. Pressed glass made in the first few decades of the nineteenth century was often decorated with relief motifs, including classical busts, and a finely stippled or mat background that hid defects in the glass and mold seams. These highly decorated pieces, usually made using leaded glass, reflected light and were aptly referred to as "lacy glass". By the 1850s, improvements in manufacturing eliminated the need to hide defects. By the 1870s, the popularity of pressed glass increased as white, multi-colored, and other new shades of glass became affordable due to improvements in the glass formula (Davis 1967; Deiss 1981:71-76; Innes 1976; McKearin and McKearin 1948). The new glass formula resembled leaded formulas and was used extensively in press-molding after the 1870s. Consequently, press molded, leaded tableware is uncommon on American sites after 1870 (McKearin and McKearin 1948:395).

More elaborate combinations of decoration types and color became popular in press molded table glass after 1870 (Innes 1976). Carnival glass, for example, often given away as prizes at carnivals and fairs, was made by coating pressed glass with metallic paint to simulate more-expensive wares. Carnival glass was produced from the late 1890s to the 1930s (Deiss 1981:86).

Optic molding was used to make tableware during the eighteenth century. Optic molding, never a popular form of manufacture, was eclipsed by press molding early in the nineteenth century. By the late nineteenth century, optic molding had a resurgence in popularity. This molding type was used predominantly for tableware, specifically tumblers. It is a distinctive molding style involving a two-stage process. The vessel is formed by blowing glass into a part-size mold. This gives the vessel a rudimentary shape and decoration on the interior of the vessel. The vessel is then placed in another mold that provides the final shape to the vessel. This type of molding is easy to identify as the interior of the vessel will often have a totally different decoration than the exterior of the vessel.

The process of pattern molding has been used for several centuries but was most popular in the late eighteenth and early to mid-nineteenth centuries (Jones and Sullivan 1985). This method involves two stages. Glass is blown into a mold that imparts the rudimentary shape and decoration to the vessel. Usually the decorations are simple ribs, panels, and stars. The partially blown vessel is then removed from the parison and its final shape is free blown. The enlargement of the vessel causes the decorations to become very diffuse.

Although these methods of manufacture alone are not useful in determining chronology, decorative style can be used to temporally place a vessel. Decorative styles changed over time in table glass. For instance, after 1870 naturalistic designs featuring animals and flowers became popular eclipsing the geometric motifs of the earlier part of the nineteenth century (Innes 1976).

Table glass type can be a good indicator of economic status or level of gentility of the occupants, as well as be indicative of cultural norms. Tumblers were inexpensive in the nineteenth century, and were used for many types of drinks. Sometimes they were even referred to as a "water glass" (Murdock 1998, Shotwell 2002). Stemware by comparison was frequently associated with a higher status household that may have entertained. Stemware would have been more common to drinking wine, sherry, or cordials (Andrews and Mullins 1989; McBride et al. 2003). Per Hooker (1981), wine consumption during the nineteenth century in America was limited predominantly to the wealthy, with very few average Americans partaking.

Other Kitchen

This category includes all kitchen artifacts not accommodated by the above categories, including utensils, cooking vessels, metal cans, metal can pull-tabs, glass bottle crown caps, metal foil, and other wrapping materials, etc. Aluminum foil was developed in 1913, and was shortly thereafter used for cigarette pack linings. Household wrap, however, was not widely used until the 1940s, when Reynold's Wrap was introduced (Farin 1969:90). Crown caps were patented in 1892, but complete transition to its use was slow (Leif 1965:17; Riley 1958:101-102). Cans with pull-tabs were introduced in 1962, and had become common by 1965 (Wright 1976:22-23).

Architecture Group

Nails

As with many other materials found on archaeological sites, nails have undergone major changes due to the impact of industrialization. Nails can be used to identify chronology on sites using the manufacturing process (wrought, cut, wire) and sometimes their size (Nelson 1968). Nail shape and size was determined by function, and several have specific forms for those functions (e.g. masonry, shingle, boat, slating). Sizes of nails were well established in the nineteenth century, but they were not necessarily universal (Ross 1976). Using modern penny-sizing charts to measure nails found at a site will not always equate to how the nail was referred to historically, but it allows a uniform method for inter and intra site comparison of nails that can produce significant data regarding the activities occurring at a site. Penny sizes and specific nail types will be recorded for all nails when possible.

Wrought nails are the earliest iron nails, and were often made locally by a smith or forge. These nails are usually square or rectangular in cross-section, and taper on all sides towards the point. Wrought nails were in common use through the 1830s and 1840s, when they began to be replaced by cheaper cut nails.

Cut nails were manufactured from a sheet of steel. These nails were stamped out, and tend to taper on only two sides. Early cut nails have a constricted shank below the head, and were first produced in the late 1790s. Later cut nails lack this constriction and were in common use by the late 1830s. Cut nails are still manufactured today for special purposes.

Wire nails are manufactured by cutting hardened steel wire. These nails are round in cross-section. They became common in usage around the 1880s, and are still the primary form manufactured today (Nelson 1968).

Window Glass

The thickness of window glass in a large assemblage can be a useful chronological indicator (Ball 1983, McBride and Sharp 1991, Moir 1987, Roenke 1978). During the eighteenth century, flat glass appropriate for windows was cut from a large disk of glass which was then cut into panes. By the early nineteenth century, glass manufacturers produced broad glass which may be distinguished by a slight thickening toward the plate margin, one surface slightly more opaque than the other, and bubbles in the glass usually distorted in straight lines. In the late nineteenth century, machine-made glass, characterized by a uniform thickness, with occasional wavy lines of bubbles, was widely produced. In the early twentieth century, production of sheet pane glass eclipsed other manufacturing processes.

Window glass thickness can be a useful indicator particularly when multiple structures appear to have been located at one site. However, ceramic as a chronological indicator is more reliable. Several methods are currently prominent in the literature. The first is Moir's method (Moir 1987). Moir has several restrictions to his analyses. First, he stresses reducing the sample size to only that which can reasonably be determined to be window glass by testing for even mild curvature. The second is that Moir excludes window glass from upper-class structures since they were likely to have larger windows that had more expensive, and thicker, panes of glass. The sites Moir used to develop his formula were all regionally from the Ohio Valley (Weiland 2009). To determine chronology with window glass, the average thickness of one concentration must first be established. The thickness is most accurately measured with calipers. This average thickness can then be inserted into Moir's formula (Moir 1987) to determine an approximate date. Moir's formula is:

[Initial Date = (84.22 x average thickness) + 1712.7]

The Schoen method was established using data from sites in the Plains regions (Schoen 1990). His method was based on Moir's method, and has a further restriction of only using samples that have an edge longer than one inch. Schoen's formula for window glass analysis is:

[Initial Date = 1725.7 + (1713.0 x average thickness)]

Earlier methods used in window glass analysis relied more heavily on modes that were then compared to a dating scale (Roenke 1978, Chance and Chance 1976, Walker 1971).

For Sites 15BE688, 15BE694, and 15BE697, the window glass analysis will be bolstered by data collections from multiple sites, from the same region, that were occupied during the same time. The problematic aspect of most the Moir and the Schoen methods are that they rely on an average in order to establish initial occupation through a regression model. This requires knowledge that the material came from a residence, and the assumption that window replacement was not common enough to skew the final data. It also does not accommodate for the introduction of a replacement residence, replacement windows, or outbuildings constructed at later dates.

As the material at these three sites is within undisturbed, in situ contexts, the material should be analyzed by provenience in addition to site wide assessment. In order to tease out outlier data from replacement panes, or areas that represent more than one building episode, it is recommended that the data first be analyzed using a histogram to establish whether there are distinct groupings that might represent different building periods. As Moir's method focused on sites within the Ohio Valley, it is recommended that his regression method be used rather than Schoen's. However, the evaluation of window glass at these three sites provides a unique opportunity to compare and contrast window glass in the region. Thus far, the time frame of construction seems the most narrowly defined for Site 15BE694, with Site 15BE688 having the least narrowed time frame of construction. Inter-site comparisons could provide a beneficial body of data that could allow for more detailed window glass analysis on other sites within the region.

Bricks

The manufacturing of bricks changed from locally made, hand-crafted varieties to machine-produced in the nineteenth century. With this chronological information in mind, bricks are classified according to method of manufacture (Gurke 1987). The fragmentary nature of most recovered bricks at archaeological sites often precludes an accurate assessment of age. Due to the vast quantities of brick likely to be recovered from the sites, most will be counted and weighed in the field, by manufacture type when possible. Samples of any diagnostic brick will be returned to the lab for analysis.

Hardware and Other Building Materials

The hardware groups includes metal items such as nuts, bolts, hinges, window sash weights, locks, knobs, screws, staples, hooks, bands, braces, tacks, insulators, wire, and other unidentified architectural metal hardware (Priess 1971, 2000). The other building materials category includes items made of various materials, including mortar, plaster, roofing materials, buildings stone, glass and ceramic insulators, and ceramic tiles. Due to the vast quantities of stone and mortar likely to be recovered from the sites, most will be counted and weighed in the field, by manufacture type when possible.

Small Finds

This category encompasses several functional groups: Furniture, Arms, Clothing, Personal, Transportation, Job/Activity, Fuel and Other. The artifacts typically recovered in these categories are either sparse in number, poor chronological indicators, or vary so widely that only once an artifact is recovered it can be useful to research it for chronology (e.g. the manufacturing dates for a toy), economic indicators (e.g. jewelry), or trade patterns.

Furniture Group

A variety of artifacts associated with furnishings and household fixtures are often recovered in small numbers from historic sites. Examples of these include lamp globe or chimney parts, mirror glass, faucet parts, fireplace equipment, clock parts, drawer pulls, flower pots and similar items (Thuro 1976). Furniture hardware and other materials can be dated by style and method of manufacture, but are not good chronological indicators of a site's age due to the fact that this only reveals the date at which the furniture was originally made. However, they can be excellent indicators of activity areas and of economic status of the site's occupants.

Arms Group

This category includes firearm parts, lead balls or bullets, cartridge casings, percussion caps, bullet molds, lead sprue, powder horn parts, and gunflints (Brussard 1993). Bullet shells and shotgun shells can be excellent temporal indicators, as they were frequently stamped with a make and model. Numerous resources exist to assist in dating these artifacts by their stamps.

Clothing Group

This category of artifacts consists of artifacts associated with clothing, such as buttons, collar studs, buckles, shoe leather, irons, eyelets, garter snaps, thimbles, straight and safety pins, and hooks and eyes (Luscomb 1967). The presence of clothing items in an assemblage can aid in discussing activities that might have occurred at a site, as well as discussions of lifestyle. Clothing items can be indicators of time frames as certain styles and manufacturing techniques were particular to specific times.

Personal Group

This category includes objects typically reserved for one person's exclusive use, which often could be carried in a pocket or purse, such as smoking pipes, watches, clasp knives, gaming pieces, toys, jewelry, combs and brushes, coins, etc. (Bradley 2000). Items in this category are often useful in identifying activity areas and temporal ranges.

Transportation Group

Artifacts assigned to this category include those associated with any form of wheeled transport, and those associated with horse, mule or ox harnessing and shoeing (Light 2000). Hand tools are also included in this category.

Job/Activity Group

This category includes items associated with any type of job or activity that occurs on a site such as tools associated with agricultural activities, woodworking, iron smithing, and general farm maintenance.

Fuel Group

This category includes items such as coal, coal cinders, ash, slag, and charcoal. Coal was adopted as a primary fuel in the middle to late nineteenth century, prior to which firewood and charcoal were used both domestically and commercially as an energy source.

Other

This category includes all materials that are not readily assignable to a major group. Items in this category include, for example, unidentified rusted metal artifacts and fragments of synthetic materials such as plastic, etc.

Faunal/Zooarchaeological Analysis

The primary goal of the faunal analysis of materials from Sites 15BE688, 15BE694, and 15BE697 is to establish what animals the inhabitants used as livestock, used as work animals, and purchased rather than raised. The first goal in this analysis will be to identifying the taxa present, and establishing which samples are likely present as a result of human practices and which animals are an incidental presence. This separation of materials into these categories will be based both on taxa and on provenience. While small rodent remains may be incidental, they can also be indicative of the storage of harvested agricultural crops.

In order to ascertain what taxa are indicative of the human occupation, the sampling strategy will include all faunal remains recovered at the sites. This will allow comparison of information both inter and intra site for analysis. The primary data that will be collected for the faunal material will include the elements represented, taxonomic identification, specimen count, modifications and pathologies, anatomical features of age and sex, measurements, and specimen weight. Some of these attributes may not be determinable from the sample, and will be noted as undetermined in the analysis. Element portions will be designated as whole, lateral, medial, anterior, posterior, proximal, distal, or shaft. The taxa of the specimen will be carefully evaluated, and only designated if the determination is conclusive. If any inconclusivity is present during identification, a specimen may be designated as a potential taxa, but will be treated separately from conclusive taxa in analyses.

Both the number of identified specimens and the minimum number of individuals will be established using elements identified. This will allow for more accurate comparison of quantity of taxa present at the site as opposed to a count of all faunal material recovered. The characteristic of greatest interest in larger mammal bones will be whether or not there are signs of butchering present. If possible to identify the method of butchering, this will be denoted during analysis as well (e.g.. cut, scraped, hacked).

The primary goal in the analyses of the faunal material recovered from these sites is to establish how the human occupants used or acquired the animals. The analyses will focus on establishing livestock, work animals, and purchased cuts of meat as a means of determining subsistence practices (e.g. raising their own food), relations with other inhabitants nearby (e.g. purchasing cuts that are not part of the person livestock), relative economic standing (e.g. whether purchased cuts or livestock were considered expensive), and cultural heritage (e.g. whether the livestock practices reflect known patterns of subsistence linked to specific groups of people). The provenience will be considered in these analyses to determine if the subsistence usage of a taxa was tied to seasonality, whether there were designated butchering areas on site, and location of cooking activities.

Once this analysis is complete, a comparison will be established between the sites and with other previously studied sites in order to draw conclusions regarding the inhabitants of the sites. In order to establish the amount a taxa contributed to the subsistence of the inhabitants, the food utility index (FUI) will be established based on the minimum number of specimens (Metcalfe and Jones 1988). In conjunction with other analyses (e.g. ceramic), the faunal analysis will help present a more detailed picture of lifeways during the time periods these sites were inhabited.

Flotation Sample Collection Methodology and Archeobotanical Analysis

As has been previously stated, at least three liters from each cultural feature will ideally be collected for flotation. Upon inspection of all field forms and notes, the flotation samples will be evaluated and prioritized. At that time, decisions will be made as to which samples rated high, moderate, or low analytical priority. Any soil sample not submitted for flotation will be screened through 1/4 inch mesh and all artifacts will be collected.

Environment & Archaeology, LLC has contacted Justine McKnight of Archeobotanical Consultant, LLC regarding the processing of flotation samples for Sites 15BE688, 15BE694, and 15BE697. Ms. McKnight provided the following sampling methodology for the fieldwork, and the methodology for the archeobotanical analysis.

Recommended Protocols for Flotation Sample Collection and Preparation

Goals

1) Maintain clear labeling;
2) Prevent contamination;
3) Strive for consistency;
4) Record details.

Soil Sampling Field Procedures

The following guidelines will help maximize archeobotanical recovery and standardize the process.

- A minimum volume of soil is not always possible, strive for a minimum of 2 liters, aim for 5-10 liters if possible.
- Soil samples should be taken from UNSCREENED soil.

- Soil samples should be double bagged.
- Sample should be labeled with a minimum of two labels:
    1) an interior tag using a standardized form;
    2) an exterior tie tag or written on the bag exterior with Sharpie marker.
- Prior to long-term storage, soil samples should be air-dried.
- Consider securing non-cultural control samples (this helps to assess seed rain and charcoal presence from forest fire).
- When shipping samples, use plenty of packing material and consider double boxing to prevent bag breakage or damage.

<u>Flotation and Archeobotanical Methodology</u>

Flotation samples will be thoroughly dried and individually processed using a Flote-Tech water flotation system equipped with 0.325mm fine fraction and 1.0mm coarse fraction screens. The Flote-Tech system is a multi-modal flotation system which facilitates the separation and recovery of plant materials from the soil matrix via agitation in water. Processing will result in two (heavy and light) or three (heavy, medium and light) fractions. Floted portions will be air dried.

Recovered flotation fractions will be passed through geologic sieves ranging from 0.5 to 4 millimeters in size. Material 2 millimeters or greater will be examined with a binocular microscope under low magnification (10X to 40X). Non-botanical and non-carbonized plant remains will be generally described. Carbonized plant remains will be sorted into material categories (wood, seed, nutshell, cultigen, et cetera.). The less than 2 millimeter fraction will be examined under low magnification and the remains of seeds and cultivated plants will be removed for analysis. Material less than 0.5 millimeters will also be scanned for the remains of seeds and cultivated plants. Each category of vegetative material will be quantified by weight and fragment count.

Identifications will be attempted on all seed, nut, crop plant remains and miscellaneous plant parts recovered, and on a sub-sample of twenty randomly selected wood fragments from each sample, in accordance with standard practice (Pearsall 2000). Each taxon will be individually packaged and labeled. All identifications will be made under low magnification (10X to 40X) with the aid of standard texts (Edlin 1969; Kozlowski 1972; Martin and Barkely 1961; Panshin and deZeeuw 1980) and checked against plant specimens from a modern reference collection representative of the flora of the project area. Identifications of all classes of botanical remains will be made to the genus level when possible, to the family level when limited diagnostic morphology is available, and to the species level only when the assignment can be made with absolute certainty. Handling and packaging of materials will be done according to archival standards. All analyses will be consistent with current professional standards for the analysis of botanical material from archaeological contexts (Pearsall 2000). All work will be conducted at the archeobotanical laboratory of Justine McKnight in Severna Park, Maryland.

Analysis of the archeobotanical samples will result in the composition of technical reports comprehensively summarizing the analytical methods used, the results of analysis, and an interpretation of the significance of these results archaeologically, culturally and within a landscape context. Photographs of key plant specimens will be included in the reports. Comparison of the macro-botanical assemblages with other appropriate data sets will be made. Electronic report will be delivered within 90 days of receipt of samples and *Environment & Archaeology, LLC's* order to proceed.

REPORTING METHODS

Following the completion of the Phase III Data Recovery fieldwork, a Management Summary will be submitted to the FAA and the KHC. This Management Summary will detail the level of excavation completed for the Data Recovery, and contain a preliminary analysis of the findings. The KHC will be asked to provide comment on whether the level of field work completed is adequate for the mitigation of adverse effects.

The final report will provide an appropriate context for the analysis and interpretation of artifacts and features, research orientation, description of the fieldwork, and analysis of the artifacts. The final Phase III Data Recovery Report for Sites 15BE688, 15BE694, and 15BE697 will include further analyses of artifacts gathered during the previous Phase II investigations, which will be incorporated into the whole. The final report will be submitted to the FAA and KHC within one and one-half years following acceptance of the Management Summary. Prior to the final report, draft reports may be submitted to the FAA and KHC for comment.

The Phase III report will be prepared according to the guidelines published in the *Specifications for Conducting Fieldwork and Preparing Cultural Resource Assessment Reports* (KHC 2006) and the *Council reporting Standards in Treatment of Archaeological Properties: A Handbook*, dated 1980. The implementation and reporting of the results of the Data Recovery Plan will be conducted by a professional archaeologist meeting the federal qualifications for an archaeologist as stipulated in 36 CFR 61, Appendix A, and in the Federal Register, Volume 48, Number 190, dated September 30, 1983 and who is approved by the KHC.

Post-Review Discoveries

Should previously unidentified significant archaeological properties or unanticipated effects to historic properties be discovered, the KHC will immediately be notified and consulted. The consultation with the KHC will determine how to record, document, and evaluate the National Register of Historic Places eligibility of the property and the project's effects on the property, and, if eligible, formulate a plan for resolving any effects.

Should human remains unexpectedly be encountered during implementation of the Data Recovery Plan, such person or persons encountering the human remains, and before resuming work, shall make a reasonable effort to refrain from disturbing or removing the human remains, protect the exposed portions of the human remains from inclement weather and vandalism, and immediately notify KCAB personnel. KCAB will notify the County Sheriff, the County Coroner, the FAA and the KHC. If the remains are not subject to a criminal investigation by local, state or federal authorities, the KHC's Policy Statement on treatment of Human Remains (1997) shall be used as guidance. Notwithstanding such guidance, all applicable state and federal laws and regulations governing the discovery and disposition of human remains shall be followed. *Environment & Archaeology, LLC*'s Unanticipated Discovery Plan will be implemented and followed. All work in the area will stop immediately and the remains will be protected. No removal of human remains will be initiated unless required by law or approved through the Section 106 consultation process. A copy of the Unanticipated Discovery Plan is included in Appendix A.

Curation

The artifacts, photographs, field notes, and other data collected for this project will be stored with *Environment & Archaeology, LLC* until the completion of the project. Upon acceptance of the reporting, they will be curated at an approved facility. Per Section VIII of the KHC's *Specifications for Conducting Fieldwork and Preparing Cultural Resource Assessment Reports,* all curated material will be curated at a facility approved by the KHC. It is recommended that the University of Kentucky's Webb Museum be contacted as the potential curational facility. Once approval is obtained to proceed with Phase III Investigations, *Environment & Archaeology, LLC* will submit a letter to the Web Museum to request the curation of materials per their *Guidelines for Archaeological Contractors* (Webb Museum 2015). The artifacts selected for curation versus discard will follow the guidance outlined by *Discarding Historic Artifacts: Guidance for Consultants* (KHC n.d.).

Public Interpretation Program

The KCAB will be responsible for the dissemination of information to the public within two years of the acceptance of the final report. The KCAB will notify the FAA and KHC prior to any presentations that are offered in furtherance of such dissemination and will make a reasonable number of copies of presentations or displays available to the FAA and KHC. The nature of the dissemination of information to the public will be outlined in the Memorandum of Agreement (MOA) regarding these sites, in an agreement between the KHC, FAA, and KCAB.

Personnel

All personnel working on this project will meet the minimum qualifications set forth in the *Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation.* Resumes are provided in Appendix B. The following personnel are proposed to perform the work:

Courtney Stoll, M.A., R.P.A., Principal Investigator, *Environment & Archaeology, LLC*
Luke Erickson, M.A., R.P.A., Principal Investigator, *Environment & Archaeology, LLC*
R. Vincent Whitlatch, Senior Field Director, *Environment & Archaeology, LLC*
Michael Shaw, Field Director, *Environment & Archaeology, LLC*

PHASE III DATA RECOVERY SUMMARIES

Research Question Summary

- All sites were occupied during the Postbellum Industrialism Period (1866-1914), allowing for comparison of lifeways between the three sites during one time period.
- The spatial analyses of these rural farmsteads will be compared to other studies of rural farmsteads to establish whether they adhere to any recognized categories of spatial organization (e.g. Upland South).
- Artifacts will be analyzed to ascertain whether they can be attributed to specific individuals or classes of individuals.
- Many known inhabitants were descendants of the Germanna Colony. Analysis will be performed to ascertain whether consumption or organizational patterns reflect known patterns of Germanna Colony peoples, or if new patterns that can be attributed to Germanna Colony ancestry emerge.
- If other ethnic groups are established as potential inhabitants, the material remains will be studied to establish if they reflect specific lifeways of those groups.
- Socio-economic data regarding consumption patterns will be analyzed to ascertain whether they changed over time, were different between sites, and what they patterns say about the period of occupation. Data will be compared to other known socio-economic studies of rural farmsteads.
- The subsistence strategies at the sites will be analyzed, as will any contribution the inhabitants had to the local/regional economies through agriculture, livestock, or craft goods.
- Previous research indicates that extensive material will be identified regarding the main residences. This material will be analyzed to determine if the residence construction methods and other attributes are reflective of a particular period of occupation or cultural background.

Data Recovery Summary

- Historic research will be conducted utilizing deed research, will and probate records, census research, local histories, and local informants. The OSA will be contacted to establish what existing reports and other material are available that are appropriate for background/context and comparative analysis.
- Field Methods
    - Excavate all features in entirety excepting those that are likely to have repetitive data-will be discussed on case by case basis with KHC.
    - Site specific methods
        - 15BE688-Close-Interval Shovel Testing and Plowzone Stripping
        - 15BE694-Close-Interval Shovel Testing and Hand Excavated Test Units
        - 15BE697-Plowzone Stripping
- Use previously established datums at sites for reference, and use GPS technology for further mapping.

- Use sampling strategies in the field for non-diagnostic material that does not need to be evaluated in the lab.

Laboratory and Analytical Summary

- General Considerations
    - Sample size will be evaluated for feasibility of analysis.
    - Appropriate analytical attributes will be established and taken for each artifact category.
    - Data visualization methods will be used to establish appropriate statistical methods.
    - All Phase II artifacts collected will be incorporated into all analyses.
- Non-diagnostic, large building material, will be cleaned and weighed in the field. Diagnostic traits if present will be recorded and samples returned to the lab.
- All artifacts returned to the lab will be cleaned and identified.
- Classification, functional, and chronological analyses will be completed of all artifacts.
- Socio-economic analyses will be performed on appropriate artifact categories. For ceramics, vessel forms, ware types, and decoration types will be evaluated for cultural styles of dining, tendency towards gentility, and economic standing.
- Architectural material will be analyzed for period of construction predominantly via nails and window glass.
- All faunal remains will be analyzed to establish taxa, element present, minimum number of individuals, and cultural modification (e.g. butchering methods). Faunal material will be used to establish subsistence patterns (e.g. food utility index), livestock present, seasonality of consumption, and activity areas.
- Flotation samples will be taken of features and processed by Archeobotanical Consultant, LLC. After flotation, plant materials will be sorted and identified by taxon. This material will be used to establish agricultural patterns, consumption patterns, and activity areas.

Reporting Summary

- A Management Summary for each site will be submitted to the FAA and KHC for review to establish if the Data Recovery efforts have satisfied the requirements of the MOA.
- A Final Phase III Data Recovery Report will be submitted to the FAA and KHC within one and one-half years of the acceptance of the Management Summary. Draft reports may be submitted prior to final submission for comment.
- Updated Site Forms will be submitted to the OSA for all sites.
- Any findings outside of the current understood site boundaries will be reported to the KHC and proper coordination will proceed to address these findings.
- All diagnostic material recovered from the NRHP eligible sites will be curated with the Webb Museum of the University of Kentucky.
- A Public Interpretation Program will be disseminated within two years of the acceptance of the final report. The nature of the dissemination will be outlined in the MOA.

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1979 *Archaeological Explorations of the Jesse Lindall and Twiss Hill Historic Sites St. Clair County Illinois.* M.S. thesis. Illinois State University. Normal, Illinois.

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1977 *Method and Theory in Historical Archaeology*. Academic Press, New York.

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1987 *Consumer Choice in Historical Archaeology*. Plenum Press, New York.

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2011 *An Archaeological Guide to Historic Artifacts in the Upper Sangamon Basin, Central Illinois., U.S.A.* Parkland College: Champaign, IL.

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2018 *Management Summary-Phase II Investigations of Site 15BE694 for the Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project in Boone County, Kentucky*. Prepared by *Environment & Archaeology, LLC.*

2018 *Management Summary-Phase II Investigations of Site 15BE697 for the Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project in Boone County, Kentucky*. Prepared by *Environment & Archaeology, LLC.*

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1976 *Oil Lamps: The Kerosene Era in North America.* Wallace-Homestead Book Co., Des Moines, Iowa.

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2011 *Quantitative Analysis in Archaeology*. Wiley-Blackwell: West Sussex, UK.

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2017 *Phase I Archaeological Survey of Two Tracts Totaling Approximately 300 Acres for a Proposed Development at the Cincinnati/Northern Kentucky International Airport, Boone County, Kentucky.* Prepared for the Kenton County Airport Board.

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1971 *Excavation of the Arkansas Post Branch of the Bank of the State of Arkansas: Arkansas Post National Memorial, Arkansas.* Manuscript, Southeast Archaeological Center. National Park Service: Tallahassee, FL.

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1999 Examining Gender, Class, and Ethnicity in Nineteenth-Century New York City. *Historical Archaeology* 33(1):102-117.

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1976 *The Beer Can.* Simon and Schuster, New York.

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1987 A Socioeconomic Indexing of 19th Century Illinois Farmsteads. Manuscript on file. Department of Anthropology. University of Illinois. Urbana, Illinois.

APPENDIX A-

Unanticipated Discovery Plan

UNANTICIPATED DISCOVERY PLAN

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UNANTICIPATED DISCOVERY PLAN

1. UNANTICIPATED DISCOVERY PLAN – CULTURAL RESOURCE SITES

In order to minimize the potential for the accidental discovery of cultural resources, Kenton County Airport Board contracted to have a detailed archaeological reconnaissance of the proposed Project area conducted. To ensure that the Company maintains full and complete compliance with all Federal and state regulations concerning the protection of cultural resources, an Unanticipated Discovery Plan has been prepared for the Project.

All inspectors have the responsibility to monitor the construction sites for potential archaeological remains throughout construction. If, during the course of construction, potential cultural resource remains are identified, the EI will immediately stop tasks in the vicinity of the potential find and make a stop work recommendations to the Project Lead. Should stop work authority be deemed necessary, the Company will notify the appropriate State Historic Preservation Office ("SHPO") and the Kenton County Airport Board (KCAB), who will contact a state-approved archaeological consultant to survey the site and provide an immediate verbal report to the Company, SHPO, and KCAB. All parties will continue to consult with the appropriate SHPO's office as per the requirements of Section 106 of the *National Historic Preservation Act* ("NHPA"). SHPO contact(s) are listed below:

Chris Gun, Kentucky Heritage Council
410 High Street
Frankfort, KY 40601
(502) 892-3615
Chris.Gunn@ky.gov

If the unanticipated discovery is determined to be ineligible for inclusion in the *National Register*, the Company will proceed with the Project following written concurrence from the SHPO and approval from the KCAB and the Federal Aviation Administration (FAA). If the site is determined to be potentially eligible for inclusion in the *National Register*, additional work such as a Determination of Eligibility or Data Recovery will be performed as required/approved by the SHPO, KCAB, and the FAA. Further work at the site will be suspended until all criteria of Section 106 of the NHPA and other related Federal and state regulations have been successfully completed.

In the event that human remains are discovered during construction, the Project Lead will immediately halt work and notify the local law enforcement agency and medical examiner. If remains are found not to be of recent origin, the Company will contact the appropriate SHPO and begin consultation to ensure that all provisions of the *Native American Grave Protection and Repatriation Act* are followed. Provision for security to protect suspected burials from vandalism must be taken. The Company will notify the SHPO, KCAB, and the FAA of the situation and will continue further consultation.

If the unanticipated discovery of human remains is determined by the SHPO, KCAB, and the FAA to be ineligible for inclusion in the *National Register*, the Company will proceed with coordinating the proper removal of the remains through cooperation from the local police, medical examiner, SHPO, KCAB, and the FAA. Only after the human remains have been properly removed from the site should construction be resumed.

Under no circumstances should human remains be removed from the site without completing all coordination processes with the local police, medical examiner, the SHPO, Native American representatives, as appropriate, KCAB, and the FAA. Further work at the site will be suspended until all criteria of Section 106 of the NHPA and other related state and Federal regulations have been successfully completed.

2. INADVERTENT DISTURBANCE OUTSIDE OF WORKSPACE

The Company will work to restrict all activities to the permitted construction ROW or workspace. However, under extreme circumstances, such as while working on steep slopes in slippery conditions, and while grading on steep side hills, some inadvertent off-ROW or workspace disturbance may occur. In the event that inadvertent off-ROW or workspace disturbance occurs, the following procedures will be implemented:

- The operator or foreman will immediately report the occurrence to a Project Lead, who will notify the appropriate Company personnel.
- The conditions which caused the disturbance will be evaluated, and the Company, KCAB, and the FAA will determine whether work at the site can continue under those conditions.
- The nature of the off-ROW or workspace disturbance will be evaluated and corrective actions taken as deemed necessary by the Project Lead, KCAB, and the FAA. Such measures may include immediate recontouring and seeding of the disturbed site, and/or installation of erosion control devices to contain the disturbance.
- The Company will notify the appropriate landowner and agencies of the disturbance.

APPENDIX B-

Curriculum Vitae

Courtney Stoll, M.A., R.P.A.
Technical Director-CRM
Archaeology Principal Investigator, Architectural Historian,
GIS Specialist, and Primary IT Personnel

EDUCATION

- Community Advisor for University of Cincinnati Graduate Student Team "Transi+ion" for Urban Land Institute, Hines Competition, Team Honorable Mention 2018
- Graduate Historic Preservation Certificate, University of Cincinnati, 2017
- M.A., Anthropology, Temple University, 2008
- B.A., Anthropology, University of Kentucky, 2003

ARCHAEOLOGY EMPLOYMENT HISTORY

Wilbur Smith Associates, CRM firm	2001-2004
Archaeology Lab Monitor and Primary Editor	
Teaching Assistant-India, Temple University	Summer 2006
Teaching Assistant-Temple University Anthropology	Fall 2006
Temple University Archaeological Department	
Phase III Field Work	May 2007-June 2007
Environment & Archaeology, LLC, CRM firm	August 2008-Current
Archaeology Principal Investigator, Architectural Historian Author, GIS Specialist, and Primary IT Personnel	

SEMINARS/TRAINING:

- 2017 TransCanada HSE Field Orientation: External Contractors
- 2017 ODOT Office of Environmental Services Section 106 Training
- 2017 OPEC Midstream Training
- 2016 Kinder Morgan Safety Orientation & Manual Review Training and Testing.
- 2015 TransCanada Health, Safety and Environment Orientation and Testing.
- 2013 Completed the *Federal Energy Regulatory Commission Environmental Review and Compliance for Natural Gas Facilities Seminar.* February 26-28, Orlando, FL. Presented by the Department of Energy Federal Energy Regulatory Commission.
- 2012 Completed the Supplement to the Safety and Health Program.
- 2011 Completed the *Section 106 Advanced Seminar*. September 15, Nashville, TN. Presented by the Advisory Council on Historic Preservation.

PROFESSIONAL EXPERIENCE

Ms. Stoll is responsible for the analysis of artifacts in the archaeology lab and also collates information from literature reviews, client data, research, and analysis in order to reach conclusions and recommendations after archaeological surveys. This information is then compiled into reports for the client and local SHPOs. Preparation of site forms for submittal and the analysis of artifacts and the production of reports for both large and small scale historic and prehistoric sites in the Southeast, Northeast, and Midwest.

Ms. Stoll has been confirmed since 2011 by the Pennsylvania, West Virginia, Ohio, Tennessee, Illinois, Arkansas, Mississippi, Missouri and Alabama SHPO's as meeting the Secretary of the Interior's guidelines for acting as Principal Investigator, and became a member of the Register of Professional Archaeologists in 2014. She has been confirmed as meeting the Secretary of Interior's guidelines for acting as a Lead Architectural Historian in Ohio. She has a total of ten years experience in a supervisory capacity, with approximately equal experience in both prehistoric and historic archaeological investigations. She is one of the primary processors of GIS data for and from archaeological, historic structure, and biological field projects.

Ms. Stoll has authored several Architectural Surveys in conjunction with a federally recognized Architectural Historian, and has completed the Graduate Certificate in Historic Preservation at the University of Cincinnati in order to meet the Secretary of the Interior's Qualifications for becoming an Architectural Historian.

In all projects in which Ms. Stoll is listed as Principal Investigator or Primary Author, all analysis of artifacts, determination of site boundaries and eligibility, historical research, writing, and GIS mapping were conducted by Ms. Stoll. Ms. Stoll's projects have included:

PROJECTS:

2018

Stoll, Courtney (Principal Investigator)

2018 *Phase I Cultural Resource Report for the Columbia Gulf Transmission TN Class Changes Project, Macon County, Tennessee.* Submitted to Columbia Gulf Transmission.

Stoll, Courtney (Primary Author)

2018 *Phase I Cultural Resources Survey for the Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Air Cargo Hub Additions Project in Boone County, Kentucky.* Prepared for Kenton County Airport Board.

2018 *Phase II Eligibility Testing Plan for Sites 15Be688, 15Be694, 15Be697, 15Be708, 15Be709, and 15Be710, and Scope of Work for Historic Cemeteries at Sites 15Be692, 15Be703, and 15Be714 at the Air Cargo Hub Additions Project at the Cincinnati/Northern Kentucky International Airport, Boone County, Kentucky.* Prepared for the Kenton County Airport Board.

Crider, Andrea and Courtney Stoll (Principal Investigators)

2018 *Addendum Phase I Cultural Resource Report for the Statoil Marty Pad Project, Monroe County, Ohio.* Prepared for Statoil USA OnShore Properties.

2017

Stoll, Courtney (GIS Mapping)

2017 Dominion Transmission, Inc. PL-1 AC Mitigation in Pennsylvania, Maryland, and Virginia.

2017 KLF Risberg Project, Ashtabula County, OH and Erie County, PA.

2017 Tennessee Gas Pipeline Company, LLC, 2016 MLV 72-1 Arthur Byrd Road Exposed Pipe

Remediation Project, McNairy County, Tennessee.

2017 Lemaster Substation Project and Transmission line Reroutes, Athens County, OH.

2017 Dominion Transmission, Inc. DEOTC and Springside Towers, Summit County, Ohio.

2017 Dominion Transmission, Inc. West Virginia M&R Station Mapping for: Littleton, Peora, Harmony, Troy, Sayres, Alfred, Westover, Philip, Tonkin, Hill Junction, Route 31, Rockport, Tygert, Big Elm, Ashton, Elizabeth, Williamstown, Horseneck, SRC Wellington, Davis, Mountwood, Underwood, Pierpoint, Schultz, Rosedale, and Waverly Projects.

2017 EQT West Virginia mapping for Big 464, Big 467, HAR 10 Projects.

2017 *ANR Pipeline Company Mapping for the MP 126.5 and MP 129.9 Projects in Ford and Kiowa Counties, Kansas.*

2017 *Walton Industrial Park Project Area Phase II Investigations, Kenton County, Kentucky.*

2017 *Natural Resource Conservation Service Gill WRP in Carlisle County, Kentucky.*

2017 *Natural Resource Conservation Service James Rasbury WRE in Todd County, Kentucky.*

2017 *Tennessee Gas Pipeline Company, LLC Pine Ridge Road Exposed Pipeline Repair, Clark County, Kentucky.*

2017 *Tennessee Gas Pipeline Company, LLC Slate Creek Anomaly Remediation Project-Line 100-7 in Montgomery County, Kentucky.*

Stoll, Courtney (Principal Investigator)

2017 *Phase I Cultural Resource Report for the East Tennessee Natural Gas, LLC Bradley Creek Revetment, Hawkins County, Tennessee.*

2017 *Phase I Cultural Resource Report for the Erwin Utilities Rocky Fork Water Line, Unicoi County, Tennessee.* Archaeological Permit No. 000911.

2017 *Phase I Cultural Resources Survey for the Proposed Tennessee Gas Pipeline Company, LLC G-105 Landslide Remediation at MLV 207-4 MP 7.1 in Bloom Township, Morgan County, Ohio.*

2017 *Abbreviated Phase I Cultural Resources Report for the Dominion Energy Transmission, Inc. Parmar Quaker State M&R Rebuild in Wood County, West Virginia.*

2017 *Abbreviated Phase I Cultural Resources Report for the Murray Energy Corporation Campbell Run Mitigation Site in Marion County, West Virginia.* FR# 16-110-MA.

2017 Archaeological Survey Short Report for the TETLP LN-1 MP 545.42 Anomaly in White County, Illinois.

Crider, Andrea (Principal Investigator) and Courtney Stoll (Primary Author)

2017 *Phase I Cultural Resources Survey for the Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Site 3D Project in Boone County, Kentucky.*

2017 *Phase I Cultural Resources Survey for the Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Site 3C Project in Boone County, Kentucky.*

2017 *Phase I Cultural Resources Survey for the Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Spent Aircraft Deicing Fluid (SADF) and Stormwater System Project in Boone County, Kentucky.*

2017 *Addendum Phase I Cultural Resources Report for the EQT Corporation PFS-6 Well Pad Project, (Former Statoil Conley Pad Project) in Tyler County, West Virginia.*

2017 *Abbreviated Phase I Cultural Resources Survey for the Tennessee Gas Pipeline Company, LLC MLV 107-5 to MLV 109-5 Class Change Project, Rowan and Bath Counties, Kentucky.*

2017 *Abbreviated Phase I Cultural Resources Survey for the Kenton County Airport Board Cincinnati/ Northern Kentucky International Airport CONRAC & Common Use Cargo Development Project in Boone County, Kentucky.*

2017 *Abbreviated Phase I Cultural Resources Survey for the Columbia Pipeline Group O&M Protocol M24034 Line P in Lawrence County, Kentucky.*

2017 *Abbreviated Phase I Cultural Resources Survey for the Paul Hemmer Company Team EPS Project in Boone County, Kentucky.*

2017 *Abbreviated Phase I Cultural Resources Survey for the Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Parcel 736 Project in Boone County, Kentucky.*

Warminski, Margo (Architectural Historian PI) and Courtney Stoll (Architectural Historian Primary Author)

2017 *Structure Analysis for the Columbia Pipeline Group UM-31 Crislip Land Project, Boyd County, Kentucky.* FY17-8951, KHC 17258496.

2017 West Virginia Historic Property Inventory Form, Dominion Energy Transmission, Inc. M&R Rebuild XS-1519/1520 Williamstown in Wood County, West Virginia.

2016

Stoll, Courtney (Architectural Historian Author) and Margo Warminski (Architectural Historian PI)

2016 *Phase I Historic Architectural Review for the Rumpke Sanitary Landfill Eastern Expansion Project in Colerain Township, Hamilton County, Ohio.*

Stoll, Courtney (Principal Investigator)

2016 *Addendum Phase I Cultural Resources Report for the EQT Corporation SHR99 Project (Formerly Statoil Yurigan Pad Project) in Tyler County, West Virginia.*

2016 *Phase I Cultural Resources Survey for the Proposed Rumpke Sanitary Landfill Eastern Expansion in Colerain Township, Hamilton County, Ohio.*

2016 *Phase I Cultural Resources Survey for the Proposed Dominion Transmission, Inc. Gilmore Station Pipeline Upgrade in Washington Township, Tuscarawas County, Ohio.* Prepared for Dominion Transmission, Inc.

2016 *Phase I Cultural Resource Report for the ANR Pipeline Company ANR Interconnect Pipeline Project, Crockett County, Tennessee.* Prepared for ANR Pipeline Company.

Stoll, Courtney (primary author) and Andrea Crider (Principal Investigator)
2016 *Revised Phase I Cultural Resources Survey for the Kenton County Airport Board Cincinnati/Northern Kentucky International Airport Site 3C Project in Boone County, Kentucky.* Prepared for Kentucky Airport Board.

Stoll, Courtney (GIS Mapping)
2016 *Natural Resource Conservation Service Barbara Trent WRE in Knox County, Kentucky.*

2016 *Columbia Pipeline Group, KY DOT Relocation, Owsley County, Kentucky.*

2016 Dominion Transmission, Inc. Canopy Clearing Mapping for: G-136 (PA, WV), LN1/LN31 (PA, NY), LN-16 (PA), LN24 (NY), LN24/LN554 (PA, NY), LN30/LN550 (NY), LN30 (NY), LN383 (NY), LN 493 (NY), LN546 (NY), LN550 (NY), LN554 (NY), TL383 (NY), TL470 (NY), NY Overview North Area, PA Well Abandonment, Sweeney Station and Lightburn Storage Systems in WV.

2016 Dominion Transmission Inc. 2016 Groundbed Replacement Project, Clearfield County, PA.

2016 Potesta EQT WAL 95 Phase I Investigations, West Virginia.

2016 Numerous Kleinfelder, DOM and Potesta Projects in Pennsylvania and West Virginia.

2016 GZA NWPA Phase 3 Well Access in McKean County, PA.

2016 TGP 72-1, 79-3, MLV 856-1 to 860-1 in Tennessee.

2015

Stoll, Courtney (Principal Investigator)
2015 *Phase I Cultural Resources Report for the Statoil Pfalzgraf Pad Project in Salem Township, Monroe County, Ohio.* Prepared for Statoil North America.

Environment & Archaeology LLC

R. Vincent Whitlatch
Senior Field Director/Archaeology/Environmental Inspector/Stream Wetland Restoration Surveyor

EDUCATION

B.A., Ohio University, Athens, Ohio, 1991, Anthropology
President, Ohio University Anthropology Club, 1989/1990 and 1990/1991

EMPLOYEMENT

1996 – Present –Senior Field Director/Archaeologist/Environmental Inspector/Post Construction Environmental Restoration Field Director/Biology Tech Assistant, Environment & Archaeology, LLC. Florence, Kentucky
1995-1996 – Field Director/Archaeologist, Kemron Environmental, Cincinnati, Ohio
1993–1995 – Field Director/Crew Chief/Archaeologist, Gray & Pape, Inc. Cincinnati, Ohio
1991-1995 – Field Director/Crew Chief/Archaeologist/Biology Tech Assistant, 3D Environmental, Cincinnati, Ohio

Environment, Health and Safety Training

TN ESPC Fundamentals of EPSC Level 1 Certified Personnel Cert#136038 Expires: 12-31-19
TransCanada Excavation Orientation, issued: 12-1-2017 Expires: 12-1-18
ISNetworld Training Completion Issued: 2-17 (ISN ID# 03215196)
PEC/Safeland USA Safety Midstream Training MSTQ module Completion Issued: 3-21-17, Safeland USA Issued: 7-17 and PEC Basic Orientation Issued: 7-17 (ID # PEC100866888)
American Safety & Health Institute certified Basic First Aid trained Registry# 93039 Issued: 12-15-16 Expires: 12-18
American Safety & Health Institute certified Adult CPR and AED trained Registry# 93039 Issued: 12-15-16 Expires: 12-18
TransCanada Health, Safety and Environmental Orientation Issued: 12-1-17 Expires: 12-1-19
Municipal Online Stormwater Training Center course: Erosion and Sediment Control for Construction Sites Certified: 12-7-17
2015 Smith System Driver Improvement Institute, Inc. – Small Vehicle Forward Motion training
2015 Shell Upstream Americas - Risk Assessment Matrix training and General HSE orientation
2014,2015,2016PEC Safety/Safeland USA Basic Orientation Safety Course – Universal Photo ID certificate
2006 Commonwealth of Virginia, Soil and Water Conservation Board, Certified – Erosion and Sediment Control Responsible Land Disturber – Certificate# 18223
Dozens of onsite and on job E&A, State, Federal and client's other annual HSE training classes and certifications over the past 27 years of fieldwork.

PROFESSIONAL EXPERIENCE

Mr. Whitlatch has over 27 years professional experience in Cultural Resource management providing a wide variety of services for a wide variety of client's projects. Responsible for the managing of the logistics, operations and oversight of field work, field crews, associated data collecting of archaeological research projects involving historic and prehistoric resources. Similar fieldwork logistics and oversight for occasional environmental projects (environmental inspector and trainer during large and small construction projects, post construction environmental rehabilitation projects, stream and wetland restorations projects, etc…) that E&A also has conducted. Southeast, Northeast, Midwest, and mid-Atlantic United States. Mr. Whitlatch's projects include:

Senior Archaeological Field Director

2018

West Virginia **Field Director:** Phase I Survey of three DETI proposed 2018 Microwave Tower projects (Burch Ridge MW Tower, Tonkin MW Tower and the Mullet MW Tower) West Virginia. For Dominion Energy Transmission.

Field Director: Phase I Survey of proposed multiple workspace configurations expanding the boundaries of two previously known prehistoric sites (46Pu267 and 46 Pu18) the study area and failed to find evidence for a previously recorded Civil War Site at the second study area. This study was for the proposed TGP WV LN100-2 Make Piggable L/R Project in Putnam County, WV. For Kinder Morgan.

Field Director: Phase I Survey for the proposed additional temporary workspaces and access for the proposed TGP MLV115-3 Valve replacements in Cabell County, WV. For Kinder Morgan.

Field Director: Phase I Survey for the proposed additional temporary workspaces and access for the proposed TGP MLV 120-2 Pipeline Replacement in Kanawha County, WV. For Kinder Morgan.

Ohio **Field Director:** Phase I Survey of the Dominion DETI 2018 Mullet microwave Tower project in Monroe County, Ohio. For Dominion Energy Transmission.

Field Director: Phase I Survey for the proposed Statoil Marty Pad Expanded Area in Monroe Co., Ohio. For Statoil.

Kentucky **Environmental Inspector:** Project Construction Kick-off and the on-going post construction monitoring for the Columbia Gulf Transmission ML100 3' Tap Valve STR-1 Removal, a 15 feet length of 30-inch dia. ML 100 removal and replacement, also a removal of 180 feet of 3-inch dia. pipeline. The project was in Metcalfe County, KY. For Columbia Gulf Transmission.

Tennessee **Environmental Inspector**: Installation of TDEC Notice Signage for the proposed construction adjacent to wetland waterbodies for the Proposed CPG HWY 109 Replacement Project in Wilson County, TN. For Columbia Gulf Transmission.

2017

Pennsylvania **Field Director:** Phase I Survey for the Proposed DOM PARMAR Quaker State M&R Rebuild Project in Wood County, WV. For Dominion Energy Transmission.

Ohio/Pennsylvania

Field Director: Phase I Survey for the proposed new KLF –33.9 mile EmKey Risberg Pipeline and associated proposed new facilities and access. Located in Ashtabula Co., OH and Erie CO., PA.

2016____

Kentucky **Field Director:** Phase I Survey of a Forced KY DOT Relocation for the Columbia Pipeline Group in Owsley Co., KY.

Archaeological Excavation Volunteer: Phase III Excavation at site 15MS1 at the 40-acre Fort Ancient prehistoric occupation site also known as Fox Farm for a KAS – NSF funded project in Mason Co., KY. Volunteered a week (vacation time) and a few weekend days excavating the final planned field excavations for this project.

Tennessee **Field Director:** Phase I Survey for the Spectra-ETNG LN3300 Hydrostatic Test Project in Greene Co., TN.

Environmental Tech: Environmental Survey for the Humboldt Lake Road M&R site for ANR.

Environmental Tech: Environmental Survey for the TGP 2016 Hickman Dickson Anomalies project for Kinder Morgan.

Ohio **Field Director:** Phase I Survey for the 433 acres Expansion of the Rumpke Landfill for Rumpke in Hamilton Co., OH.

2015____

Ohio **Field Director:** Phase I Survey for the Statoil Faunda Pad in Monroe Co., Ohio. For Statoil.

Field Director: Phase I Survey for the Statoil Pfalzgraf Pad in Monroe Co., Ohio. For Statoil.

Field Director: Multiple Phase I survey areas for the Dominion Mullet Compressor Station project in Monroe Co., Ohio. For Dominion Gas.

Ohio **Field Director:** Phase I Survey for the Marty Pad project in Monroe Co., Ohio for Statoil.

Field Director: Multiple Phase I surveys for the Mullett Station/ Clarington project in Monroe Co., Ohio. For Hatch Mott MacDonald and Dominion Gas.

Field Director: Phase I Survey for the Statoil – Moore (Ohio) Well Pad project in Monroe Co., Ohio. For Statoil.

Field Director: Phase I for a proposed Potesta/ EQT 13.46 acre well pad project in Ritchie Co., WV. For EQT/Potesta.

Kentucky **Field Director:** Phase I Survey for the NRCS Sue Cronch WRP in Graves Co., KY. For the KY NRCS.

Field Director: Phase I Survey for the TGP –KY Highway 49 Road Widening Project in Marion County, KY. For Tennessee Gas Pipeline Company.

Field Director: Phase I Survey for CVG Site 3C in Boone Co., KY. For the Kenton County Airport Board.

Field Director: Phase I Survey for the NRCS Larry Crutcher WRP in Calloway County, KY for the KY NRCS.

Field Director: Phase I Survey for the CVG Atlas Air project in Boone Co., KY. For the Kenton County Airport Board.

Field Director: Phase I Surveys (multiple configurations tested) for the TGP 2015 Spring PCM (KY Hwy 49 Widening) in Marion County, Kentucky. For Tennessee Gas Pipeline.

Field Director: Phase I Survey for the CVG Bosch Site 6-C in Boone Co., KY. For the Kenton County Airport Board.

Tennessee **Field Director:** Phase I Survey for the Lenoir City – Wartburg project in Roane County, Tennessee. For East Tennessee Gas, LLC.

Pennsylvania **Field Director:** Two deployments for the Archaeological Phase I Survey for the Seneca Millstone Heath 3D Seismic Project.

Environmental Tech: Environmental Post Construction Monitoring at five gas facility/pipeline sites located in Clifford, Springville, Mt. Jewett, Mercer and Mahoning, PA.

West Virginia **Field Director:** Phase I Survey for the Statoil Parr Pad in Tyler Co., West Virginia. For Statoil

Field Director: Phase I Survey for the Spruce Station Project in Ritchie Co., WV. For Dominion Transmission, Inc.

Field Director: Phase I for a proposed Potesta/ EQT 13.46 acre well pad project in Ritchie Co., WV. For EQT/Potesta.

Tennessee **Field Director:** Phase II Testing for the prehistoric sites 40Re104 and 40Re611 for the Wartburg Discharge IMP Project in Roane Co., TN. For East Tennessee Gas, LLC.

2014

Virginia **Field Director:** Phase I Survey for the ETNG Bristol IMP project in Washington Co., Virginia. For Spectra Energy Transmission.

Tennessee **Field Director:** Phase I Survey for the ETNG Lenoir City IMP project in Roane and Loudon Co.s, Tennessee, For Spectra Energy Transmission.

Field Director: Phase I Survey for the ETNG Pipe Cover Repair Project in Morgan Co., Tennessee. For Spectra Energy Transmission.

Pennsylvania **Field Director:** Gelatt Well Connect Project, Ararat and Jackson Townships, Susquehanna County, Pennsylvania. ER# 2014-0375-115-A. Williams Field Services Company, LLC and Kleinfelder East, Inc.

2013____

Kentucky **Field Director:** Historic Cemetery Location and Recovery for the Cleek Family Cemetery, Boone County, KY. For Triple Crown Development.

West Virginia **Field Director:** Phase I Archaeology Survey for the MOSA-sO22 Pipeline Project, Ritchie Co., West Virginia. For Kleinfelder.

Field Director: Phase I Archaeology Survey for the Mullet Station Project. For Dominion Transmission.

Field Director: Phase I Cultural Resources Survey for the EQT Production Company OXF-43 Well Line Alt Project in Doddridge County, West Virginia. FR# 12-483-DO-1.

Field Director: Gessler Well Site Project, Doddridge County, West Virginia, FR# 13-135-DO-2.

Ohio **Field Director:** Phase I Cultural Resources survey for the Antero Resources Corporation Schroder Alt Project, Center Township, Noble County, Ohio. For Antero.

Pennsylvania **Field Director:** Phase I survey for the TETLP 2015 Cathodic Protection project in Huntington County, PA. For Spectra.

Tennessee **Field Director:** Phase I Cultural Resource Report for the Wacker Polysilicon North America, LLC Utility Corridor Project, Bradley County, Tennessee. For Wacker Polysilicon North America, LLC.

West Virginia **Field Director:** Three field surveys for three separate Pipeline Projects for Antero through HMM.

Field Director: Phase I Cultural Resources Report for the Dominion H-192 Segment Project in Gilmer County, West Virginia. For Dominion Transmission, Inc.

2012____\\\\

West Virginia **Field Director:** Phase I Cultural Resources Survey for the proposed North Canton Extension Project in Tyler Co.,West Virginia.

Luke W. Erickson, M.A., RPA
Archaeology Project Manager/Principal Investigator

EDUCATION

GIS Certification, Northern Kentucky University, Highland Heights, KY 2014
M.A., Anthropology, Eastern New Mexico University, Portales, NM, May 2002
B.A., Anthropology, Northern Illinois University, DeKalb, IL, May 1997

PROFESSIONAL EXPERIENCE

With *Environment & Archaeology, LLC* since 2009, Mr. Erickson's responsibilities range from client/project management to field survey and technical report writing. Certified as a Principal Investigator in the states of Pennsylvania, West Virginia, Ohio, Tennessee, Illinois, and New York and a Registered Professional Archaeologist since 2002, Mr. Erickson is responsible for implementing and seeing through to completion, cultural resource investigations for a wide variety of projects such as natural gas pipelines and well pads, historic structure assessments, and cemetery recordation.

Phase I Surveys

2017

West Virginia

- Abbreviated Phase I Cultural Resource Report for the EQT Production Company Well Site HAR 10 Project in Ritchie County, West Virginia. FR# 16-752-RT-1. For Potesta and EQT.
- Abbreviated Phase I Cultural Resource Report for the EQT Production Company Well Site BIG 464 Project in Marion and Wetzel Counties, West Virginia. FR# 17-283-MULTI. For Potesta and EQT.
- Abbreviated Phase I Cultural Resources Report for the EQT Production Company Well Site WAL 95 Project in Harrison County, West Virginia. FR# 16-753-HS1. For Potesta and EQT.
- Abbreviated Phase I Cultural Resources Report for the EQT Production Company PUL 65 Project in Ritchie County, West Virginia. USACE # LRH-2017-00067-LKR-Star Fork. For Kleinfelder and EQT.
- Abbreviated Phase I Cultural Resource Report for the Angelina Gathering Company, LLC Victory Trunkline Project, Schostag Impoundment to Hieronimus Frac Ponds, Marshall County, West Virginia.
- Abbreviated Phase I Cultural Resource Report for the Angelina Gathering Company, LLC Victory Trunkline Project, Ohio River to Schostag Impoundment in Marshall and Wetzel Counties, West Virginia.

Virginia

- Phase I Archaeological Survey for the Colonial Pipeline Company Line 27 Replacement Project. Suffolk, Virginia. For CPC and Kleinfelder. DHR File No. 2017-3384.

Ohio

- Phase I Cultural Resource Report for the Tallgrass Energy Boston Road Groundbed Installation, Somerset Township, Belmont County, Ohio. 2017-BEL-37695. For Kleinfelder and Tallgrass Energy.
- Phase I Archaeology Survey for the RH energytrans, LLC Risberg Line Project in Conneaut and Kingsville Townships, Ashtabula County, Ohio. For Kleinfelder and RH energytrans, LLC. OHC# 2017-ATB-39745.
- Phase I Architectural Review for the RH energytrans, LLC Risberg Natural Gas Transmission Line Project in Conneaut and Kingsville Townships, Ashtabula County, Ohio. OHC# 2017-ATB-39745. For Kleinfelder and RH energytrans, LLC.

Kentucky

- Phase I Archaeology Report for the Columbia Pipeline Group UM-31 Crislip Lane Project, Boyd County, Kentucky.
- Abbreviated Phase I Archaeology Report for the TETLP LN 10 Hydrostatic Test Project MP 339 to MP 341, Monroe County, Kentucky.
- Management Summary for the Phase II Testing of Site 15Ke176, Walton Industrial Park Project, Walton, Kentucky.
- Phase II Report for the Phase II Testing of Site 15Ke176, Walton Industrial Park Project, Walton, Kentucky.

Pennsylvania

- PRF and NSF Documents for the Phase I Archaeological Survey of the Bliss Lateral Project, Liberty Township, Tioga County, Pennsylvania. For HEP and Kleinfelder. ER# 2017-0495-117-B.
- NSF for the Phase 3 South Pipeline Wetland Mitigation Area, Sergeant Township, McKean County, PA. ER# 2014-1882-047-L. For NFG.
- Phase I Archaeological Investigation, Risberg Line Project, Elk Creek, Conneaut and Springfield Townships, Erie County, Pennsylvania. ER# 2017-2111-049-C. For Kleinfelder and RH energytrans, LLC.
- Above Ground Resources & Indirect Effect Review & Assessment: RH energytrans, LLC Risberg Line Project, Conneaut & Springfield Townships, Erie County and East Fairfield Township, Crawford County, Pennsylvania. ER# 2017-2111-049-B.
- Phase I Cultural Resource Report for the 59-60 Loop Pipeline Project in Jackson and New Milford Townships, Susquehanna County, Pennsylvania. ER# 2017-1031-115. For Kleinfelder and Bluestone Pipeline Company of Pennsylvania, LLC.

Tennessee

- Phase I Report for the Columbia Gulf Transmission Highway 109 Pipeline Replacement Project, Wilson County, Tennessee.
- Phase I Cultural Resource Report for the East Tennessee Natural Gas, LLC 2018 CLKR-WART Hydrostatic Test Project, Morgan County, Tennessee.

2016

West Virginia

- Abbreviated Phase I Cultural Resources Report for the EQT Production Company Well Site GRT 28 Project in Marion County, West Virginia. FR# 16-137-MA-1. For Potesta and EQT.
- Phase I Cultural Resource Report for the EQM Gathering OPCO, LLC MOSA-S022 Pipeline Project in Ritchie County, West Virginia. FR# 16-254-RT. For Kleinfelder and EQT.
- Desktop Analysis Packet for the EQT County Road 52 Upgrades Project in Wetzel County, West Virginia. FR# 16-427-WZ-1. For Potesta and EQT.
- Phase I Cultural Resources Report for the EQM Gathering OPCO, LLC MOSA-S022 Pipeline Project in Ritchie County, West Virginia. FR# 16-254-RT. For Kleinfelder and EQM.
- Cultural Resources Consultation for the DTI Hill Top Junction M&R Rebuild Project in Wood County, West Virginia. FR# 16-838-WD. For DTI.
- Additional Structures Documentation for the MOSA-S002 Pipeline Project in Ritchie County, West Virginia. FR# 16-254-RT-2.
- Abbreviated Phase I Cultural Resources Report for the EQT CPT-10 Well Line Project, Doddridge County, West Virginia. For Potesta and EQT. USACE Cleared. Not sent to WVDCH.
- Additional Architectural Resources Information for the Well Site PNG 234 Project, Wetzel County, West Virginia. FR# 16-873-WZ. For Potesta and EQT.

Virginia

- Phase I Archaeological Survey for the ETNG LN 3300-1 Pulaski Radford Hydrostatic Test Project, Pulaski County, Virginia. VA DHR File No. 2016-0638.
- Phase I Archaeological Survey for the ETNG LN 3300-1 Montgomery Christiansburg Hydrostatic Test Project, Montgomery County, Virginia. VA DHR File No. 2016-0651.

Pennsylvania

- Desktop Analysis Letter for the Seneca Resources Corporation, Clermont West Temporary Water Line Project, Sergeant Township, McKean County, Pennsylvania. ER 2016-0598-083-A.
- Project Review Form (PRF) and Negative Survey Form (NSF) for the Tioga North Trunkline Project, Tioga County, Pennsylvania. ER# 2016-0622-117-A. Howard Energy Partners and Kleinfelder.
- PRF for the M19 Pipe Exposed Roberts Run Creek Project, Greene County, Pennsylvania. For EQM Gathering OPCO, LLC and Kleinfelder. ER# 2016-1531-059-A.
- PRF and NSF for the Tioga South Trunkline Project, Tioga County, Pennsylvania. ER# 2016-0621-117-A. Howard Energy Partners and Kleinfelder.
- PRF and NSF for the Tioga CPF #1 Gathering Line Project, Tioga County, Pennsylvania. ER# 2016-0652-117-B.

Tennessee

- Phase I Cultural Resource Report for the TGP MLV 78 Toad Hollow Cathodic Protection Installation Project, Perry County, Tennessee.

Kentucky

- Abbreviated Phase I Archaeology Report for the TETLP Fleming 517.54 Shallow Cover Repair Project, Fleming County, Kentucky. For TETLP.

Indiana

- Phase Ia Archaeological Reconnaissance of the Proposed ANR Pipeline Company LN 1-100 MP 892.11 Casing Repair Project, LaPorte County, Indiana. DHPA # 19598. For ANR Pipeline Company.

Kansas

- Phase II Cultural Resource Report for the ANR Pipeline Company TR 1-100 MP 129.9 Casing Repair Project, Kiowa County, Kansas. For ANR Pipeline Company.

Ohio

- Phase I Cultural Resource Report for the Tallgrass Energy Big Inch Road NW Groundbed Installation Project, Reading Township, Perry County, Ohio. For Kleinfelder and Tallgrass Energy. 2016-PER-36193.

2015

Pennsylvania

- Three (3) reports for 3 separate natural gas related projects for Seneca Resources Corporation and Kleinfelder.
- PRF, NSF and Supplemental Information Packet (SIP) for the San Filippo Well Connect Project, Fayette County, Pennsylvania. ER# 2015-0430-051-A. Laurel Mountain Midstream, LLC and HMM.
- Six (6) reports for 6 separate natural gas related projects for NFG Midstream Clermont, LLC.
- Phase I Cultural Resource Report for the CNX Gas Company, LLC NEWF-1 Gas Well Pad Project in Greene County, Pennsylvania. ER# 2014-1858-059-B. Blue Mountain and CNX.

Tennessee

- Survey and the Phase I Cultural Resource Report for the TETLP 2015 Mt. Pleasant Pipeline Replacement Project in Rutherford County, Tennessee.
- Addendum Survey Letter for the TETLP 2015 Mt. Pleasant Pipeline Replacement Project in Rutherford County, Tennessee.

West Virginia

- Eleven (11) reports for 11 separate natural gas related projects for EQT through Potesta, Kleinfelder and the Larson Design Group.
- Historic Property Inventory Form (HPI) for the "Stone Structure" found on the EQT WL-133451 Pipeline Relocation Project, Logan County, West Virginia. FR# 15-348-LG-1. For Potesta and EQT.

2014

Pennsylvania

- Six (6) PRF, NSF and SIP documents for 6 separate natural gas related projects for Utica Gas Services.
- PRF, NSF and SIP for the NIMI-S005 Pipeline Project, Washington County, Pennsylvania. ER# 2015-0189-125-A. For EQT and Kleinfelder.
- Six (6) PRF, NSF and SIP documents for 6 separate natural gas related projects for Seneca Resources Corporation.
- Two (2) PRF, NSF and SIP documents for 2 separate natural gas related projects for NFG Midstream Clermont, LLC.
- PRF, NSF and SIP for the Daniel Field Gathering System Project, Cameron County, Pennsylvania. ER# 2014-0970-023-C. Endeavour Operating Corporation and Kleinfelder, Inc.
- PRF, NSF and SIP for the Grassy Run Pipeline Project, Fayette County, Pennsylvania. ER# 2014-0436-051-A. Laurel Mountain Midstream, LLC and HMM.
- PRF, NSF and SIP for the Central Distribution Line Project, Susquehanna County, Pennsylvania. ER# 2014-0542-115-A. Williams Field Services Company, LLC and Kleinfelder East, Inc.

West Virginia

- Seven (7) reports for 7 separate natural gas related projects for Antero.
- Five (5) reports for 4 separate natural gas related projects for EQT.
- Federal Communications Commission (FCC) Form 620 Completion for the Parkersburg Catholic Schools Foundation FM Radio Tower Project, Pleasants County, West Virginia. FR# 14-759-PL. Potesta. Report only.
- Viewshed Analysis for the EQT Well Site OXF 163 Project, Ritchie County, West Virginia. FR# 14-837-RT. EQT and Potesta. Report only.
- Cemetery Survey for the EQT Well Site PET 35 Project, Lewis County, West Virginia. FR# 14-948-LE. EQT and Potesta.

- Abbreviated Phase I Report for the CPG 136 Crestwood Relocation Project in Doddridge, County, West Virginia. FR# 14-349-DO-1. For CPG and Potesta & Associates.

2013

West Virginia

- Ten (10) reports for 7 separate pipeline projects for Antero Resources.
- Abbreviated Phase I Cultural Resources Report for the Potesta Big 177 Well Pad Project in Wetzel County, West Virginia. FR# 13-603-WZ.
- Nine (9) reports for 7 separate natural gas pipeline projects for EQT through Antero and Potesta.
- Abbreviated Phase I Cultural Resources Report for the Antero Resources Corporation McGill Pipeline Project in Doddridge County, West Virginia. For Kleinfelder East, Inc.
- Two (2) Historic Property Inventory Forms for 2 separate EQT projects.

Ohio

- Phase I Cultural Resources Report for the Antero Resources Corporation Schroder Alt Project, Noble County, Ohio. For Antero.
- GIS Mapping for dozens of Antero Resources Corporation Well Pad Projects in several Ohio Counties.

Pennsylvania

- Four (4) reports for 3 separate natural gas gathering line projects for Williams Field Services Company, LLC through Kleinfelder East, Inc.
- Two (2) NSF documents for 2 separate natural gas related projects for Utica Gas Services, LLC and Kleinfelder East Inc.
- NSF for the Phase I Survey of the Roaring Run Lateral Project, Lycoming County, Pennsylvania. PVR Marcellus Gas Gathering, LLC. For Kleinfelder East, Inc.
- NSF for the Phase I Survey of the MAWC 7020 Gathering Line Project, Fayette County, Pennsylvania. Triana Energy, LLC. For Kleinfelder East, Inc.

2012

Kentucky

- Abbreviated Phase I Resources Report for the Kenton County Airport Forcemain Reroute Project, Boone County, Kentucky. For the Kenton County Airport Board.

Ohio

- Five (5) reports for 5 separate pipeline projects for Cardinal Gas Services, LLC through Kleinfelder East, Inc.
- Three (3) reports for 3 separate pipeline projects for Utica East Ohio Midstream through Kleinfelder East, Inc.
- Ten (10) Phase I Cultural Resource Due Diligence Packets for 10 separate Antero Well Pad Projects.

Pennsylvania

- Two (2) reports for 2 separate natural ga gathering line projects for EQT through Kleinfelder East, Inc.
- Five (5) reports for 5 separate natural gas gathering line project for Williams Field Services Company, LLC through Kleinfelder East, Inc.
- Four (4) reports for 4 separate gathering line projects for Utica Gas Services, LLC through Kleinfelder East, Inc.
- NSF for the Phase I Survey of the Corson-Sechrist Lateral Gathering Line Project, Lycoming County, Pennsylvania. PVR Marcellus Gas Gathering, LLC. For Kleinfelder East, Inc.
- NSF for the Phase I Survey of the Anthracite West II Gathering Line Project, Wyoming County, Pennsylvania. For AMS and Kleinfelder East, Inc.

West Virginia

- Five (5) reports for 5 separate Pipeline Projects for Antero through HMM.
- Abbreviated Phase I Cultural Resources Report for the Antero Resources Corporation Eureka Lateral Pipeline Project in Doddridge and Tyler Counties, West Virginia. For Kleinfelder East, Inc.
- Phase I Cultural Resources Survey for the Marsden Pad Project in Doddridge County, West Virginia. For Antero.

2011

Kentucky

- Survey and Abbreviated Phase I Archaeology Report for the Proposed Kenton County Airport Stormwater Management System Upgrade Project, Boone County, Kentucky. For the Kenton County Airport Board.
- Abbreviated Phase I Archaeology Report for the TGP, LN 200-4 Drip Access Road Project, Greenup County, Kentucky. For TGP.

New York

- Phase IA/IB Cultural Resource Report and Historic Resource Inventory for the Minisink Compressor Station Project, Orange County, New York. For HMM.

Pennsylvania

- Twenty-three (23) surveys/reports for 23 separate natural gas gathering line projects for AMS through Kleinfelder East, Inc. and Hanover Engineering.
- Addendum 3 Phase I Cultural Resource Report and Avoidance Plan for Site 36BR0295 for the Marc I Project in Bradford County, Pennsylvania. For AK Environmental, LLC.

Tennessee

- Phase I Cultural Resource Report for the Wacker Polysilicon North America, LLC Utility Corridor Project, Bradley County, Tennessee. For Wacker Polysilicon North America, LLC.

West Virginia

- Three (3) reports for 3 separate Pipeline Projects for Antero through HMM.
- Abbreviated Phase I Cultural Resources Report for the DTI H-192 Segment Project in Gilmer County, West Virginia. For DTI.

2010

Kentucky

- Survey and Phase I Cultural Resources Report for the 865 Acre SAMI Floodplain Easement Project, Hopkins County, Kentucky. For the NRCS.
- Survey and Phase I Cultural Resources Report, Cincinnati/Northern Kentucky International Airport 55-Acre and 10-Acre Airport and ZF Lenksysteme Expansion Projects, Boone County, Kentucky. For the Kenton County Airport Board.

New York

- Survey and Phase I Cultural Resources Report, NFG, Empire Tioga Connector Project, Steuben County, New York and Tioga County, Pennsylvania. For HMM.

Pennsylvania

- Seven (7) surveys/reports for 7 separate natural gas gathering line projects for AMS through Kleinfelder East, Inc. and Hanover Engineering.
- Survey and Phase I Cultural Resources Report, AMS, Marshview Compressor Station, Bradford County, Pennsylvania. For Kleinfelder East, Inc.
- NSF for Addendum I to the Phase I Cultural Resource Report for the CNYOG North South Project, Compressor Station NS2 in Bradford County, Pennsylvania. For CNYOG.
- Addendum Phase I Cultural Resource Report for the Eastern Shore Natural Gas Mainline Extension Interconnect Project with TETLP in Chester and Lancaster Counties, Pennsylvania. For HMM.
- Two (2) separate survey/reports for two (2) separate investigations for the Marc I Project.
- Phase III Data Recovery at Site 36GR77 for the DTI HUB III Project, Greene County, Pennsylvania. For DTI.

2009

Illinois

- Report for the Phase III Data Recovery at Site 11PK1702 for the REX-East Project, Pike County, Illinois. For Caprock Environmental Services, LLC.

Ohio

- Two (2) reports for two (2) separate DTI.
- Survey and Phase I Cultural Resources Report for the Parky's Farm Improvements Project, West Fork Lake Project, Springfield Township, Hamilton County, Ohio. For the Hamilton County Park District.

Pennsylvania

- Phase I Cultural Resources Assessment Report for the NFG West to East – Overbeck to Leidy Project, Elk, Jefferson, Clearfield, Cameron and Clinton Counties, Pennsylvania. For HMM.

Kentucky

- Six (6) reports for six (6) separate Cellular Tower Projects.

New York

- Two (2) reports for two (2) separate NRCS projects.

West Virginia

- Three (3) reports for three (3) separate project for DTI.

Representative Phase I Surveys

2002 to 2006	Over 200 Phase I Surveys conducted for the Georgia Department of Transportation, Atlanta
2002 to 2006	Hundreds of Borrow Pit Surveys conducted for the Georgia Department of Transportation, Atlanta, Georgia.

Michael D. Shaw II, M.A., RPA
Archaeological Field Director
Environment & Archaeology, LLC
Email: mshaw@environment-archaeology.com

EDUCATION

- M.A., Egyptian Archaeology, University College London
- B.A., Anthropology, University of Alabama

PROFESSIONAL EXPERIENCE

Mr. Shaw is responsible for the implementation and execution of archaeological research projects involving historic and prehistoric resources. Plans and conducts surveys and excavations of historic and prehistoric sites. Preparation of technical reports in the Southeast, Northeast, Midwest, and mid-Atlantic United States, Mr. Shaw's major projects include:

2017 Projects

Kentucky	2 parcel development projects for Cincinnati Airport, CVG 3D Project and CVG Parcel 736 Project 1 Pipeline Project: CPG EM7 Geohazard Project
Kansas	NGPL Salt Creek Project
Illinois	Spectra TETLP MP 545.42 IL Anomaly Project
Nebraska	2 Pipeline Projects, NGPL Big Blue River Project and NGPL Little Blue River Project
Ohio	2 Microwave Tower Projects: DTI Springside Tower Project, DTI DEOTC Tower Project
	1 Pipeline Project, KLF Tallgrass Boston Rd. Cath. Project
Pennsylvania	3 Pipeline Projects: KLF HEP Bliss Lateral, NFG Clermont 3 Wet Mit, KLF Risberg Crawford survey
Tennessee	2 Pipeline Projects: CPG I-40 Mainline 200 Replacement and CPG - ML 200/ ML 300 Exposure
	1 waterline project, Erwin Rocky Fork
Virginia	Nansemond river line 27 project
West Virginia	6 Pipeline Projects: Renttew EQT Big 467, CPG M24034 Access Road, KLF EQT PUL 65 Well Pad, Mott McDonald MMD Cambells Run, KLF Victory Elson to Hiero, KLF OH River toSchostag, KLF Victory Schostag to Elson

2016 Projects

Iowa	ANR Clinton Meter Station
Kentucky	TPG MLV 97-5 Replacement
Kansas	2 Pipeline Projects: ANR MP 92.7 Cathodic Protection and ANR MP 892.11 Casing Repair
Ohio	TGP Lebanon Meter Station
Pennsylvania	Kleinfelder HEP CPF#1 GL, Kleinfelder HEP Tioga North

South Carolina KLF Colonial Broad River RC

Tennessee 3 Pipeline Projects: TPG Toad Hollow, Spectra TETLP LN 15 Hydrotest, ETNG LN 3300-1 Boyd-Flat hydrotest

West Virginia 3 Pipeline projects: Potesta EQT GRT 28, Kleinfelder EQT Mossa s022, EQT GRT77 Cemetery Survey

Virginia 3 Pipeline Projects: Spectra ETNG LN 3300-1 Christiansburg, ETNG LN 3300-1 Radford, ETNG LN 3300-1 Clearbrook

2015 Projects

Pennsylvania 6 Pipeline Projects: HRG Cardinal B11, HRG Cardinal B37, Seneca Resources Corporation Mt. Jewett, Seneca Resources Corporation Seneca to rich valley, TETLP Mt. Pleasant, Blue Mountain Group/ EQT FAW64

West Virginia Spectra TETLP Line 30 Slip Repair

2014 Projects

Ohio Line 25 MP606 Slip Repair project for TETLP. Meigs County.

Pennsylvania 3 Pipeline Projects for Seneca Resources Corporation and Kleinfelder East, Inc, West Branch Waterline Impoundment Project, Clermont 24-Inch Main Line Extension Project, Clermont to Rich Valley Pipeline Project, McKean County

Clermont Pad H to Pad NF-A Pipeline Project for Resources Corporation and Kleinfelder East, Inc Elk County

4 Pipeline Projects for Utica Gas Services and Kleinfelder East, Inc, CTG McDaniel Well Connect and SE Beaver Lateral Project, North Beaver Phase 3 Pipeline Project, Darlington Pipeline, Victory Pipeline. Beaver County

Grassy Run Pipeline Project for Laurel Mountain Midstream, LLC and Hatch Mott McDonald, Fayette County

2 Pipeline Projects for Williams Field Services and Kleinfelder East, Inc., Central Distribution Line Project, Gelatt Well Connect Project, Susquehanna County

K-16-A Pipeline Project for Seneca Resources Corporation and Kleinfelder East, Inc., Jefferson County

West Virginia 4 Pipeline Projects for Antero Resources Corporation and Kleinfelder East, Inc. Dotson Pipeline Project, Cofer Pipeline Project, Diane Davis Pipeline Project, Prim West Pipeline Project. Doddridge County.

3 Pipeline Projects for Antero Resources Corporation and Kleinfelder East, Inc. Monroe Compressor Facility Project and Costal 1 and 2 Pipeline Project, and North Canton Pipeline Project, Tyler County

Line 1360-Crestwood Relocation Project for Columbia Pipeline Group and Potesta & Associates, Doddridge County

4 Pipeline Projects for EQT Gathering, LLC and Potesta & Associates, MOSA-SO15 Pipeline Project, OXF 159 Well Line Project, OXF 163 Well Line Project, OXF 164 Well Line Project, Doddridge County, FAW-52 Well Pad Project for EQT Gathering, LLC and Potesta & Associates, Marion County

Cemetery Survey for the Potesta & Associates PET 35 Project. Lewis County

2013 Projects

Kentucky	Triple Crown-Cleek Cemetery Project, Boone County
	NRCS Alfred Allen Project, Hickman County
	Spectra TETLP MP 408.5 Project, Casey County
Ohio	Phase I survey for the development of the Elm Valley Fire Station, Delaware County
	Dominion Transmission, Inc. TL-388 Pipeline Replacement Project, Marion Township, Noble County
	Spectra TETLP Mark West-Seneca Interconnect Project, Franklin Township, Monroe County
	Wilson Well Pad Survey for Antero Resources Appalachian Corporation, Marion Township, Noble County
Pennsylvania	4 Gathering Lines for Kleinfelder East, Inc. and Williams ABA in Susquehanna County: Lucy Pipeline Project, Heartley Pipeline Project, Johnson Pipeline Project, and Hathaway Pipleline Project.
	2 Gathering Lines for Kleinfelder East, Inc. and EQT Gathering, LLC. in Armstrong County: NITE-S005 Pipeline Project and NITE-S006 Pipeline Project.
West Virginia	6 Gathering Lines for Kleinfelder East, Inc. and Antero Resources Appalachian Corporation in Doddridge County: Mountain Gathering Line Project. Primm Gathering Line Project, Tom's Fork Gathering Line Project, and Sandy Creek Gathering Line Project, Canton East Gathering Line Project, McGill Lateral Gathering Line Project.
	New Milton Compressor Facility Project for Kleinfelder East, Inc. and Antero Resources Appalachian Corporation in Doddridge County
	2 Gathering Lines for Potesta & Associates, Inc. and EQT Production in Doddridge County: WEU 8 Well Line project, PEN 13 Well Line Project.
	2 Well Sites for Potesta & Associates, Inc. and EQT Production in Wetzel County: Big 177Well Site Project and Big 182 Well Site Project
	1 Well Site for Potesta & Associates, Inc. and EQT Production in Doddridge County: OXF 157
	1 Well Site for Potesta & Associates, Inc. and EQT Production in Tyler County: Heartley West

2012 Projects

Pennsylvania	4 Gathering Lines for Kleinfelder East, Inc. and Utica Gas Services, LLC in Beaver County: South Beaver Phase 1 Gathering Line Project, South Beaver Phase 2 Gathering Line Project, South Beaver Phase 3 Gathering Line Project, North Beaver Phase 2 Pipeline Project
	6 Gathering Lines for Kleinfelder East, Inc. and Williams ABA in Susquehanna County: Quarry Pipeline Project, Loffredo Pipeline Project, Horton Pipeline Project, Leslie Pipeline Project, Mulligan Gathering Line Project, Squire Gathering Line Project.

1 Gathering Lines for Kleinfelder East, Inc. and PVR Marcellus Gas Gathering, LLC in Lycoming County: Corson-Sechrist Lateral Pipeline Project

Phase I survey of the MAWC 7020 Gathering Line Project, Fayette County

Ohio Phase II Testing at the Harrison Hub Fractionation Facility in Harrison County, Ohio

Tennessee Gas PIP-Glouster Pipeline Replacement, Morgan County

2 Gathering Lines for Kleinfelder East, Inc. and Utica East Ohio Midstream in Columbiana County: Kensington TGP Alignment Pipeline Project, Kensington TPL 7 & 15 Alignment Pipeline Project,

2 Gathering Lines for Kleinfelder East, Inc. and Cardinal Gas Services, LLC in Nobel County: Antero Resources Corporation Ervin Site Pad Project, Summitville West Pipeline,

3 Gathering Lines for Kleinfelder East, Inc. and Cardinal gas Services, LLC in Carroll County: Lindentree to Waynesburg Pipeline Project, Waynesburg Pipeline Project, Atwood to Lindentree Phase I Pipeline Project,

West Virginia 3 Gathering Lines for Hatch Mott MacDonald and Appalachia Midstream Services, LLC in Tyler County: Canton Pipeline Project , Canton North Extension Pipeline Project, Canton South/Canton Connector Gathering Line Project

3 Gathering Lines for Hatch Mott MacDonald and Appalachia Midstream Services, LLC in Doddridge County: Moore Pipeline Project, Erwin Valley Pipeline Project, Erwin Hilltop Pipeline Project

1 Gathering Line for Potesta & Associates, Inc. and EQT Production in Doddridge County: WEU 6 Well Line project.

2 Gathering Lines for Kleinfelder East Inc. and Antero Resources Appalachian Corporation in Doddridge County: Eureka Lateral Gathering Line Project, Leatherman Gathering Line Project.

2 Gathering Lines for CTL Engineering Inc. and Antero Resources Appalachian Corporation in Doddridge County: Erwin Valley Gathering Line Project and Erwin Hilltop Gathering Line Project.

2011 Projects

New York Phase I Survey of the Minisink Compressor Station Project, Orange County, New York. Millennium. For Hatch Mott MacDonald. Survey and co-author.

Phase I Survey for the Empire Tioga pipeline, Steuben County for Hatch Mott MacDonald.

Pennsylvania Pennsylvania Phase II survey for the AK Environmental Marc I Pipeline project Bradford County, PA

1 Gathering Line for Kleinfelder East, Inc. and Williams ABA in Susquehanna County: Crystella Pipeline Project.

7 Gathering Lines for Kleinfelder East, Inc. and Appalachia Midstream Services, LLC in Bradford County: Sayre Hill, Orwell, Nadine, Babcock, Babcock Extension, Anthracite West and Otis Gathering Line Projects,

	14 Gathering Lines for Hanover Engineering and Appalachia Midstream Services, LLC in Bradford County: KLF project, Yencha Gathering Line Project, Laurel Gathering Line Project, Vandemark Gathering Line Project, Lehigh Phase I Gathering Line Project, Kilmer Gathering Line Project, Oilcan Gathering Line Project, Yaney Gathering Line Project, Chase Gathering Line Project, Balsam Gathering Line Project, Grammes Gathering Line Project, Baumunk Gathering Line Project, Yengo Gathering Line Project, and Wright Gathering Line Project.
	Phase I for the AK Environmental Marc I Pipeline project in Bradford County, PA
	1 Gathering Line for AK Environmental Ogontz 49-52 Well Lateral Project in Lycoming County, PA
Tennessee	Phase I Survey of the Wacker Polysilicon North America, LLC Utility Corridor Project, Bradley County, Tennessee. For Wacker Polysilicon North America, LLC. Survey only.
West Virginia	2 Gathering Lines for Hatch Mott MacDonald and Antero Resources Appalachian Corporation in Doddridge County: Swiger Pipeline Project, Tichenal pipeline
	1 Gathering Line for Hatch Mott MacDonald and Antero Resources Appalachian Corporation in Harrison County: Posey Pipeline Project.
	1 Gathering Line for Dominion in Calhoun County: H-192 gathering line.
	Phase I survey for the NRCS Salem Fork Project

2010 Projects

Illinois	Phase II survey for the IGT-6 Natural Gas Pipeline Gray & Pape Inc.
	Phase I Survey for the Akuo Energy wind farm, for JFNew Consultants
Indiana	Phase I survey for the U.S. 231 alt 30 bypass Gray & Pape Inc.
	Phase I survey for the I-69 Highway reroutes section 4 Gray & Pape Inc.
	Phase I Survey Akuo Energy wind farm, Montgomery County, IN for JFNew Consultants
Kentucky	Phase I survey for the NRCS Travis Farms Project in Union County, KY
	Mitigation of the Ghent Cemetery in Carroll County, KY for GAI Consultants
Michigan	Phase I Survey for the InvenEnergy, LLC wind farm, Gratiot County, MI for JFNew Consultants
Mississippi	Phase I survey for the Tennessee Gas PIP-Snow Lake Pipeline Project in Benton County, MS
Ohio	Mitigation of the Washington Park Cemetery, Cincinnati, OH Gray & Pape Inc.
	Phase I survey for the I-Brent Spence Bridge replacement Study for Gray & Pape Inc.
	Phase I Survey for the Ravenna Arsenal Project, Portage County, OH for JFNew Consultants
	Phase I Survey for the Horizon Wind energy wind farm, Paulding County, OH for JFNew Consultants

Appendix F

APPENDIX F
NOISE

This appendix contains the Technical Report presenting the Noise analysis prepared for the Environmental Assessment.

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NOISE TECHNICAL REPORT

For the Proposed Air Cargo Facility Development

at

Cincinnati/Northern Kentucky International Airport

September 2018

Prepared for:

Kenton County Airport Board

Prepared by:

Landrum & Brown, Incorporated

11279 Cornell Park Road

Cincinnati, Ohio 45242

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1.0 INTRODUCTION

The purpose of this Noise Technical Report is to provide supporting documentation for the Environmental Assessment (EA) being prepared for the Proposed Air Cargo Facility Development project at the Cincinnati/Northern Kentucky International Airport (CVG or Airport). Noise Exposure Contours were prepared for the following conditions: Existing, Future (2021) No Action, Future (2021) Proposed Action, Future (2026) No Action, and Future (2026) Proposed Action. The Existing Noise Exposure Contour represents the current operating conditions at CVG and is based on data collected from January 2017 through December 2017, which was the most recent data available when modeling began. The Future (2021) conditions represent the opening year of the air cargo facility. Future (2026) conditions represent five years after the opening of the air cargo facility.

2.0 BACKGROUND ON CHARACTERISTICS OF NOISE

Sound is created by a vibrating source that induces vibrations in the air. The vibration produces alternating bands of relatively dense and sparse particles of air, spreading outward from the source like ripples on a pond. Sound waves dissipate with increasing distance from the source. Sound waves can also be reflected, diffracted, refracted, or scattered. When the source stops vibrating, the sound waves disappear almost instantly and the sound ceases.

Sound conveys information to listeners. It can be instructional, alarming, pleasant and relaxing, or annoying. Identical sounds can be characterized by different people, or even by the same person at different times, as desirable or unwanted. Unwanted sound is commonly referred to as "noise."

Sound can be defined in terms of three components:

1. Level (amplitude)
2. Pitch (frequency)
3. Duration (time pattern)

2.1 SOUND LEVEL

The level of sound is measured by the difference between atmospheric pressure (without the sound) and the total pressure (with the sound). Amplitude of sound is like the relative height of the ripples caused by the stone thrown into the water. Although physicists typically measure pressure using the linear Pascal scale, sound is measured using the logarithmic decibel (dB) scale. This is because the range of sound pressures detectable by the human ear can vary from *1 to 100 trillion units*. A logarithmic scale allows us to discuss and analyze noise using more manageable numbers. The range of audible sound ranges from approximately 1 to 140 dB, although everyday sounds rarely rise above about 120 dB. The human ear is extremely sensitive to sound pressure fluctuations. A sound of 140 dB, which is sharply painful to humans, contains *100 trillion (10^{14}) times more* sound pressure than the least audible sound.

By definition, a 10-dB increase in sound is equal to a tenfold (10^1) increase in the mean square sound pressure of the reference sound. A 20-dB increase is a 100-fold (10^2) increase in the mean square sound pressure of the reference sound. A 30-dB increase is a 1,000-fold (10^3) increase in mean square sound pressure.

A logarithmic scale requires different mathematics than used with linear scales. The sound pressures of two separate sounds, expressed in dB, are not arithmetically additive. For example, if a sound of 80 dB is added to another sound of 74 dB, the total is a 1-dB increase in the louder sound (81 dB), not the arithmetic sum of 154 dB. If two equally loud noise events occur simultaneously, the sound pressure level from the combined events is 3-dB higher than the level produced by either event alone.

Human perceptions of changes in sound pressure are less sensitive than a sound level meter. People typically perceive a tenfold increase in sound pressure, a 10-dB increase, as a doubling of loudness. Conversely, a 10-dB decrease in sound pressure is normally perceived as half as loud. In community settings, most people perceive a 3-dB increase in sound pressure (a doubling of the sound pressure or energy) as just noticeable. (In laboratory settings, people with good hearing are able to detect changes in sounds of as little as 1-dB.)

2.2 SOUND FREQUENCY

The pitch (or frequency) of sound can vary greatly from a low-pitched rumble to a shrill whistle. If we consider the analogy of ripples in a pond, high frequency sounds are vibrations with tightly spaced ripples, while low rumbles are vibrations with widely spaced ripples. The rate at which a source vibrates determines the frequency. The rate of vibration is measured in units called "Hertz" -- the number of cycles, or waves, per second. One's ability to hear a sound depends greatly on the frequency composition. Humans hear sounds best at frequencies between 1,000 and 6,000 Hertz. Sound at frequencies above 10,000 Hertz (high-pitched hissing) and below 100 Hertz (low rumble) are much more difficult to hear.

If we are attempting to measure sound in a way that approximates what our ears hear, we must give more weight to sounds at the frequencies we hear well and less weight to sounds at frequencies we do not hear well. Acousticians have developed several weighting scales for measuring sound. The A-weighted scale was developed to correlate with the judgments people make about the loudness of sounds. The A-weighted decibel scale (dBA) is used in studies where audible sound is the focus of inquiry. The U.S. Environmental Protection Agency (USEPA) has recommended the use of the A-weighted decibel scale in studies of environmental noise.[1] Its use is required by the FAA in airport noise studies.[2] For the purposes of this analysis, dBA was used as the noise metric and dB and dBA are used interchangeably.

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1 Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety. U.S. Environmental Protection Agency, Office of Noise Abatement and Control. 1974, P. A-10.

2 "Airport Noise Compatibility Planning." 14 CFR Part 150, Sec. A150.3, September 24, 2004.

2.3 DURATION OF SOUNDS

The duration of sounds – their patterns of loudness and pitch over time – can vary greatly. Sounds can be classified as *continuous* like a waterfall, *impulsive* like a firecracker, or *intermittent* like aircraft overflights. Intermittent sounds are produced for relatively short periods, with the instantaneous sound level during the event roughly appearing as a bell-shaped curve. An aircraft event is characterized by the period during which it rises above the background sound level, reaches its peak, and then recedes below the background level.

3.0 STANDARD NOISE DESCRIPTORS

Given the multiple dimensions of sound, a variety of descriptors, or metrics, have been developed for describing sound and noise. Some of the most commonly used metrics are discussed in this section. They include:

1. Maximum Level (Lmax)
2. Time Above Level (TA)
3. Sound Exposure Level (SEL)
4. Equivalent Sound Level (Leq)
5. Day/Night Average Sound Level (DNL)

3.1 MAXIMUM LEVEL (LMAX)

Lmax is simply the highest sound level recorded during an event or over a given period of time. It provides a simple and understandable way to describe a sound event and compare it with other events. In addition to describing the peak sound level, Lmax can be reported on an appropriate weighted decibel scale (A-weighted, for example) so that it can disclose information about the frequency range of the sound event in addition to the loudness.

Lmax, however, fails to provide any information about the <u>duration</u> of the sound event. This can be a critical shortcoming when comparing different sounds. Even if they have identical Lmax values, sounds of greater duration contain more sound energy than sounds of shorter duration. Research has demonstrated that for many kinds of sound effects, the total sound energy, not just the peak sound level, is a critical consideration.

3.2 TIME ABOVE LEVEL (TA)

The "time above," or TA, metric indicates the amount of time that sound at a particular location exceeds a given sound level threshold. TA is often expressed in terms of the total time per day that the threshold is exceeded. The TA metric explicitly provides information about the duration of sound events, although it conveys no information about the peak levels during the period of observation.

3.3 SOUND EXPOSURE LEVEL (SEL)

The sound exposure level, or SEL metric, provides a way of describing the total sound energy of a single event. In computing the SEL value, all sound energy occurring during the event, within 10 dB of the peak level (Lmax), is mathematically integrated over one second. (Very little information is lost by discarding the sound below the 10 dB cut-off, since the highest sound levels completely dominate the integration calculation.) Consequently, the SEL is always greater than the Lmax for events with a duration greater than one second. SELs for aircraft overflights typically range from five to 10 dB higher than the Lmax for the event.

3.4 EQUIVALENT SOUND LEVEL (LEQ)

The equivalent sound level (Leq) metric may be used to define cumulative noise dosage, or noise exposure, over a period of time. In computing Leq, the total noise energy over a given period of time, during which numerous events may have occurred, is logarithmically averaged over the time period. The Leq represents the steady sound level that is equivalent to the varying sound levels actually occurring during the period of observation. For example, an 8-hour Leq of 67 dB indicates that the amount of sound energy in all the peaks and valleys that occurred in the 8-hour period is equivalent to the energy in a continuous sound level of 67 dB. Leq is typically computed for measurement periods of 1 hour, 8 hours, or 24 hours, although any time period can be specified.

Leq is a critical noise metric for many kinds of analysis where total noise dosage, or noise exposure, is under investigation. As already noted, noise dosage is important in understanding the effects of noise on both animals and people. Indeed, research has led to the formulation of the "equal energy rule." This rule states that it is the total acoustical energy to which people are exposed that explains the effects the noise will have on them. That is, a very loud noise with a short duration will have the same effect as a lesser noise with a longer duration if they have the same total sound energy.

3.5 DAY/NIGHT AVERAGE SOUND LEVEL (DNL)

The DNL metric is really a variation of the 24-hour Leq metric. Like Leq, the DNL metric describes the total noise exposure during a given period. Unlike Leq, however, DNL, by definition, can only be applied to a 24-hour period. In computing DNL, an extra weight of 10 dB is assigned to any sound levels occurring between the hours of 10:00 p.m. and 6:59 a.m. This is intended to account for the greater annoyance that nighttime noise is presumed to cause for most people. Recalling the logarithmic nature of the dB scale, this extra weight treats one nighttime noise event as equivalent to 10 daytime events of the same magnitude.

As with Leq, DNL values are strongly influenced by the loud events. For example, 30 seconds of sound of 100 dB, followed by 23 hours, 59 minutes, and 30 seconds of silence would compute to a DNL value of 65 dB. If the 30 seconds occurred at night, it would yield a DNL of 75 dB.

This example can be roughly equated to an airport noise environment. Recall that an SEL is the mathematical compression of a noise event into one second. Thus, 30 SELs of 100 dB during a 24-hour period would equal DNL 65 dB, or DNL 75 dB if they occurred at night. This situation could actually occur in places around a real airport. If the area experienced 30 overflights during the day, each of which produced an SEL of 100 dB, it would be exposed to DNL 65 dB. Recalling the relationship of SEL to the peak noise level (Lmax) of an aircraft overflight, the Lmax recorded for each of those overflights (the peak level a person would actually hear) would typically range from 90 to 95 dB.

4.0 REGULATORY SETTING

This section presents information regarding noise and land use criteria that may be useful in the evaluation of noise impacts. The FAA has a long history of publishing noise and use assessment criteria. A summary of some of the more pertinent regulations and guidelines is presented in the following paragraphs.

4.1 NOISE CONTROL ACT

Congress passed the Noise Control Act (42 U.S.C. §4901 et seq.) in 1972, which established a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. The act set forth the foundation for conducting research and setting guidelines to restrict noise pollution.

4.2 FEDERAL AVIATION NOISE ABATEMENT POLICY

On November 18, 1976, the U.S. Department of Transportation and FAA jointly issued the Federal Aviation Noise Abatement Policy. This policy recognized aircraft noise as a major constraint on the further development of the commercial aviation established key responsibilities for addressing aircraft noise. The policy stated that the Federal Government has the authority and responsibility to regulate noise at the source by designing and managing flight procedures to limit the impact of aircraft noise on local communities; and by providing funding to airports for noise abatement planning.

4.3 AVIATION SAFETY AND NOISE ABATEMENT ACT OF 1979

The Aviation Safety and Noise Abatement Act of 1979 (ASNA), which is codified as 49 U.S.C. 47501-47510, set forth the foundation for the airport noise compatibility planning program outlined in 14 Code of Federal Regulations (CFR) Part 150. The act established the requirements for conducting noise compatibility planning and provided assistance to, and funding for which airport operators could apply to undertake such planning.

4.4 AIRPORT NOISE AND CAPACITY ACT OF 1990

The Airport Noise and Capacity Act (ANCA) of 1990 established two broad directives for the FAA: 1) to establish a method by which to review airport noise and access/use restrictions imposed by airport proprietors, and 2) to institute a program to phase out Stage 2 aircraft over 75,000 lbs. by December 31, 1999.[3] To implement ANCA, the FAA amended 14 CFR Part 91 and issued 14 CFR Part 161 which sets forth noise levels that are permitted for aircraft of various weights, engine number.

[3] Title 14, Part 36 of the CFR sets forth noise levels that are permitted for aircraft of various weights, engine number, and date of certification. Aircraft were divided into three classes according to noise level, Stage 1, Stage 2, and Stage 3, with Stage three being the quietest. Per 14 CFR Part 36, to be designated as Stage 3, aircraft must meet noise levels defined by the FAA at takeoff, sideline, and approach measurement locations.

4.5 FEDERAL REQUIREMENTS TO USE DNL IN ENVIRONMENTAL NOISE STUDIES

DNL is the standard metric used for environmental noise analysis in the U.S. This practice originated with the USEPA's effort to comply with the Noise Control Act of 1972. The USEPA designated a task group to "consider the characterization of the impact of airport community noise and develop a community noise exposure measure."[4] The task group recommended using the DNL metric. The USEPA accepted the recommendation in 1974, based on the following considerations:

- The measure is applicable to the evaluation of pervasive, long-term noise in various defined areas and under various conditions over long periods of time.
- The measure correlates well with known effects of the noise environment on individuals and the public.
- The measure is simple, practical, and accurate.
- Measurement equipment is commercially available.
- The metric at a given location is predictable, within an acceptable tolerance, from knowledge of the physical events producing the noise.[5]

Soon thereafter, the Department of Housing and Urban Development (HUD), Department of Defense, and the Veterans Administration adopted the use of DNL.

At about the same time, the Acoustical Society of America developed a standard (ANSI S3.23-1980) which established DNL as the preferred metric for outdoor environments. This standard was reevaluated in 1990 and they reached the same conclusions regarding the use of DNL (ANSI S12.40-1990).

In 1980, the Federal Interagency Committee on Urban Noise (FICUN) met to consolidate Federal guidance on incorporating noise considerations in local land use planning. The committee selected DNL as the best noise metric for the purpose, thus endorsing the USEPA's earlier work and making it applicable to all Federal agencies.[6]

In response to the requirements of the ASNA Act of 1979 and the recommendations of FICUN and USEPA, the FAA established DNL in 1981 as the single metric for use in airport noise and land use compatibility planning. This decision was incorporated into the final rule implementing ASNA, 14 CFR Part 150, in 1985. Part 150 established the DNL as the noise metric for determining the exposure of individuals to aircraft noise and identified residential land uses as being normally compatible with noise levels below DNL 65 dB.

4 Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety. U.S. Environmental Protection Agency, Office of Noise Abatement and Control. 1974, P. A-10.
5 Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety. U.S. Environmental Protection Agency, Office of Noise Abatement and Control. 1974, Pp. A-1–A-23.
6 *Guidelines for Considering Noise in Land Use Planning and Control*. Federal Interagency Committee on Urban Noise (FICUN). 1980.

5.0 MODELING METHODOLOGY

The analysis of noise exposure around CVG was prepared using the FAA's Aviation Environmental Design Tool (AEDT) Version 2d SP2. Inputs to the AEDT include runway definition, number of aircraft operations during the time period evaluated, the types of aircraft flown, the time of day when they are flown, how frequently each runway is used for arriving and departing aircraft, the routes of flight used when arriving to and departing from the runways, and ground run-up activity. The AEDT calculates noise exposure for the area around an airport and outputs contours of noise exposure using the Day-Night Average Sound Level (DNL) metric. Noise exposure contours for the levels of 65, 70, and 75 DNL were calculated and represent average-annual day conditions.

5.1 EXISTING NOISE EXPOSURE CONTOUR INPUT DATA

Runway Definition: The Airport currently has four runways: three parallel runways (18L/36R, 18C/36C, and 18R/36L), and a crosswind runway (09/27). The current airfield layout at CVG is shown on **Exhibit 1**. The runways and lengths at CVG are listed below:

Runway	Length (feet)
09/27	12,000
18L/36R	10,000
18C/36C	11,000
18R/36L	8,000

Number of Operations and Fleet Mix: The number of annual operations modeled for the Air Cargo Facility Development EA at CVG was based on Air Traffic Control Tower (ATCT) counts for the period from January 2017 through December 2017, which was the most recent twelve months of data available when the noise modeling began. During that twelve-month period, 150,463 operations occurred at CVG, which results in 412.2 average-annual day operations. Specific aircraft types and times of operation for commercial and non-commercial aircraft was based on representative aircraft derived from the flight information included in the Airport's flight tracking system data for the period from January 2017 through December 2017. **Table 1** provides a summary of the average daily operations and fleet mix at CVG, organized by aircraft type, operation type, and time of day.

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Air Cargo Facility Environmental Assessment	**Existing Airfield Layout**	EXHIBIT: **1**

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Table 1
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY
EXISTING CONDITIONS

Aircraft Type	Noise Model ID	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Heavy Jets						
Boeing 747-800 Freighter	7478	1.0	3.0	1.4	2.6	7.9
Boeing 747-400 Series Freighter	747R21	0.6	1.8	0.8	1.5	4.7
Boeing 767-300 Series	767300	3.7	11.6	5.3	10.0	30.7
Boeing 767-200 Series Freighter	767CF6	3.5	10.9	5.0	9.4	28.7
Boeing 777 Freighter	777FRE	0.4	1.3	0.6	1.1	3.5
Airbus A300F4-600 Series	A300-622R	0.3	1.0	0.5	0.9	2.7
Airbus A300-200 Series Freighter	A300B4-203	0.0	0.1	0.0	0.1	0.3
Subtotal		*9.5*	*29.7*	*13.6*	*25.6*	*78.4*
Large Cargo Jets						
Boeing 727-200 Series Freighter	727EM2	0.1	0.3	0.1	0.2	0.7
Boeing 737-400 Series Freighter	737400	0.2	4.1	0.8	3.5	8.6
Boeing 757-200 Series Freighter	757PW	2.3	0.4	2.5	0.3	5.5
Boeing 757-200 Series	757RR	1.3	0.2	1.4	0.1	3.1
Subtotal		*3.9*	*5.1*	*4.9*	*4.1*	*17.9*
Large Passenger Jets						
Boeing 717-200 Series	717200	1.6	1.6	1.6	1.6	6.4
Boeing 737-300 Series	737300	0.1	0.0	0.1	0.0	0.2
Boeing 737-700 Series	737700	3.6	0.7	3.8	0.4	8.5
Boeing 737-800 Series	737800	5.9	1.1	6.4	0.7	14.1
Boeing 737-900-ER	737900	0.6	0.1	0.7	0.1	1.5
Airbus A319-100 Series	A319-131	7.6	1.4	8.1	0.8	17.9
Airbus A320-200 Series	A320-211	8.2	1.5	8.8	0.9	19.3
Airbus A320-200 Series	A320-232	0.6	0.1	0.6	0.1	1.4
Airbus A321-100 Series	A321-232	2.4	0.4	2.5	0.3	5.6
Boeing MD-82	MD82	1.3	0.2	1.4	0.1	3.0
Boeing MD-83	MD83	6.7	1.2	7.1	0.7	15.8
Boeing MD-90	MD9025	0.2	0.0	0.2	0.0	0.5
Subtotal		*38.7*	*8.4*	*41.4*	*5.7*	*94.1*
Regional Jets						
Bombardier CRJ-100	CLREGJ	20.8	2.3	21.0	2.1	46.1
Bombardier CRJ-700-ER	CRJ701	17.6	3.2	18.9	1.9	41.7
Bombardier CRJ-900	CRJ9-ER	19.6	3.6	21.1	2.2	46.4
Embraer ERJ145-LR	EMB145	12.5	1.4	12.6	1.3	27.7
Embraer ERJ170	EMB170	4.0	0.7	4.2	0.4	9.3
Embraer ERJ175	EMB175	8.8	1.6	9.4	1.0	20.8
Subtotal		*83.3*	*12.8*	*87.2*	*8.9*	*192.1*

Table 1, *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY EXISTING CONDITIONS

Aircraft Type	Noise Model ID	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Business Jets						
Cessna 650 Citation III	CIT3	0.0	0.0	0.0	0.0	0.1
Bombardier Challenger 600	CL600	1.4	0.2	1.4	0.1	3.2
Bombardier Challenger 601	CL601	0.1	0.0	0.1	0.0	0.3
Cessna 500 Citation I	CNA500	0.6	0.4	0.7	0.4	2.1
Cessna 500 Citation I	CNA510	0.0	0.0	0.0	0.0	0.1
Cessna 525 Citation Jet	CNA525C	0.3	0.2	0.3	0.2	0.9
Cessna 550 Citation II Bravo	CNA55B	0.5	0.1	0.5	0.0	1.0
Cessna 560 Citation Ultra	CNA560U	0.1	0.0	0.1	0.0	0.2
Cessna 560 Citation Excel	CNA560XL	0.4	0.0	0.4	0.0	1.0
Cessna 680 Citation Sovereign	CNA680	0.1	0.0	0.1	0.0	0.1
Cessna 750 Citation X	CNA750	0.1	0.0	0.1	0.0	0.1
Eclipse Aerospace EA500	ECLIPSE500	0.0	0.0	0.0	0.0	0.1
Fokker 100	F10062	0.1	0.0	0.1	0.0	0.3
Gulfstream G-IIB	GIIB	0.1	0.0	0.1	0.0	0.3
Gulfstream G450	GIV	0.1	0.0	0.1	0.0	0.3
Gulfstream V	GV	0.2	0.0	0.2	0.0	0.4
Raytheon Hawker 800	IA1125	0.1	0.0	0.1	0.0	0.2
Bombardier Learjet 60	LEAR35	0.6	0.1	0.6	0.1	1.3
Mitsubishi MU-300	MU3001	0.2	0.0	0.2	0.0	0.4
Subtotal		*5.1*	*1.1*	*5.2*	*1.0*	*12.4*
Propeller Aircraft						
Raytheon Beechcraft 1900	1900D	0.9	0.1	0.9	0.1	2.0
Beechcraft Baron 58P	BEC58P	0.4	0.0	0.4	0.0	0.9
Cessna 172 Skyhawk	CNA172	0.3	0.2	0.3	0.2	1.0
Cessna 182 Skyhawk	CNA182	0.1	0.0	0.1	0.0	0.2
Cessna 206 Caravan	CNA206	0.1	0.0	0.1	0.0	0.2
Cessna 208 Caravan	CNA208	0.7	0.5	0.8	0.4	2.5
Cessna 441 Conquest II	CNA441	0.8	0.1	0.8	0.1	1.8
De Havilland Canada DHC Twin Otter	DHC6	1.6	0.2	1.6	0.2	3.6
Dornier Do 228	DO228	0.1	0.0	0.1	0.0	0.1
Embraer EMB120 Brasilia	EMB120	0.4	0.3	0.4	0.2	1.3
General Aviation Single Engine Prop	GASEPV	0.7	0.1	0.7	0.1	1.6
Piper PA-28 Cherokee	PA28	0.1	0.1	0.1	0.1	0.3
Shorts 330 Series	SD330	0.5	0.3	0.6	0.3	1.7
Subtotal		*6.7*	*1.9*	*6.9*	*1.7*	*17.2*
Grand Total		**147.3**	**58.9**	**159.1**	**47.0**	**412.2**

Notes: Day = 7:00 a.m. to 9:59 p.m., Night = 10:00 p.m. to 6:59 a.m.
Totals may not equal sum due to rounding.

Source: FAA Operations Network (OPSNET) data, CVG Flight Tracking System Data, Landrum & Brown, 2018.

Runway End Utilization: Average-annual day runway end utilization was derived primarily from analysis of radar data and a review of previous noise analysis at CVG. **Table 2** summarizes the percentage of use by each aircraft category on each of the runways at CVG during the daytime (7:00 a.m. – 9:59 p.m.) and nighttime (10:00 p.m. – 6:59 a.m.).

Table 2
RUNWAY END UTILIZATION - EXISTING CONDITIONS

Daytime Arrivals								
	09	**27**	**18C**	**18L**	**18R**	**36C**	**36L**	**36R**
Heavy Jets	0.9%	2.5%	22.8%	54.5%	0.5%	6.5%	0.0%	12.4%
Large Cargo Jets	0.8%	3.1%	36.2%	38.5%	0.0%	10.8%	0.0%	10.8%
Large Passenger Jets	0.5%	3.8%	31.3%	40.8%	0.3%	10.4%	0.0%	12.9%
Propeller Aircraft	0.5%	4.2%	33.8%	39.1%	1.0%	11.5%	0.1%	9.9%
Regional / Business Jets	0.4%	4.1%	33.1%	37.5%	0.3%	12.9%	0.0%	11.8%
Nighttime Arrivals								
	09	**27**	**18C**	**18L**	**18R**	**36C**	**36L**	**36R**
Heavy Jets	60.5%	32.2%	4.1%	0.0%	0.0%	2.2%	0.0%	0.9%
Large Cargo Jets	18.1%	27.7%	3.4%	7.8%	0.4%	4.6%	0.1%	38.0%
Large Passenger Jets	56.9%	34.3%	4.3%	0.1%	0.0%	2.7%	0.0%	1.8%
Propeller Aircraft	43.9%	27.3%	4.7%	3.1%	0.2%	3.1%	0.0%	17.7%
Regional / Business Jets	17.0%	18.9%	7.5%	17.6%	7.7%	3.4%	0.0%	28.0%
Daytime Departures								
	09	**27**	**18C**	**18L**	**18R**	**36C**	**36L**	**36R**
Heavy Jets	0.0%	84.0%	5.1%	4.3%	0.0%	2.8%	0.0%	3.8%
Large Cargo Jets	0.0%	67.6%	2.2%	17.3%	0.6%	1.9%	0.0%	10.3%
Large Passenger Jets	0.0%	68.4%	3.5%	18.5%	0.0%	2.2%	0.0%	7.3%
Propeller Aircraft	0.0%	62.6%	2.5%	24.3%	0.1%	1.7%	0.0%	8.8%
Regional / Business Jets	0.0%	69.5%	2.2%	16.7%	0.8%	2.2%	0.5%	8.1%
Nighttime Departures								
	09	**27**	**18C**	**18L**	**18R**	**36C**	**36L**	**36R**
Heavy Jets	0.0%	85.0%	1.2%	0.4%	0.0%	4.4%	0.0%	9.0%
Large Cargo Jets	0.1%	78.8%	1.0%	3.7%	0.3%	6.0%	0.0%	10.0%
Large Passenger Jets	0.0%	80.2%	1.6%	1.6%	0.0%	8.4%	0.0%	8.2%
Propeller Aircraft	0.0%	80.9%	1.2%	5.2%	0.1%	8.4%	0.2%	4.1%
Regional / Business Jets	0.2%	30.2%	1.0%	12.5%	0.1%	8.5%	1.3%	46.4%

Daytime = 7:00 a.m. – 9:59 p.m.
Nighttime = 10:00 p.m. – 6:59 a.m.
Source: FAA radar data, Landrum & Brown analysis, 2018.

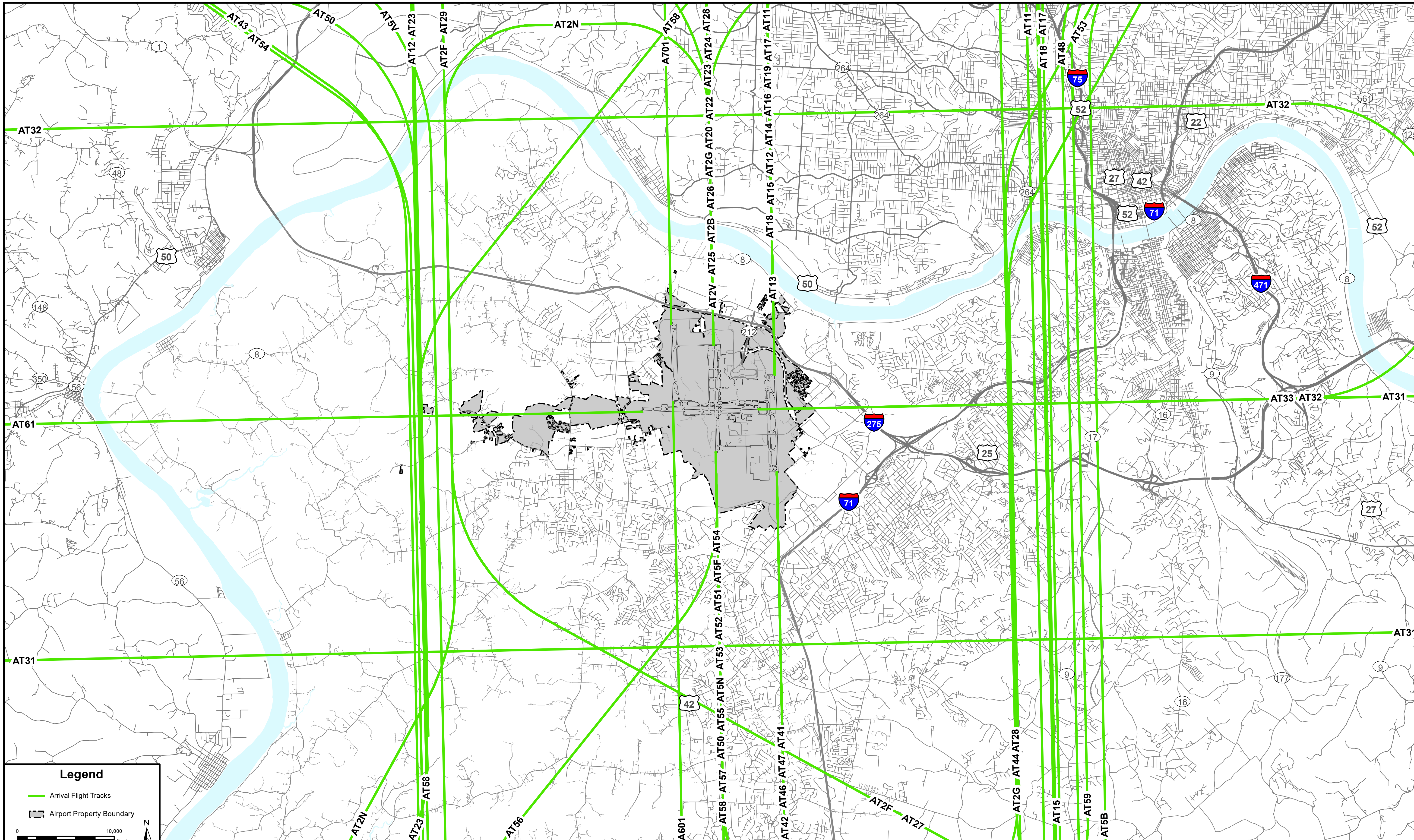
During the daytime, the Airport operates in one of two operating configurations - south/west flow or north/west flow. When the Airport operates in the south/west flow configuration, aircraft arrive from the north to Runways 18L and 18C. Departures to the south/west occur from Runways 18L, 18C, and 27. The primary departure runway is Runway 27 followed by Runways 18L and 18C. When the Airport operates in the north/west flow, aircraft arrive from the south to Runways 36R and 36C. Departures to the north/west occur from Runways 27, 36R, and 36C.

During the nighttime, Runway 9 is the primary runway for arrivals and Runway 27 is the preferred departure runway due to the compatible land use corridor that has been created as a result of a land acquisition program to the west of CVG the Airport

Flight Tracks: Radar data was gathered for selected periods from January 2017 through December 2017[7] and analyzed to verify the location, density, and width of existing flight corridors. Consolidated flight tracks were developed from this radar data and used in the AEDT to model the flight corridors present around the Airport.

The AEDT arrival flight tracks modeled for the Existing Noise Exposure Contour are shown on **Exhibit 2. Table 3** shows arrival flight track utilization percentages. The AEDT departure flight tracks modeled for the Existing Noise Exposure Contour are shown on **Exhibit 3. Table 4** shows departure flight track utilization percentages for the Existing conditions. Each flight track is identified by a track ID that corresponds to the label in the flight track exhibits.

[7] Radar flight track data was obtained from specific days in February, May, August, and November 2017 to provide a sample of data from different seasons and days of the week.



Air Cargo Facility
Environmental Assessment

Modeled Arrival Flight Tracks

EXHIBIT:
2

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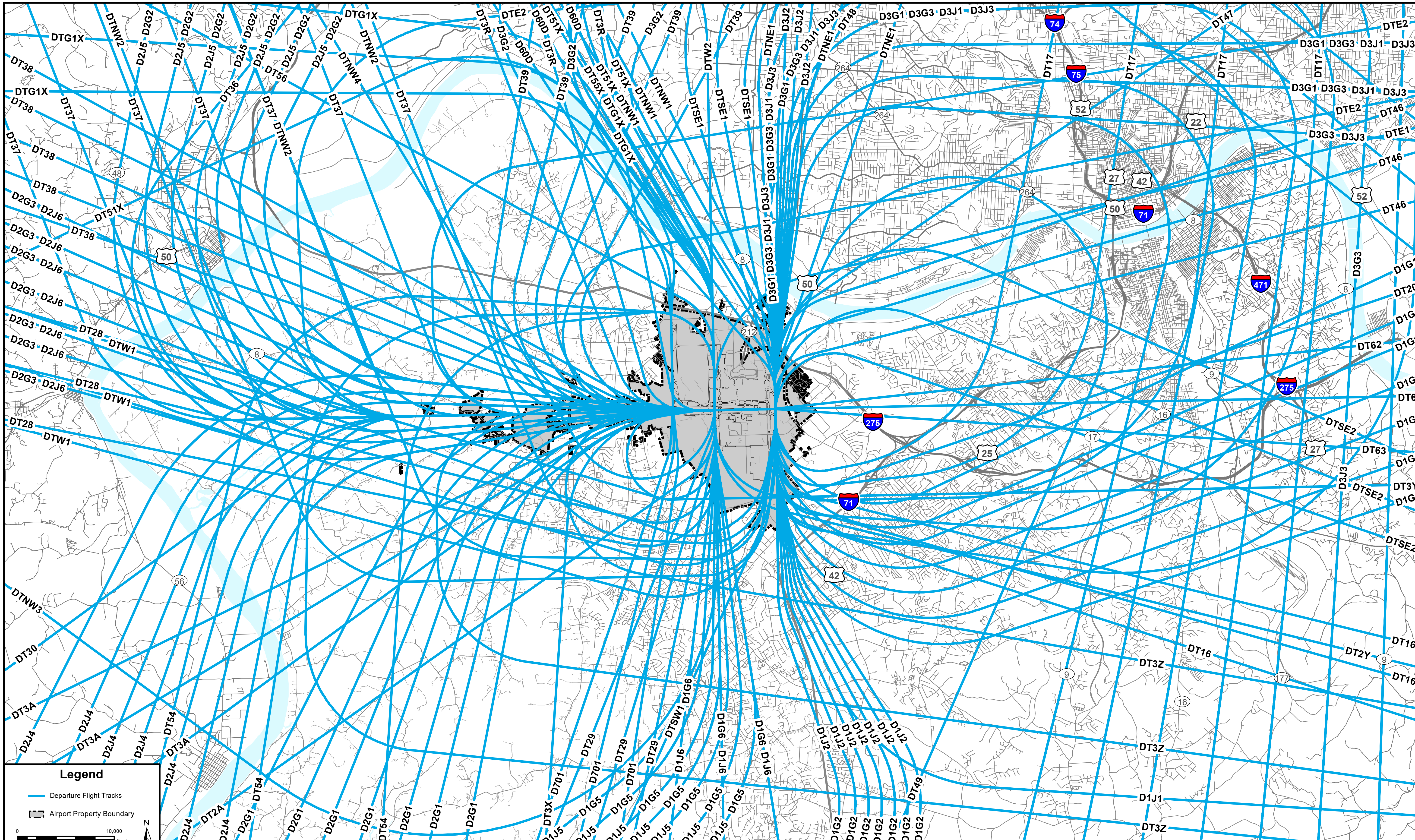

Air Cargo Facility Environmental Assessment

Modeled Departure Flight Tracks

EXHIBIT: 3

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Table 3
ARRIVAL FLIGHT TRACK UTILIZATION PERCENTAGES – EXISTING CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
09	AT61	46.0%	10.6%	10.6%	10.0%	2.6%
27	AT31	14.6%	8.9%	4.6%	5.5%	2.3%
	AT32	6.7%	6.6%	2.1%	2.4%	1.6%
	AT33	3.7%	1.5%	2.5%	1.3%	2.2%
18C	AT20	0.0%	0.0%	0.0%	4.4%	3.7%
	AT22	2.7%	0.0%	4.7%	0.0%	0.0%
	AT23	3.9%	15.1%	11.7%	0.0%	0.0%
	AT24	0.9%	2.5%	3.4%	0.0%	0.0%
	AT25	1.1%	0.0%	6.6%	0.0%	0.0%
	AT26	0.0%	0.0%	0.0%	2.9%	3.4%
	AT27	0.0%	0.0%	0.0%	1.1%	1.2%
	AT28	0.0%	0.0%	0.0%	1.1%	1.2%
	AT29	0.0%	0.0%	0.0%	4.3%	5.4%
	AT2B	0.0%	0.0%	0.0%	2.9%	3.4%
	AT2F	0.0%	0.0%	0.0%	1.1%	1.2%
	AT2G	0.0%	0.0%	0.0%	1.1%	1.2%
	AT2N	0.0%	0.0%	0.0%	4.3%	5.4%
	AT2V	0.0%	0.0%	0.0%	4.4%	3.7%
18L	AT11	0.8%	0.0%	4.2%	0.0%	0.0%
	AT12	5.9%	18.1%	14.8%	0.0%	0.0%
	AT13	4.2%	0.0%	6.0%	0.0%	0.0%
	AT14	1.4%	3.0%	4.4%	0.0%	0.0%
	AT15	0.8%	0.0%	4.2%	0.0%	0.0%
	AT16	0.0%	0.0%	0.0%	6.6%	8.1%
	AT17	0.0%	0.0%	0.0%	5.0%	5.4%
	AT18	0.0%	0.0%	0.0%	9.7%	12.6%
	AT19	0.0%	0.0%	0.0%	10.0%	8.7%
18R	A701	0.1%	0.2%	0.2%	0.8%	1.3%
36C	AT50	0.0%	0.0%	0.0%	1.5%	1.5%
	AT51	0.4%	0.0%	2.3%	0.0%	0.0%
	AT52	1.5%	6.2%	4.0%	0.0%	0.0%
	AT53	0.4%	1.0%	1.2%	0.0%	0.0%
	AT54	1.0%	0.0%	1.6%	0.0%	0.0%
	AT55	0.0%	0.0%	0.0%	0.5%	0.9%
	AT56	0.0%	0.0%	0.0%	1.2%	1.6%
	AT57	0.0%	0.0%	0.0%	1.3%	0.9%
	AT58	0.0%	0.0%	0.0%	0.7%	0.9%
	AT59	0.0%	0.0%	0.0%	0.7%	0.9%
	AT5B	0.0%	0.0%	0.0%	0.7%	0.9%
	AT5F	0.0%	0.0%	0.0%	0.5%	0.9%
	AT5N	0.0%	0.0%	0.0%	1.2%	1.7%
	AT5V	0.0%	0.0%	0.0%	1.5%	1.5%
36L	A601	0.0%	0.1%	0.0%	0.1%	0.0%

Table 3, *(continued)*
ARRIVAL FLIGHT TRACK UTILIZATION PERCENTAGES – EXISTING CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
36R	AT41	1.7%	22.4%	4.8%	0.0%	0.0%
	AT42	0.5%	0.0%	2.7%	0.0%	0.0%
	AT43	1.2%	0.0%	1.9%	0.0%	0.0%
	AT44	0.4%	3.7%	1.4%	0.0%	0.0%
	AT46	0.0%	0.0%	0.0%	7.1%	6.7%
	AT47	0.0%	0.0%	0.0%	1.2%	2.2%
	AT48	0.0%	0.0%	0.0%	3.4%	5.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

Source: FAA radar data, Landrum & Brown analysis, 2018.

Table 4
DEPARTURE FLIGHT TRACK UTILIZATION PERCENTAGES – EXISTING CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
09	DT61	0.0%	0.0%	0.0%	0.0%	0.0%
	DT62	0.0%	0.0%	0.0%	0.0%	0.0%
	DT63	0.0%	0.0%	0.0%	0.0%	0.0%
27	D2G1	0.8%	0.0%	3.5%	0.0%	0.0%
	D2G2	83.0%	0.0%	55.9%	0.0%	0.0%
	D2G3	0.8%	0.0%	3.5%	0.0%	0.0%
	D2J4	0.0%	28.4%	0.0%	0.0%	0.0%
	D2J5	0.0%	34.2%	0.0%	0.0%	0.0%
	D2J6	0.0%	10.2%	0.0%	0.0%	0.0%
	DT30	0.0%	0.0%	0.0%	4.3%	5.9%
	DT36	0.0%	0.0%	0.0%	7.0%	7.9%
	DT37	0.0%	0.0%	0.0%	14.2%	11.8%
	DT38	0.0%	0.0%	0.0%	11.6%	7.2%
	DT39	0.0%	0.0%	0.0%	6.6%	5.9%
	DT3A	0.0%	0.0%	0.0%	4.6%	5.9%
	DT3R	0.0%	0.0%	0.0%	2.6%	3.9%
	DT3X	0.0%	0.0%	0.0%	8.6%	5.3%
	DT3Y	0.0%	0.0%	0.0%	3.3%	5.3%
	DT3Z	0.0%	0.0%	3.5%	1.7%	2.6%
	DTE2	0.0%	0.0%	3.5%	1.7%	3.9%
18C	D1G5	2.5%	0.0%	2.4%	0.0%	0.0%
	D1G6	0.0%	0.0%	0.1%	0.0%	0.0%
	D1J5	0.0%	1.6%	0.0%	0.0%	0.0%
	D1J6	0.0%	0.1%	0.0%	0.0%	0.9%
	DT20	0.0%	0.0%	0.0%	0.4%	0.2%
	DT28	0.0%	0.0%	0.0%	1.1%	0.4%
	DT29	0.0%	0.0%	0.0%	0.3%	0.1%
	DT2A	0.0%	0.0%	0.0%	0.3%	0.2%
	DT2Y	0.0%	0.0%	0.0%	0.2%	0.2%
	DTNW3	0.0%	0.0%	0.8%	0.0%	0.1%
	DTNW4	0.0%	0.0%	0.0%	0.0%	0.0%
18L	D1G1	0.4%	0.0%	2.6%	0.0%	0.0%
	D1G2	1.4%	0.0%	13.9%	0.0%	0.0%
	D1J1	0.0%	1.6%	0.0%	0.0%	4.6%
	D1J2	0.0%	9.5%	0.0%	0.0%	6.6%
	DT16	0.0%	0.0%	0.0%	12.9%	2.4%
	DT17	0.0%	0.0%	0.0%	7.6%	1.6%
	DTSW1	0.0%	0.0%	0.0%	0.0%	0.5%
	DTW1	0.0%	0.0%	0.0%	0.0%	0.5%
18R	D701	0.0%	0.5%	0.0%	0.1%	0.8%

Table 4, *(continued)*
DEPARTURE FLIGHT TRACK UTILIZATION PERCENTAGES – EXISTING CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
36C	DT51X	0.0%	3.8%	0.0%	0.0%	0.0%
	DT54	0.0%	0.0%	0.0%	1.2%	1.3%
	DT55X	0.0%	0.0%	0.0%	0.4%	0.4%
	DT56	0.0%	0.0%	0.0%	1.4%	1.1%
	DTE1	0.0%	0.0%	0.0%	0.0%	0.0%
	DTG1X	3.8%	0.0%	3.0%	0.0%	0.0%
	DTW2	0.0%	0.0%	0.0%	0.0%	0.0%
36L	D60D	0.0%	0.0%	0.0%	0.0%	0.6%
36R	D3G1	0.5%	1.7%	0.0%	0.0%	0.0%
	D3G2	2.8%	0.2%	0.1%	0.0%	0.0%
	D3G2	0.0%	0.0%	0.0%	0.0%	0.0%
	D3G3	0.5%	3.6%	0.0%	0.0%	0.0%
	D3J1	0.0%	0.0%	0.3%	0.0%	0.0%
	D3J1	0.0%	0.0%	1.9%	0.0%	0.0%
	D3J2	0.0%	0.0%	0.0%	0.0%	0.0%
	D3J2	0.1%	0.3%	0.3%	0.0%	0.1%
	D3J3	0.0%	0.0%	4.2%	0.0%	0.0%
	DT46	0.0%	0.0%	0.0%	0.3%	1.4%
	DT46	0.0%	0.0%	0.0%	2.3%	2.3%
	DT47	0.0%	0.0%	0.0%	0.1%	0.6%
	DT47	0.0%	0.0%	0.0%	0.9%	0.9%
	DT48	0.0%	0.0%	0.0%	0.1%	0.3%
	DT48	0.0%	0.0%	0.0%	0.9%	0.5%
	DT49	0.0%	0.0%	0.0%	0.3%	1.6%
	DT49	0.0%	0.0%	0.0%	3.1%	2.6%
	DTNE1	2.9%	1.4%	0.0%	0.0%	0.3%
	DTNE1	0.0%	0.0%	0.0%	0.0%	0.5%
	DTNW1	0.1%	0.0%	0.0%	0.0%	0.0%
	DTNW1	0.3%	0.0%	0.0%	0.0%	0.0%
	DTSE1	0.2%	3.0%	0.6%	0.0%	0.0%
	DTSE2	0.0%	0.0%	0.0%	0.0%	0.3%
	DTSE2	0.0%	0.0%	0.0%	0.0%	0.5%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

Source: FAA radar data, Landrum & Brown analysis, 2018.

Aircraft Weight and Trip Length: Aircraft weight upon departure is a factor in the dispersion of noise because it impacts the rate at which an aircraft is able to climb. Generally, heavier aircraft have a slower rate of climb and a wider dispersion of noise along the flight route. Where specific aircraft weights are unknown, the AEDT uses the distance flown to the first stop as a surrogate for the weight, by assuming that the weight has a direct relationship with the fuel load necessary to reach the first destination. The AEDT groups trip lengths into nine stage categories and assigns standard aircraft weights to each stage category. These categories are:

Stage Category	Stage Length
1	0-500 nautical miles
2	501-1000 nautical miles
3	1001-1500 nautical miles
4	1501-2500 nautical miles
5	2501-3500 nautical miles
6	3501-4500 nautical miles
7	4501-5500 nautical miles
8	5501-6500 nautical miles
9	6500+ nautical miles

The trip lengths modeled for the Air Cargo Facility at CVG is based upon a review of aircraft departures primarily from analysis of OAG data and a review of previous noise analysis at CVG. **Table 5** indicates the proportion of the operations that fell within each of the nine trip length categories during this time period. For the Existing conditions, the majority of departures operated to destinations with a stage length of one (0 to 500 nautical miles).

Table 5
DEPARTURE TRIP LENGTH DISTRIBUTION
EXISTING CONDITIONS

Stage Length Category	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
1	16.1%	31.9%	48.0%	100.0%	68.2%
2	29.3%	33.6%	43.0%	0.0%	26.5%
3	17.9%	11.8%	4.0%	0.0%	3.2%
4	16.0%	11.2%	4.7%	0.0%	2.2%
5	6.7%	4.2%	0.0%	0.0%	0.0%
6	6.7%	3.4%	0.3%	0.0%	0.0%
7	7.3%	3.9%	0.0%	0.0%	0.0%
8	0.0%	0.0%	0.0%	0.0%	0.0%
9	0.0%	0.0%	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: FAA radar data, Landrum & Brown analysis, 2018.

5.2 FUTURE (2021) NO ACTION NOISE EXPOSURE CONTOUR INPUT DATA

Runway Definition: No changes to runway configuration are expected at CVG by 2021; therefore, the runway layout discussed for the existing condition was also used to model the Future (2021) No Action Noise Exposure Contour.

Number of Operations and Fleet Mix: The Future (2021) No Action Noise Exposure Contour operating levels are based upon the FAA's Terminal Area Forecast (TAF) issued in January 2018 plus additional air cargo activity that would occur with general growth in aviation demand and the expected increase in cargo operations that would occur with or without the Proposed Action. This growth in activity can be handled at the Airport without new facilities being constructed. The Future (2021) No Action conditions include 194,426 annual operations or 532.7 average-annual day operations, an increase of 29.2 percent from the Existing Noise Exposure Contour operating levels. **Table 6** provides a summary of the average daily operations and fleet mix at CVG for the Future (2021) No Action conditions, organized by aircraft category, operation type, and time of day.

Table 6
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY
FUTURE (2021) NO ACTION CONDITIONS

Aircraft Type	Noise Model ID	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Heavy Jets						
Boeing 747-800 Freighter	7478	1.3	4.0	1.8	3.5	10.7
Boeing 747-400 Series Freighter	747R21	0.8	2.4	1.1	2.1	6.4
Boeing 767-300 Series	767300	12.1	21.8	14.2	19.6	67.7
Boeing 767-200 Series Freighter	767CF6	4.7	14.7	6.8	12.7	38.9
Boeing 777 Freighter	777FRE	0.6	1.8	0.8	1.5	4.7
Airbus A300F4-600 Series	A300-622R	0.3	1.0	0.5	0.9	2.7
Airbus A300-200 Series Freighter	A300B4-203	0.0	0.1	0.0	0.1	0.3
Airbus A300-200 Series Freighter	A330-301	6.0	6.0	6.0	6.0	24.0
Subtotal		*25.8*	*51.9*	*31.3*	*46.4*	*155.3*
Large Cargo Jets						
Boeing 727-200 Series Freighter	727EM2	0.1	0.3	0.1	0.2	0.7
Boeing 737-400 Series Freighter	737400	0.2	5.6	1.1	4.7	11.7
Boeing 737-800 Series	737800	2.0	2.0	2.0	2.0	8.0
Boeing 757-200 Series	757PW	3.2	0.6	3.4	0.4	7.5
Boeing 757-200 Series	757RR	1.8	0.3	1.9	0.2	4.2
Airbus A321-200 Series	A321-232c	1.0	2.0	1.0	2.0	6.0
Subtotal		*8.3*	*10.8*	*9.6*	*9.5*	*38.1*

Table 6, *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY FUTURE (2021) NO ACTION CONDITIONS

Aircraft Type	Noise Model ID	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Large Passenger Jets						
Boeing 717-200 Series	717200	2.2	2.2	2.2	2.2	8.7
Boeing 737-300 Series	737300	0.1	0.0	0.1	0.0	0.3
Boeing 737-700 Series	737700	4.9	0.9	5.2	0.5	11.5
Boeing 737-800 Series	737800	8.1	1.5	8.7	0.9	19.1
Boeing 737-900-ER	737900	0.8	0.2	0.9	0.1	2.0
Airbus A319-100 Series	A319-131	10.3	1.9	11.0	1.1	24.3
Airbus A320-200 Series	A320-211	11.1	2.0	11.9	1.2	26.2
Airbus A320-200 Series	A320-232	0.8	0.1	0.9	0.1	1.9
Airbus A321-100 Series	A321-232	3.2	0.6	3.4	0.4	7.6
Boeing MD-82	MD82	1.3	0.2	1.4	0.1	3.0
Boeing MD-83	MD83	6.7	1.2	7.1	0.7	15.8
Boeing MD-90	MD9025	0.3	0.1	0.3	0.0	0.7
Subtotal		*38.7*	*8.4*	*41.4*	*5.7*	*121.1*
Regional Jets						
Bombardier CRJ-100	CLREGJ	9.5	1.0	9.5	1.0	21.0
Bombardier CRJ-700-ER	CRJ701	23.9	4.4	25.6	2.6	56.6
Bombardier CRJ-900	CRJ9-ER	26.7	4.9	28.6	2.9	63.0
Embraer ERJ145-EP	EMB145	5.7	0.6	5.7	0.6	12.6
Embraer ERJ170	EMB170	5.4	1.0	5.8	0.6	12.7
Embraer ERJ175	EMB175	11.9	2.2	12.8	1.3	28.2
Subtotal		*83.0*	*14.0*	*88.0*	*9.0*	*194.1*
Business Jets						
Cessna 650 Citation III	CIT3	0.1	0.0	0.1	0.0	0.1
Bombardier Challenger 600	CL600	0.6	0.1	0.7	0.1	1.4
Bombardier Challenger 601	CL601	0.1	0.0	0.1	0.0	0.1
Cessna 500 Citation I	CNA500	0.7	0.5	0.7	0.4	2.3
Cessna Citation Mustang 510	CNA510	0.0	0.0	0.0	0.0	0.1
Cessna 525 CitationJet	CNA525C	0.3	0.2	0.3	0.2	1.0
Cessna 550 Citation II Bravo	CNA55B	0.5	0.1	0.5	0.1	1.1
Cessna 560 Citation Ultra	CNA560U	0.1	0.0	0.1	0.0	0.3
Cessna 560 Citation Excel	CNA560XL	0.5	0.1	0.5	0.0	1.1
Cessna 680 Citation Sovereign	CNA680	0.1	0.0	0.1	0.0	0.1
Cessna 750 Citation X	CNA750	0.1	0.0	0.1	0.0	0.1
Eclipse Aerospace EA500	ECLIPSE500	0.0	0.0	0.0	0.0	0.1
Fokker 100	F10062	0.1	0.0	0.1	0.0	0.1
Gulfstream G-IIB	GIIB	0.1	0.0	0.1	0.0	0.1
Gulfstream G450	GIV	0.2	0.0	0.2	0.0	0.4
Gulfstream V	GV	0.1	0.0	0.1	0.0	0.2
Raytheon Hawker 800	IA1125	0.1	0.0	0.1	0.0	0.3
Bombardier Learjet 60	LEAR35	0.6	0.1	0.6	0.1	1.4
Mitsubishi MU-300	MU3001	0.2	0.0	0.2	0.0	0.4
Subtotal		*4.4*	*1.0*	*4.4*	*0.9*	*10.8*

Table 6, *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY FUTURE (2021) NO ACTION CONDITIONS

Aircraft Type	Noise Model ID	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Propeller Aircraft						
Raytheon Beechcraft 1900	1900D	0.4	0.0	0.4	0.0	0.9
Beechcraft Baron 58P	BEC58P	0.4	0.0	0.4	0.0	0.9
Cessna 172 Skyhawk	CNA172	0.3	0.2	0.3	0.2	1.1
Cessna 182 Skyhawk	CNA182	0.1	0.0	0.1	0.0	0.2
Cessna 206 Caravan	CNA206	0.1	0.0	0.1	0.0	0.2
Cessna 208 Caravan	CNA208	0.8	0.5	0.9	0.5	2.7
Cessna 441 Conquest II	CNA441	0.9	0.1	0.9	0.1	2.0
De Havilland Canada DHC6 Twin Otter	DHC6	0.7	0.1	0.7	0.1	1.6
Dornier Do 228	DO228	0.0	0.0	0.0	0.0	0.1
Embraer EMB120 Brasilia	EMB120	0.2	0.1	0.2	0.1	0.6
General Aviation Single Engine Prop	GASEPV	0.8	0.1	0.8	0.1	1.8
Piper PA-28 Cherokee	PA28	0.1	0.1	0.1	0.1	0.3
Shorts 330 Series	SD330	0.2	0.2	0.3	0.1	0.8
Subtotal		*5.2*	*1.5*	*5.3*	*1.4*	*13.3*
Grand Total		**165.2**	**87.7**	**180.0**	**72.9**	**532.7**

Notes: Day = 7:00 a.m. to 9:59 p.m., Night = 10:00 p.m. to 6:59 a.m.
Totals may not equal sum due to rounding.
Source: FAA Operations Network (OPSNET) data, APO Terminal Area Forecast, CVG Flight Tracking System Data, Landrum & Brown, 2018.

Runway End Utilization: Average-annual day runway end utilization in 2021 is expected to be similar to what was modeled for the Existing Noise Exposure Contour as shown in Table 2.

Flight Tracks: Minimal changes to flight track locations or utilization percentages are expected to occur by 2021. Flight track percentages modeled for the Future (2021) No Action Noise Exposure Contour are shown in **Table 7** and **Table 8**.

Table 7
ARRIVAL FLIGHT TRACK UTILIZATION PERCENTAGES – FUTURE (2021) NO ACTION CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
09	AT61	40.7%	10.3%	10.7%	10.2%	2.8%
27	AT31	2.5%	0.9%	4.4%	5.6%	2.4%
	AT32	1.2%	0.7%	2.1%	2.4%	1.6%
	AT33	0.6%	0.2%	2.4%	1.3%	2.3%
18C	AT20	0.0%	0.0%	0.0%	4.4%	3.7%
	AT22	4.7%	0.0%	4.5%	0.0%	0.0%
	AT23	6.7%	18.9%	11.9%	0.0%	0.0%
	AT24	1.6%	3.2%	3.4%	0.0%	0.0%
	AT25	1.9%	0.0%	6.3%	0.0%	0.0%
	AT26	0.0%	0.0%	0.0%	2.9%	3.4%
	AT27	0.0%	0.0%	0.0%	1.1%	1.1%
	AT28	0.0%	0.0%	0.0%	1.1%	1.1%
	AT29	0.0%	0.0%	0.0%	4.2%	5.3%
	AT2B	0.0%	0.0%	0.0%	2.9%	3.4%
	AT2F	0.0%	0.0%	0.0%	1.1%	1.1%
	AT2G	0.0%	0.0%	0.0%	1.1%	1.1%
	AT2N	0.0%	0.0%	0.0%	4.2%	5.3%
	AT2V	0.0%	0.0%	0.0%	4.4%	3.7%
18L	AT11	1.1%	0.0%	4.0%	0.0%	0.0%
	AT12	8.1%	18.5%	14.8%	0.0%	0.0%
	AT13	5.7%	0.0%	5.7%	0.0%	0.0%
	AT14	2.0%	3.1%	4.3%	0.0%	0.0%
	AT15	1.1%	0.0%	4.0%	0.0%	0.0%
	AT16	0.0%	0.0%	0.0%	6.5%	8.1%
	AT17	0.0%	0.0%	0.0%	5.0%	5.4%
	AT18	0.0%	0.0%	0.0%	9.6%	12.5%
	AT19	0.0%	0.0%	0.0%	9.9%	8.6%

Table 7, *(continued)*
ARRIVAL FLIGHT TRACK UTILIZATION PERCENTAGES – FUTURE (2021) NO ACTION CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
18R	A701	0.2%	0.2%	0.2%	0.8%	1.4%
36C	AT50	0.0%	0.0%	0.0%	1.5%	1.4%
	AT51	0.9%	0.0%	2.2%	0.0%	0.0%
	AT52	3.1%	8.2%	4.2%	0.0%	0.0%
	AT53	0.8%	1.4%	1.2%	0.0%	0.0%
	AT54	2.2%	0.0%	1.5%	0.0%	0.0%
	AT55	0.0%	0.0%	0.0%	0.5%	0.9%
	AT56	0.0%	0.0%	0.0%	1.2%	1.6%
	AT57	0.0%	0.0%	0.0%	1.2%	0.9%
	AT58	0.0%	0.0%	0.0%	0.7%	0.9%
	AT59	0.0%	0.0%	0.0%	0.7%	0.9%
	AT5B	0.0%	0.0%	0.0%	0.7%	0.9%
	AT5F	0.0%	0.0%	0.0%	0.5%	0.9%
	AT5N	0.0%	0.0%	0.0%	1.2%	1.6%
	AT5V	0.0%	0.0%	0.0%	1.5%	1.4%
36L	A601	0.0%	0.1%	0.0%	0.1%	0.0%
36R	AT41	6.6%	29.5%	6.2%	0.0%	0.0%
	AT42	1.9%	0.0%	2.6%	0.0%	0.0%
	AT43	4.7%	0.0%	1.8%	0.0%	0.0%
	AT44	1.6%	4.9%	1.6%	0.0%	0.0%
	AT46	0.0%	0.0%	0.0%	7.1%	6.8%
	AT47	0.0%	0.0%	0.0%	1.2%	2.2%
	AT48	0.0%	0.0%	0.0%	3.4%	5.1%
Total		100%	100%	100%	100%	100%

Source: FAA radar data, Landrum & Brown analysis, 2018.

Table 8
DEPARTURE FLIGHT TRACK UTILIZATION PERCENTAGES – FUTURE (2021) NO ACTION CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
09	DT61	0.0%	0.1%	0.0%	0.0%	0.0%
	DT62	0.0%	0.0%	0.0%	0.0%	0.0%
	DT63	0.0%	0.0%	0.0%	0.0%	0.0%
27	D2G1	0.8%	0.0%	3.3%	0.0%	0.0%
	D2G2	83.2%	0.0%	53.2%	0.0%	0.0%
	D2G3	0.8%	0.0%	3.3%	0.0%	0.0%
	D2J4	0.0%	27.0%	1.3%	0.0%	0.0%
	D2J5	0.0%	32.5%	1.5%	0.0%	0.0%
	D2J6	0.0%	9.7%	0.5%	0.0%	0.0%
	DT30	0.0%	0.0%	0.0%	4.3%	5.9%
	DT36	0.0%	0.0%	0.0%	7.0%	7.9%
	DT37	0.0%	0.0%	0.0%	14.3%	11.8%
	DT38	0.0%	0.0%	0.0%	11.6%	7.2%
	DT39	0.0%	0.0%	0.0%	6.6%	5.9%
	DT3A	0.0%	0.0%	0.0%	4.6%	5.9%
	DT3R	0.0%	0.0%	0.0%	2.7%	3.9%
	DT3X	0.0%	0.0%	0.0%	8.6%	5.3%
	DT3Y	0.0%	0.0%	0.0%	3.3%	5.3%
	DT3Z	0.0%	0.0%	3.3%	1.7%	2.6%
	DTE2	0.0%	0.0%	3.3%	1.7%	3.9%
18C	D1G5	2.8%	0.0%	2.3%	0.0%	0.0%
	D1G6	0.0%	0.0%	0.1%	0.0%	0.0%
	D1J5	0.0%	1.5%	0.1%	0.0%	0.0%
	D1J6	0.0%	0.1%	0.0%	0.0%	0.9%
	DT20	0.0%	0.0%	0.0%	0.4%	0.2%
	DT28	0.0%	0.0%	0.0%	1.1%	0.4%
	DT29	0.0%	0.0%	0.0%	0.3%	0.1%
	DT2A	0.0%	0.0%	0.0%	0.3%	0.2%
	DT2Y	0.0%	0.0%	0.0%	0.2%	0.2%
	DTNW3	0.0%	0.0%	0.7%	0.0%	0.1%
	DTNW4	0.0%	0.0%	0.0%	0.0%	0.0%
18L	D1G1	0.5%	0.0%	2.5%	0.0%	0.0%
	D1G2	2.0%	0.0%	13.2%	0.0%	0.0%
	D1J1	0.0%	1.7%	0.1%	0.0%	4.6%
	D1J2	0.0%	10.2%	0.4%	0.0%	6.6%
	DT16	0.0%	0.0%	0.0%	12.9%	2.4%
	DT17	0.0%	0.0%	0.0%	7.6%	1.6%
	DTSW1	0.0%	0.0%	0.0%	0.0%	0.5%
	DTW1	0.0%	0.0%	0.0%	0.0%	0.5%

Table 8, *(continued)*
DEPARTURE FLIGHT TRACK UTILIZATION PERCENTAGES – FUTURE (2021) NO ACTION CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
18R	D701	0.0%	0.5%	0.0%	0.1%	0.8%
36C	DT51X	0.0%	3.4%	0.2%	0.0%	0.0%
	DT54	0.0%	0.0%	0.0%	1.2%	1.3%
	DT55X	0.0%	0.0%	0.0%	0.4%	0.4%
	DT56	0.0%	0.0%	0.0%	1.4%	1.1%
	DTE1	0.0%	0.0%	0.0%	0.0%	0.0%
	DTG1X	2.7%	0.0%	2.8%	0.0%	0.0%
	DTW2	0.0%	0.0%	0.0%	0.0%	0.0%
36L	D60D	0.0%	0.0%	0.0%	0.0%	0.6%
36R	D3G1	0.5%	1.6%	0.0%	0.0%	0.0%
	D3G2	2.0%	0.4%	0.1%	0.0%	0.0%
	D3G2	0.0%	0.0%	0.0%	0.0%	0.0%
	D3G3	0.5%	3.6%	0.1%	0.0%	0.0%
	D3J1	0.0%	0.0%	0.3%	0.0%	0.0%
	D3J1	0.0%	0.0%	1.8%	0.0%	0.0%
	D3J2	0.0%	0.0%	0.0%	0.0%	0.0%
	D3J2	0.1%	0.3%	0.3%	0.0%	0.1%
	D3J3	0.0%	0.0%	4.0%	0.0%	0.0%
	DT46	0.0%	0.0%	0.0%	0.3%	1.4%
	DT46	0.0%	0.0%	0.0%	2.3%	2.3%
	DT47	0.0%	0.0%	0.0%	0.1%	0.6%
	DT47	0.0%	0.0%	0.0%	0.8%	0.9%
	DT48	0.0%	0.0%	0.0%	0.1%	0.3%
	DT48	0.0%	0.0%	0.0%	0.8%	0.5%
	DT49	0.0%	0.0%	0.0%	0.4%	1.6%
	DT49	0.0%	0.0%	0.0%	3.0%	2.6%
	DTNE1	2.5%	2.4%	0.2%	0.0%	0.3%
	DTNE1	0.0%	0.0%	0.0%	0.0%	0.5%
	DTNW1	0.5%	0.0%	0.0%	0.0%	0.0%
	DTNW1	0.4%	0.0%	0.0%	0.0%	0.0%
	DTSE1	0.6%	5.2%	1.0%	0.0%	0.0%
	DTSE2	0.0%	0.0%	0.0%	0.0%	0.3%
	DTSE2	0.0%	0.0%	0.0%	0.0%	0.5%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

Source: FAA radar data, Landrum & Brown analysis, 2018.

Aircraft Weight and Trip Length: The trip lengths flown from CVG are based upon projected operations for the future conditions. There are no major changes in the destinations served by airlines from CVG as compared to the Existing condition. However, changes in the number of operations and fleet mix may result in small variations in the departure trip length distributions for the Future (2021) No Action conditions, as shown in **Table 9**.

Table 9
DEPARTURE TRIP LENGTH DISTRIBUTION -
FUTURE (2021) NO ACTION CONDITIONS

Stage Length Category	Heavy Passenger Jets	Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
1	20.74%	36.50%	48.10%	100.00%	58.33%
2	31.80%	37.78%	43.33%	0.00%	34.42%
3	15.78%	8.81%	3.81%	0.00%	4.33%
4	15.55%	8.40%	4.44%	0.00%	2.92%
5	4.52%	3.03%	0.00%	0.00%	0.00%
6	6.64%	2.56%	0.32%	0.00%	0.00%
7	4.97%	2.92%	0.00%	0.00%	0.00%
8	0.0%	0.0%	0.0%	0.0%	0.0%
9	0.0%	0.0%	0.0%	0.0%	0.0%
Total	100%	100%	100%	100%	100%

Source: Official Airline Guide, Landrum & Brown, 2018.

Aircraft Engine Run-Ups: Engine run-ups were modeled to account for the expected increase in run-ups performed for maintenance purposes. Under the No Action, run-ups would be expected to occur on the north airfield just east of Runway 18C/36C as shown on **Exhibit 4**. The number of run-ups expected to be performed is based on the number of total operations and typical routine maintenance requirements. The number of run-ups modeled for the Future (2021) No Action is shown in **Table 10**.

Table 10
ENGINE RUN-UPS – FUTURE (2021) NO ACTION CONDITIONS

AEDT Aircraft ID	RUN-UP LOCATION	AIRCRAFT HEADING (DEGREES)	AVERAGE WEEKLY RUN-UPS		AVERAGE DURATION (IN MINUTES)	THRUST SETTING (LBS.)
			DAYTIME	NIGHTTIME		
737400	North Airfield	180	2.8	2.8	60	12,000
737400	North Airfield	360	4.2	4.2	60	12,000
737400	North Airfield	180	2.8	2.8	4	23,500
737400	North Airfield	360	4.2	4.2	4	23,500
767300	North Airfield	180	2.8	2.8	60	12,000
767300	North Airfield	360	4.2	4.2	60	12,000
767300	North Airfield	180	2.8	2.8	4	23,500
767300	North Airfield	360	4.2	4.2	4	23,500
TOTAL			**28**	**28**	**n/a**	**n/a**

Note: Daytime = 7:00 a.m. to 9:59 p.m., Nighttime = 10:00 p.m. to 6:59 a.m.
n/a = total value not applicable

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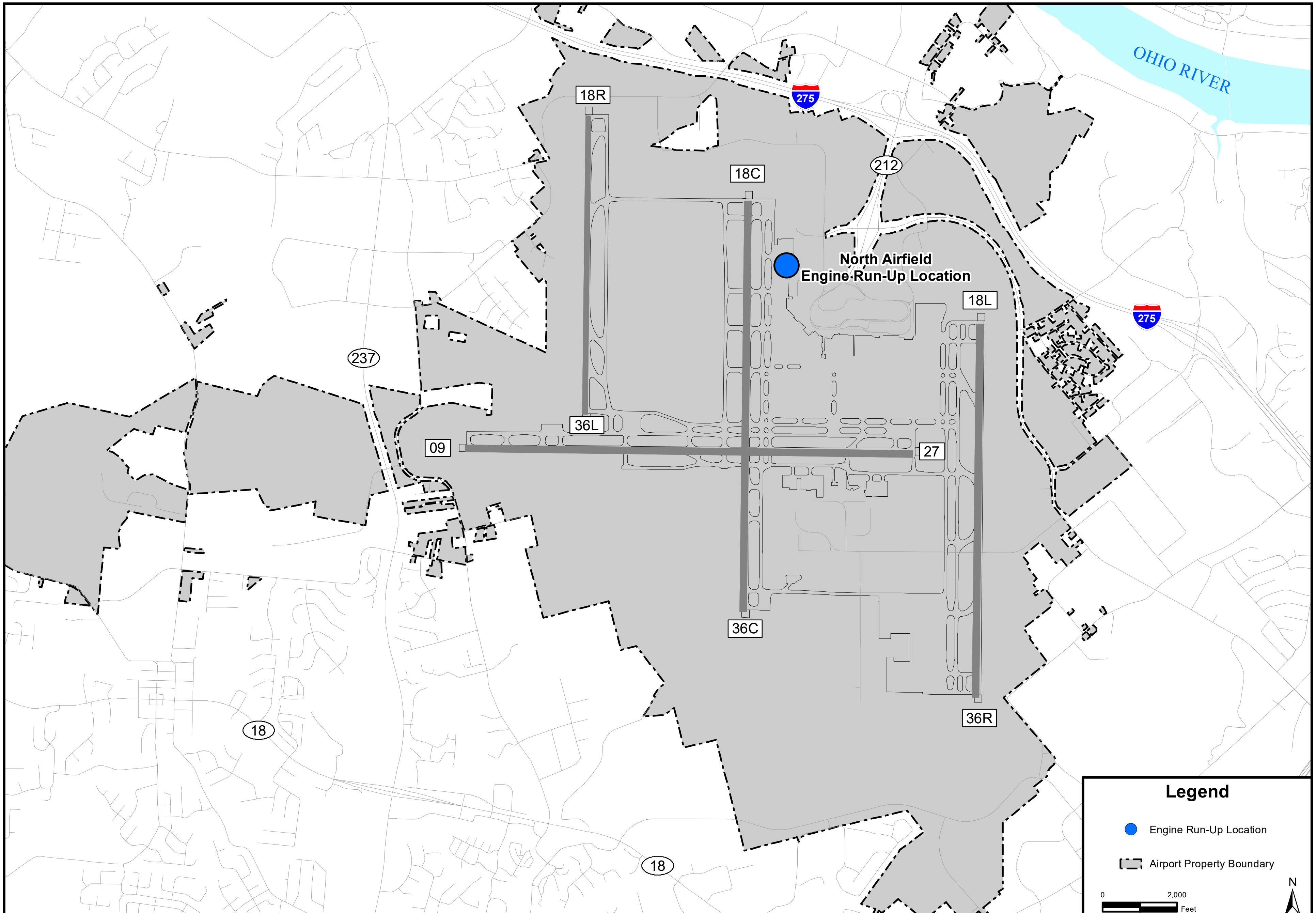

Air Cargo Facility
Environmental Assessment

No Action Aircraft Run-Up Location

EXHIBIT:
4

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5.3 FUTURE (2021) PROPOSED ACTION NOISE EXPOSURE CONTOUR INPUT DATA

Runway Definition: No changes to runway configuration are included as part of the Future (2021) Proposed Action; therefore, the runway layout discussed for the Future (2021) No Action was also used to model the Future (2021) Proposed Action Noise Exposure Contour.

Number of Operations and Fleet Mix: The Future (2021) Proposed Action operating levels would be the same as the Future (2021) No Action.

Runway End Utilization: The Future (2021) Proposed Action runway end utilization would be the same as the Future (2021) No Action.

Flight Tracks: The Future (2021) Proposed Action flight tracks would be the same as the Future (2021) No Action.

Aircraft Weight and Trip Length: The Future (2021) Proposed Action aircraft weight and trip lengths would be the same as the Future (2021) No Action.

Aircraft Engine Run-Ups: The number of aircraft engine run-ups would remain the same for the Future (2021) Proposed Action as compared to the Future (2021) No Action. However, aircraft engine run-ups would occur at the proposed cargo facility on the south airfield. Therefore, engine run-up locations would be different under the Future (2021) Proposed Action as compared to the Future (2021) No Action as shown in **Exhibit 5** and **Table 11**.

Table 11
ENGINE RUN-UPS – FUTURE (2021) NO ACTION CONDITIONS

AEDT Aircraft ID	RUN-UP LOCATION	AIRCRAFT HEADING (DEGREES)	AVERAGE WEEKLY RUN-UPS		AVERAGE DURATION (IN MINUTES)	THRUST SETTING (LBS.)
			DAYTIME	NIGHTTIME		
737400	South Airfield	180	2.8	2.8	60	12,000
737400	South Airfield	360	4.2	4.2	60	12,000
737400	South Airfield	180	2.8	2.8	4	23,500
737400	South Airfield	360	4.2	4.2	4	23,500
767300	South Airfield	180	2.8	2.8	60	12,000
767300	South Airfield	360	4.2	4.2	60	12,000
767300	South Airfield	180	2.8	2.8	4	23,500
767300	South Airfield	360	4.2	4.2	4	23,500
TOTAL			**28**	**28**	**n/a**	**n/a**

Note: Daytime = 7:00 a.m. to 9:59 p.m., Nighttime = 10:00 p.m. to 6:59 a.m.
n/a = total value not applicable

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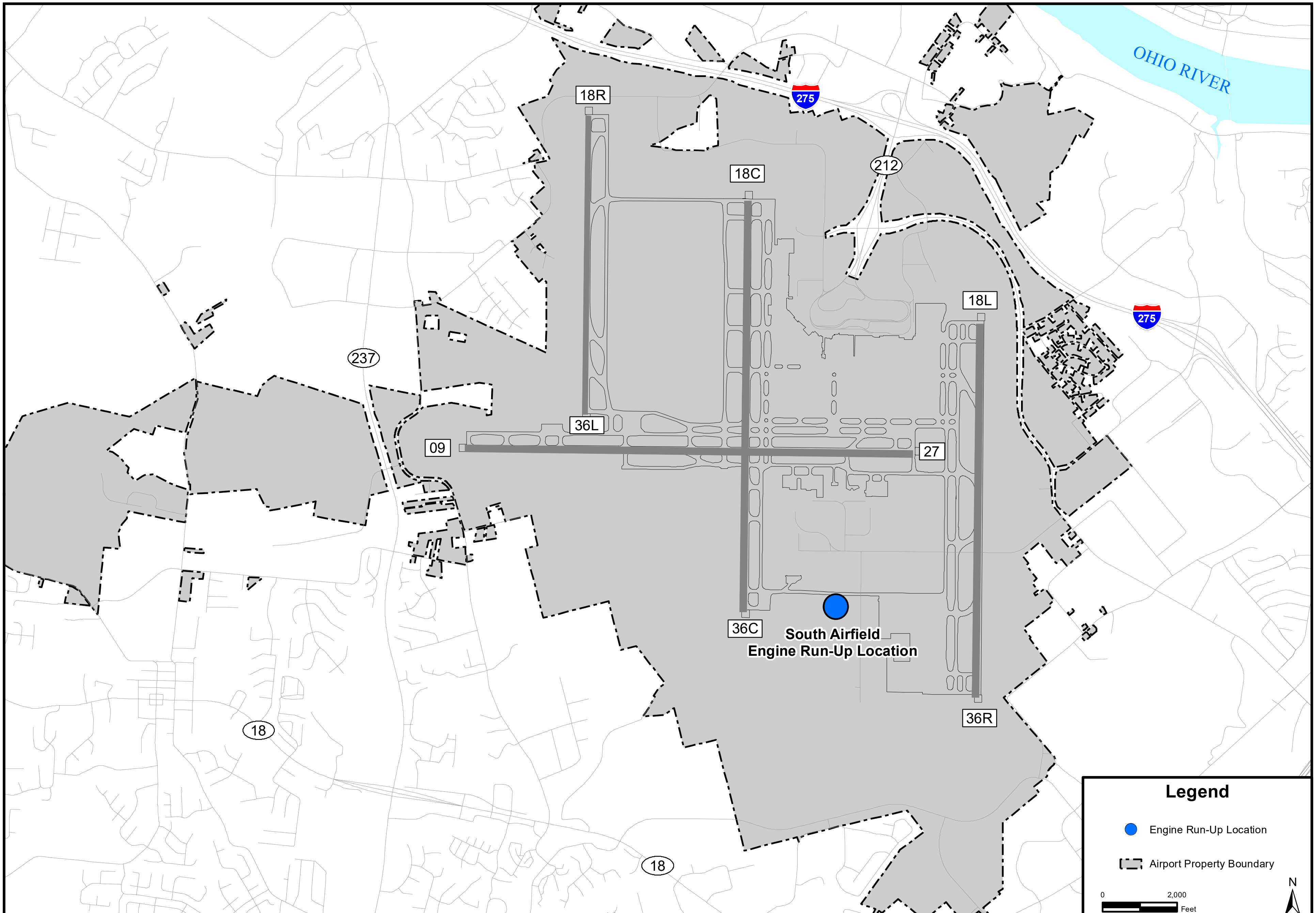

Air Cargo Facility
Environmental Assessment

Proposed Action Aircraft Run-Up Location

EXHIBIT:
5

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5.4 FUTURE (2026) NO ACTION NOISE EXPOSURE CONTOUR INPUT DATA

Runway Definition: No changes to runway configuration are expected at CVG by 2026; therefore, the runway layout discussed for the Existing condition was also used to model the Future (2026) No Action Noise Exposure Contour.

Number of Operations and Fleet Mix: The Future (2026) No Action Noise Exposure Contour operating levels are based upon the FAA's Terminal Area Forecast (TAF) issued in January 2018 plus additional air cargo activity that would occur with general growth in aviation demand and the expected increase in cargo operations that would occur with or without the Proposed Action. However, unlike the 2021 operating levels, all of the anticipated growth in activity could not be accommodated at the Airport due to a lack of ramp and cargo processing facilities. The Future (2026) No Action condition includes 233,430 annual operations or 639.5 average-annual day operations, an increase of 20.1 percent from the Future (2021) No Action Noise Exposure Contour operating levels. **Table 12** provides a summary of the average daily operations and fleet mix at CVG for the Future (2026) No Action conditions, organized by aircraft category, operation type, and time of day.

Table 12
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY
FUTURE (2026) NO ACTION CONDITIONS

Aircraft Type	Noise Model ID	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Heavy Jets						
Boeing 747-800 Freighter	7478	1.5	4.7	2.1	4.0	12.4
Boeing 747-400 Series Freighter	747R21	0.9	2.8	1.3	2.4	7.4
Boeing 767-300 Series	767300	11.9	24.6	14.4	22.1	72.9
Boeing 767-200 Series Freighter	767CF6	5.5	17.1	7.8	14.8	45.3
Boeing 777 Freighter	777FRE	0.7	3.6	0.9	3.3	8.6
Airbus A300F4-600 Series	A300-622R	0.3	1.0	0.5	0.9	2.7
Airbus A300-200 Series Freighter	A300B4-203	0.0	0.1	0.0	0.1	0.3
Airbus A300-200 Series Freighter	A330-301	5.0	6.2	5.0	6.2	22.4
Subtotal		*25.8*	*60.2*	*32.1*	*53.8*	*171.9*
Large Cargo Jets						
Boeing 727-200 Series Freighter	727EM2	0.1	0.3	0.1	0.2	0.7
Boeing 737-400 Series Freighter	737400	0.2	6.5	1.3	5.5	13.6
Boeing 737-800 Series	737800	13.0	7.0	13.0	7.0	40.0
Boeing 757-200 Series	757PW	3.7	0.7	4.0	0.4	8.8
Boeing 757-200 Series	757RR	2.1	0.4	2.2	0.2	4.9
Airbus A321-200 Series	A321-232c	12.0	7.0	12.0	7.0	38.0
Subtotal		*31.1*	*21.9*	*32.6*	*20.3*	*105.9*

Table 12, *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY FUTURE (2026) NO ACTION CONDITIONS

Aircraft Type	Noise Model ID	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Large Passenger Jets						
Boeing 717-200 Series	717200	2.5	2.5	2.5	2.5	10.2
Boeing 737-300 Series	737300	0.1	0.0	0.1	0.0	0.3
Boeing 737-700 Series	737700	5.6	1.0	6.0	0.6	13.3
Boeing 737-800 Series	737800	9.4	1.7	10.1	1.0	22.2
Boeing 737-900-ER	737900	1.0	0.2	1.0	0.1	2.3
Airbus A319-100 Series	A319-131	11.9	2.2	12.8	1.3	28.2
Airbus A320-200 Series	A320-211	12.9	2.4	13.8	1.4	30.5
Airbus A320-200 Series	A320-232	0.9	0.2	1.0	0.1	2.2
Airbus A321-100 Series	A321-232	3.7	0.7	4.0	0.4	8.8
Boeing MD-82	MD82	1.3	0.2	1.4	0.1	3.0
Boeing MD-83	MD83	6.7	1.2	7.1	0.7	15.8
Boeing MD-90	MD9025	0.4	0.1	0.4	0.0	0.8
Subtotal		*38.7*	*8.4*	*41.4*	*5.7*	*137.7*
Regional Jets						
Bombardier CRJ-100	CLREGJ	4.6	0.5	4.7	0.5	10.3
Bombardier CRJ-700-ER	CRJ701	27.8	5.1	29.8	3.1	65.8
Bombardier CRJ-900	CRJ9-ER	31.0	5.7	33.2	3.4	73.3
Embraer ERJ145-EP	EMB145	2.8	0.3	2.8	0.3	6.2
Embraer ERJ170	EMB170	6.2	1.1	6.7	0.7	14.7
Embraer ERJ175	EMB175	13.8	2.5	14.8	1.5	32.7
Subtotal		*86.3*	*15.2*	*92.0*	*9.5*	*203.0*
Business Jets						
Cessna 650 Citation III	CIT3	0.1	0.0	0.1	0.0	0.1
Bombardier Challenger 600	CL600	0.3	0.0	0.3	0.0	0.7
Bombardier Challenger 601	CL601	0.0	0.0	0.0	0.0	0.1
Cessna 500 Citation I	CNA500	0.7	0.5	0.7	0.4	2.3
Cessna Citation Mustang 510	CNA510	0.0	0.0	0.0	0.0	0.1
Cessna 525 Citation Jet	CNA525C	0.3	0.2	0.3	0.2	1.0
Cessna 550 Citation II Bravo	CNA55B	0.5	0.1	0.5	0.1	1.1
Cessna 560 Citation Ultra	CNA560U	0.1	0.0	0.1	0.0	0.3
Cessna 560 Citation Excel	CNA560XL	0.5	0.1	0.5	0.0	1.1
Cessna 680 Citation Sovereign	CNA680	0.1	0.0	0.1	0.0	0.1
Cessna 750 Citation X	CNA750	0.1	0.0	0.1	0.0	0.1
Eclipse Aerospace EA500	ECLIPSE500	0.0	0.0	0.0	0.0	0.1
Fokker 100	F10062	0.0	0.0	0.0	0.0	0.1
Gulfstream G-IIB	GIIB	0.0	0.0	0.0	0.0	0.1
Gulfstream G450	GIV	0.2	0.0	0.2	0.0	0.4
Gulfstream V	GV	0.0	0.0	0.0	0.0	0.1
Raytheon Hawker 800	IA1125	0.1	0.0	0.1	0.0	0.3
Bombardier Learjet 60	LEAR35	0.6	0.1	0.6	0.1	1.4
Mitsubishi MU-300	MU3001	0.2	0.0	0.2	0.0	0.4
Subtotal		*3.9*	*1.0*	*4.0*	*0.9*	*9.7*

Table 12, *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY FUTURE (2026) NO ACTION CONDITIONS

Aircraft Type	Noise Model ID	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Propeller Aircraft						
Raytheon Beechcraft 1900	1900D	0.2	0.0	0.2	0.0	0.4
Beechcraft Baron 58P	BEC58P	0.4	0.0	0.4	0.0	0.9
Cessna 172 Skyhawk	CNA172	0.3	0.2	0.3	0.2	1.1
Cessna 182 Skyhawk	CNA182	0.1	0.0	0.1	0.0	0.2
Cessna 206 Caravan	CNA206	0.1	0.0	0.1	0.0	0.2
Cessna 208 Caravan	CNA208	0.8	0.5	0.9	0.5	2.7
Cessna 441 Conquest II	CNA441	0.9	0.1	0.9	0.1	2.0
De Havilland Canada DHC6 Twin Otter	DHC6	0.4	0.0	0.4	0.0	0.8
Dornier Do 228	DO228	0.0	0.0	0.0	0.0	0.0
Embraer EMB120 Brasilia	EMB120	0.1	0.1	0.1	0.1	0.3
General Aviation Single Engine Prop	GASEPV	0.8	0.1	0.8	0.1	1.8
Piper PA-28 Cherokee	PA28	0.1	0.1	0.1	0.1	0.3
Shorts 330 Series	SD330	0.1	0.1	0.1	0.1	0.4
Subtotal		*4.4*	*1.3*	*4.5*	*1.2*	*11.3*
Grand Total		**190.1**	**107.9**	**206.6**	**91.4**	**639.5**

Notes: Day = 7:00 a.m. to 9:59 p.m., Night = 10:00 p.m. to 6:59 a.m.
Totals may not equal sum due to rounding.

Source: FAA Operations Network (OPSNET) data, APO Terminal Area Forecast, CVG Flight Tracking System Data, Landrum & Brown, 2018.

Runway End Utilization: Average-annual day runway end utilization in 2026 is expected to remain the same as the Future (2021) No Action conditions.

Flight Tracks: Minimal changes to flight tracks locations or utilization percentages are expected to occur by 2026. Flight track percentages modeled for the Future (2026) No Action Noise Exposure Contour are shown in **Table 13** and **Table 14**.

Table 13
ARRIVAL FLIGHT TRACK UTILIZATION PERCENTAGES – FUTURE (2026) NO ACTION CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
09	AT61	42.6%	8.4%	9.9%	10.2%	2.9%
27	AT31	2.6%	1.1%	3.9%	5.7%	2.4%
	AT32	1.2%	0.8%	1.9%	2.5%	1.6%
	AT33	0.7%	0.2%	2.0%	1.3%	2.3%
18C	AT20	0.0%	0.0%	0.0%	4.4%	3.6%
	AT22	4.6%	0.0%	3.7%	0.0%	0.0%
	AT23	6.5%	21.3%	14.1%	0.0%	0.0%
	AT24	1.6%	3.6%	3.5%	0.0%	0.0%
	AT25	1.9%	0.0%	5.2%	0.0%	0.0%
	AT26	0.0%	0.0%	0.0%	2.9%	3.4%
	AT27	0.0%	0.0%	0.0%	1.1%	1.1%
	AT28	0.0%	0.0%	0.0%	1.1%	1.1%
	AT29	0.0%	0.0%	0.0%	4.2%	5.3%
	AT2B	0.0%	0.0%	0.0%	2.9%	3.4%
	AT2F	0.0%	0.0%	0.0%	1.1%	1.1%
	AT2G	0.0%	0.0%	0.0%	1.1%	1.1%
	AT2N	0.0%	0.0%	0.0%	4.2%	5.3%
	AT2V	0.0%	0.0%	0.0%	4.4%	3.6%
18L	AT11	1.0%	0.0%	3.3%	0.0%	0.0%
	AT12	7.3%	21.4%	16.6%	0.0%	0.0%
	AT13	5.2%	0.0%	4.7%	0.0%	0.0%
	AT14	1.8%	3.6%	4.3%	0.0%	0.0%
	AT15	1.0%	0.0%	3.3%	0.0%	0.0%
	AT16	0.0%	0.0%	0.0%	6.5%	8.0%
	AT17	0.0%	0.0%	0.0%	5.0%	5.3%
	AT18	0.0%	0.0%	0.0%	9.6%	12.5%
	AT19	0.0%	0.0%	0.0%	9.9%	8.6%
18R	A701	0.1%	0.2%	0.2%	0.8%	1.4%
36C	AT50	0.0%	0.0%	0.0%	1.5%	1.4%
	AT51	0.9%	0.0%	1.8%	0.0%	0.0%
	AT52	3.1%	8.4%	5.0%	0.0%	0.0%
	AT53	0.8%	1.4%	1.2%	0.0%	0.0%
	AT54	2.2%	0.0%	1.2%	0.0%	0.0%
	AT55	0.0%	0.0%	0.0%	0.5%	0.9%
	AT56	0.0%	0.0%	0.0%	1.2%	1.6%
	AT57	0.0%	0.0%	0.0%	1.2%	0.9%
	AT58	0.0%	0.0%	0.0%	0.7%	0.9%
	AT59	0.0%	0.0%	0.0%	0.7%	0.9%
	AT5B	0.0%	0.0%	0.0%	0.7%	0.9%
	AT5F	0.0%	0.0%	0.0%	0.5%	0.9%
	AT5N	0.0%	0.0%	0.0%	1.2%	1.6%
	AT5V	0.0%	0.0%	0.0%	1.5%	1.4%

Table 13, *(continued)*
ARRIVAL FLIGHT TRACK UTILIZATION PERCENTAGES – FUTURE (2026) NO ACTION CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
36L	A601	0.0%	0.1%	0.0%	0.1%	0.0%
36R	AT41	6.6%	25.4%	8.7%	0.0%	0.0%
	AT42	1.9%	0.0%	2.1%	0.0%	0.0%
	AT43	4.7%	0.0%	1.5%	0.0%	0.0%
	AT44	1.6%	4.2%	1.9%	0.0%	0.0%
	AT46	0.0%	0.0%	0.0%	7.1%	6.9%
	AT47	0.0%	0.0%	0.0%	1.2%	2.2%
	AT48	0.0%	0.0%	0.0%	3.4%	5.1%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

Source: FAA radar data, Landrum & Brown analysis, 2018.

Table 14
DEPARTURE FLIGHT TRACK UTILIZATION PERCENTAGES – FUTURE (2026) NO ACTION CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
09	DT61	0.0%	0.1%	0.0%	0.0%	0.0%
	DT62	0.0%	0.0%	0.0%	0.0%	0.0%
	DT63	0.0%	0.0%	0.0%	0.0%	0.0%
27	D2G1	0.8%	0.0%	2.7%	0.0%	0.0%
	D2G2	83.2%	0.0%	43.8%	0.0%	0.0%
	D2G3	0.8%	0.0%	2.7%	0.0%	0.0%
	D2J4	0.0%	26.9%	5.8%	0.0%	0.0%
	D2J5	0.0%	32.4%	7.0%	0.0%	0.0%
	D2J6	0.0%	9.6%	2.1%	0.0%	0.0%
	DT30	0.0%	0.0%	0.0%	4.3%	5.9%
	DT36	0.0%	0.0%	0.0%	7.0%	7.9%
	DT37	0.0%	0.0%	0.0%	14.3%	11.8%
	DT38	0.0%	0.0%	0.0%	11.6%	7.2%
	DT39	0.0%	0.0%	0.0%	6.6%	5.9%
	DT3A	0.0%	0.0%	0.0%	4.6%	5.9%
	DT3R	0.0%	0.0%	0.0%	2.7%	3.9%
	DT3X	0.0%	0.0%	0.0%	8.6%	5.3%
	DT3Y	0.0%	0.0%	0.0%	3.3%	5.3%
	DT3Z	0.0%	0.0%	2.7%	1.7%	2.6%
	DTE2	0.0%	0.0%	2.7%	1.7%	3.9%
18C	D1G5	2.7%	0.0%	1.9%	0.0%	0.0%
	D1G6	0.0%	0.0%	0.1%	0.0%	0.0%
	D1J5	0.0%	1.6%	0.4%	0.0%	0.0%
	D1J6	0.0%	0.1%	0.0%	0.0%	0.9%
	DT20	0.0%	0.0%	0.0%	0.4%	0.2%
	DT28	0.0%	0.0%	0.0%	1.1%	0.4%
	DT29	0.0%	0.0%	0.0%	0.3%	0.1%
	DT2A	0.0%	0.0%	0.0%	0.3%	0.2%
	DT2Y	0.0%	0.0%	0.0%	0.2%	0.2%
	DTNW3	0.0%	0.0%	0.6%	0.0%	0.1%
	DTNW4	0.0%	0.0%	0.0%	0.0%	0.0%
18L	D1G1	0.5%	0.0%	2.1%	0.0%	0.0%
	D1G2	1.9%	0.0%	10.8%	0.0%	0.0%
	D1J1	0.0%	1.8%	0.4%	0.0%	4.6%
	D1J2	0.0%	11.0%	2.4%	0.0%	6.6%
	DT16	0.0%	0.0%	0.0%	12.8%	2.4%
	DT17	0.0%	0.0%	0.0%	7.5%	1.6%
	DTSW1	0.0%	0.0%	0.0%	0.0%	0.5%
	DTW1	0.0%	0.0%	0.0%	0.0%	0.5%
18R	D701	0.0%	0.5%	0.1%	0.1%	0.8%

Table 14, *(continued)*
DEPARTURE FLIGHT TRACK UTILIZATION PERCENTAGES – FUTURE (2026) NO ACTION CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
36C	DT51X	0.0%	3.1%	0.7%	0.0%	0.0%
	DT54	0.0%	0.0%	0.0%	1.2%	1.3%
	DT55X	0.0%	0.0%	0.0%	0.4%	0.4%
	DT56	0.0%	0.0%	0.0%	1.5%	1.1%
	DTE1	0.0%	0.0%	0.0%	0.0%	0.0%
	DTG1X	2.7%	0.0%	2.3%	0.0%	0.0%
	DTW2	0.0%	0.0%	0.0%	0.0%	0.0%
36L	D60D	0.0%	0.0%	0.0%	0.0%	0.6%
36R	D3G1	0.5%	1.9%	0.4%	0.0%	0.0%
	D3G2	2.1%	0.3%	0.1%	0.0%	0.0%
	D3G2	0.0%	0.0%	0.0%	0.0%	0.0%
	D3G3	0.5%	4.0%	0.9%	0.0%	0.0%
	D3J1	0.0%	0.0%	0.2%	0.0%	0.0%
	D3J1	0.0%	0.0%	1.5%	0.0%	0.0%
	D3J2	0.0%	0.0%	0.0%	0.0%	0.0%
	D3J2	0.1%	0.3%	0.3%	0.0%	0.1%
	D3J3	0.0%	0.0%	3.3%	0.0%	0.0%
	DT46	0.0%	0.0%	0.0%	0.3%	1.4%
	DT46	0.0%	0.0%	0.0%	2.3%	2.3%
	DT47	0.0%	0.0%	0.0%	0.1%	0.6%
	DT47	0.0%	0.0%	0.0%	0.8%	0.9%
	DT48	0.0%	0.0%	0.0%	0.1%	0.3%
	DT48	0.0%	0.0%	0.0%	0.8%	0.5%
	DT49	0.0%	0.0%	0.0%	0.4%	1.6%
	DT49	0.0%	0.0%	0.0%	3.0%	2.6%
	DTNE1	2.6%	2.0%	0.4%	0.0%	0.3%
	DTNE1	0.0%	0.0%	0.0%	0.0%	0.5%
	DTNW1	0.5%	0.0%	0.0%	0.0%	0.0%
	DTNW1	0.4%	0.0%	0.0%	0.0%	0.0%
	DTSE1	0.7%	4.3%	1.4%	0.0%	0.0%
	DTSE2	0.0%	0.0%	0.0%	0.0%	0.3%
	DTSE2	0.0%	0.0%	0.0%	0.0%	0.5%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

Aircraft Weight and Trip Length: The trip lengths flown from CVG are based upon projected operations for the future conditions. There are no major changes in the destinations served by airlines at CVG from Future (2021) No Action conditions. However, changes in the number of operations and fleet mix may result in small variations in the departure trip length distributions, as shown in **Table 15**.

Table 15
DEPARTURE TRIP LENGTH DISTRIBUTION
FUTURE (2026) NO ACTION CONDITIONS

Stage Length Category	Heavy Passenger Jets	Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
1	19.7%	45.3%	48.0%	100.0%	53.8%
2	30.9%	45.7%	43.0%	0.0%	38.0%
3	15.8%	3.1%	4.0%	0.0%	4.8%
4	15.3%	2.9%	4.6%	0.0%	3.3%
5	4.7%	1.0%	0.0%	0.0%	0.0%
6	6.5%	0.9%	0.3%	0.0%	0.0%
7	7.0%	1.0%	0.0%	0.0%	0.0%
8	0.0%	0.0%	0.0%	0.0%	0.0%
9	0.0%	0.0%	0.0%	0.0%	0.0%
Total	100%	100%	100%	100%	100%

Source: Official Airline Guide, Landrum & Brown, 2018.

Aircraft Engine Run-Ups: Engine run-ups were modeled to account for the expected increase in run-ups performed for maintenance purposes. Under the No Action, run-ups would be expected to occur on the north airfield just east of Runway 18C/36C as shown on Exhibit 4. The number of run-ups expected to be performed was based on the number of total operations and typical routine maintenance requirements. The number of run-ups modeled for the Future (2026) No Action is shown in **Table 16**.

Table 16
ENGINE RUN-UPS – FUTURE (2026) NO ACTION CONDITIONS

AEDT Aircraft ID	RUN-UP LOCATION	AIRCRAFT HEADING (DEGREES)	AVERAGE WEEKLY RUN-UPS		AVERAGE DURATION (IN MINUTES)	THRUST SETTING (LBS.)
			DAYTIME	NIGHTTIME		
737400	North Airfield	180	2.8	5.6	60	12,000
737400	North Airfield	360	4.2	8.4	60	12,000
737400	North Airfield	180	2.8	5.6	4	23,500
737400	North Airfield	360	4.2	8.4	4	23,500
767300	North Airfield	180	2.8	5.6	60	12,000
767300	North Airfield	360	4.2	8.4	60	12,000
767300	North Airfield	180	2.8	5.6	4	23,500
767300	North Airfield	360	4.2	8.4	4	23,500
7773ER	North Airfield	180	0.0	0.6	60	12,000
7773ER	North Airfield	360	0.0	0.8	60	12,000
7773ER	North Airfield	180	0.0	0.6	4	23,500
7773ER	North Airfield	360	0.0	0.8	4	23,500
TOTAL			**28**	**28**	**n/a**	**n/a**

Note: Daytime = 7:00 a.m. to 9:59 p.m., Nighttime = 10:00 p.m. to 6:59 a.m.
n/a = total value not applicable

5.5 FUTURE (2026) PROPOSED ACTION NOISE EXPOSURE CONTOUR INPUT DATA

Runway Definition: No changes to runway configuration are expected at CVG by 2026; therefore, the runway layout discussed for the Existing condition was also used to model the Future (2026) Proposed Action Noise Exposure Contour.

Number of Operations and Fleet Mix: The Future (2026) Proposed Action operating levels are higher than those in the Future (2026) No Action Noise Exposure Contour due to the additional operations that could be accommodated with the development of the cargo facility. The Future (2026) Proposed Action condition includes 239,257 annual operations or 655.5 average-annual day operations, an increase of 2.5 percent over the Future (2026) No Action operating levels. **Table 17** provides a summary of the average daily operations and fleet mix at CVG for the Future (2026) Proposed Action conditions, organized by aircraft category, operation type, and time of day.

Table 17
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY
FUTURE (2026) PROPOSED ACTION CONDITIONS

Aircraft Type	Noise Model ID	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Heavy Jets						
Boeing 747-800 Freighter	7478	1.5	4.7	2.1	4.0	12.4
Boeing 747-400 Series Freighter	747R21	0.9	2.8	1.3	2.4	7.4
Boeing 767-300 Series	767300	11.9	26.4	14.4	23.8	76.5
Boeing 767-200 Series Freighter	767CF6	5.5	17.1	7.8	14.8	45.3
Boeing 777 Freighter	777FRE	0.7	4.1	0.9	3.8	9.4
Airbus A300F4-600 Series	A300-622R	0.3	1.0	0.5	0.9	2.7
Airbus A300-200 Series Freighter	A300B4-203	0.0	0.1	0.0	0.1	0.3
Airbus A300-200 Series Freighter	A330-301	5.0	8.0	5.0	8.0	26.0
Subtotal		*25.8*	*64.2*	*32.1*	*57.8*	*179.9*
Large Cargo Jets						
Boeing 727-200 Series Freighter	727EM2	0.1	0.3	0.1	0.2	0.7
Boeing 737-400 Series Freighter	737400	0.2	6.5	1.3	5.5	13.6
Boeing 737-800 Series	737800	13.0	9.0	13.0	9.0	44.0
Boeing 757-200 Series	757PW	3.7	0.7	4.0	0.4	8.8
Boeing 757-200 Series	757RR	2.1	0.4	2.2	0.2	4.9
Airbus A321-200 Series	A321-232c	12.0	9.0	12.0	9.0	42.0
Subtotal		*31.1*	*25.9*	*32.6*	*24.3*	*113.9*

Table 17, *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY
FUTURE (2026) PROPOSED ACTION CONDITIONS

Aircraft Type	Noise Model ID	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Large Passenger Jets						
Boeing 717-200 Series	717200	2.5	2.5	2.5	2.5	10.2
Boeing 737-300 Series	737300	0.1	0.0	0.1	0.0	0.3
Boeing 737-700 Series	737700	5.6	1.0	6.0	0.6	13.3
Boeing 737-800 Series	737800	9.4	1.7	10.1	1.0	22.2
Boeing 737-900-ER	737900	1.0	0.2	1.0	0.1	2.3
Airbus A319-100 Series	A319-131	11.9	2.2	12.8	1.3	28.2
Airbus A320-200 Series	A320-211	12.9	2.4	13.8	1.4	30.5
Airbus A320-200 Series	A320-232	0.9	0.2	1.0	0.1	2.2
Airbus A321-100 Series	A321-232	3.7	0.7	4.0	0.4	8.8
Boeing MD-82	MD82	1.3	0.2	1.4	0.1	3.0
Boeing MD-83	MD83	6.7	1.2	7.1	0.7	15.8
Boeing MD-90	MD9025	0.4	0.1	0.4	0.0	0.8
Subtotal		*38.7*	*8.4*	*41.4*	*5.7*	*137.7*
Regional Jets						
Bombardier CRJ-100	CLREGJ	4.6	0.5	4.7	0.5	10.3
Bombardier CRJ-700-ER	CRJ701	27.8	5.1	29.8	3.1	65.8
Bombardier CRJ-900	CRJ9-ER	31.0	5.7	33.2	3.4	73.3
Embraer ERJ145-EP	EMB145	2.8	0.3	2.8	0.3	6.2
Embraer ERJ170	EMB170	6.2	1.1	6.7	0.7	14.7
Embraer ERJ175	EMB175	13.8	2.5	14.8	1.5	32.7
Subtotal		*86.3*	*15.2*	*92.0*	*9.5*	*203.0*
Business Jets						
Cessna 650 Citation III	CIT3	0.1	0.0	0.1	0.0	0.1
Bombardier Challenger 600	CL600	0.3	0.0	0.3	0.0	0.7
Bombardier Challenger 601	CL601	0.0	0.0	0.0	0.0	0.1
Cessna 500 Citation I	CNA500	0.7	0.5	0.7	0.4	2.3
Cessna Citation Mustang 510	CNA510	0.0	0.0	0.0	0.0	0.1
Cessna 525 CitationJet	CNA525C	0.3	0.2	0.3	0.2	1.0
Cessna 550 Citation II Bravo	CNA55B	0.5	0.1	0.5	0.1	1.1
Cessna 560 Citation Ultra	CNA560U	0.1	0.0	0.1	0.0	0.3
Cessna 560 Citation Excel	CNA560XL	0.5	0.1	0.5	0.0	1.1
Cessna 680 Citation Sovereign	CNA680	0.1	0.0	0.1	0.0	0.1
Cessna 750 Citation X	CNA750	0.1	0.0	0.1	0.0	0.1
Eclipse Aerospace EA500	ECLIPSE500	0.0	0.0	0.0	0.0	0.1
Fokker 100	F10062	0.0	0.0	0.0	0.0	0.1
Gulfstream G-IIB	GIIB	0.0	0.0	0.0	0.0	0.1
Gulfstream G450	GIV	0.2	0.0	0.2	0.0	0.4
Gulfstream V	GV	0.0	0.0	0.0	0.0	0.1
Raytheon Hawker 800	IA1125	0.1	0.0	0.1	0.0	0.3
Bombardier Learjet 60	LEAR35	0.6	0.1	0.6	0.1	1.4
Mitsubishi MU-300	MU3001	0.2	0.0	0.2	0.0	0.4
Subtotal		*3.9*	*1.0*	*4.0*	*0.9*	*9.7*

Table 17, *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT CATEGORY FUTURE (2026) PROPOSED ACTION CONDITIONS

Aircraft Type	Noise Model ID	Arrivals		Departures		Total
		Daytime	Nighttime	Daytime	Nighttime	
Propeller Aircraft						
Raytheon Beechcraft 1900	1900D	0.2	0.0	0.2	0.0	0.4
Beechcraft Baron 58P	BEC58P	0.4	0.0	0.4	0.0	0.9
Cessna 172 Skyhawk	CNA172	0.3	0.2	0.3	0.2	1.1
Cessna 182 Skyhawk	CNA182	0.1	0.0	0.1	0.0	0.2
Cessna 206 Caravan	CNA206	0.1	0.0	0.1	0.0	0.2
Cessna 208 Caravan	CNA208	0.8	0.5	0.9	0.5	2.7
Cessna 441 Conquest II	CNA441	0.9	0.1	0.9	0.1	2.0
De Havilland Canada DHC6 Twin Otter	DHC6	0.4	0.0	0.4	0.0	0.8
Dornier Do 228	DO228	0.0	0.0	0.0	0.0	0.0
Embraer EMB120 Brasilia	EMB120	0.1	0.1	0.1	0.1	0.3
General Aviation Single Engine Prop	GASEPV	0.8	0.1	0.8	0.1	1.8
Piper PA-28 Cherokee	PA28	0.1	0.1	0.1	0.1	0.3
Shorts 330 Series	SD330	0.1	0.1	0.1	0.1	0.4
Subtotal		*4.4*	*1.3*	*4.5*	*1.2*	*11.3*
Grand Total		**190.1**	**115.9**	**206.6**	**99.4**	**655.5**

Notes: Day = 7:00 a.m. to 9:59 p.m., Night = 10:00 p.m. to 6:59 a.m.
Totals may not equal sum due to rounding.
Source: FAA Operations Network (OPSNET) data, CVG Flight Tracking System Data, Landrum & Brown, 2018.

Runway End Utilization: Average-annual day runway end utilization in 2026 is expected to remain the same as the Future (2021) No Action and the Future (2026) No Action conditions.

Flight Tracks: Flight tracks locations would not change under the Future (2026) Proposed Action. There would be small variations in flight track utilization percentages due to the increase in the number of operations. Flight track percentages modeled for the Future (2026) Proposed Action Noise Exposure Contour are shown in **Table 18** and **Table 19**.

Table 18
ARRIVAL FLIGHT TRACK UTILIZATION PERCENTAGES – FUTURE (2026) PROPOSED ACTION CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
09	AT61	43.4%	8.9%	10.1%	10.4%	2.9%
27	AT31	2.6%	1.0%	3.8%	5.7%	2.4%
	AT32	1.2%	0.8%	1.8%	2.4%	1.6%
	AT33	0.7%	0.2%	2.0%	1.3%	2.3%
18C	AT20	0.0%	0.0%	0.0%	4.3%	3.6%
	AT22	4.6%	0.0%	3.6%	0.0%	0.0%
	AT23	6.5%	20.6%	14.0%	0.0%	0.0%
	AT24	1.6%	3.4%	3.5%	0.0%	0.0%
	AT25	1.8%	0.0%	5.1%	0.0%	0.0%
	AT26	0.0%	0.0%	0.0%	2.9%	3.4%
	AT27	0.0%	0.0%	0.0%	1.1%	1.1%
	AT28	0.0%	0.0%	0.0%	1.1%	1.1%
	AT29	0.0%	0.0%	0.0%	4.2%	5.3%
	AT2B	0.0%	0.0%	0.0%	2.9%	3.4%
	AT2F	0.0%	0.0%	0.0%	1.1%	1.1%
	AT2G	0.0%	0.0%	0.0%	1.1%	1.1%
	AT2N	0.0%	0.0%	0.0%	4.2%	5.3%
	AT2V	0.0%	0.0%	0.0%	4.3%	3.6%
18L	AT11	1.0%	0.0%	3.2%	0.0%	0.0%
	AT12	7.0%	20.6%	16.4%	0.0%	0.0%
	AT13	5.0%	0.0%	4.6%	0.0%	0.0%
	AT14	1.7%	3.4%	4.2%	0.0%	0.0%
	AT15	1.0%	0.0%	3.2%	0.0%	0.0%
	AT16	0.0%	0.0%	0.0%	6.5%	8.0%
	AT17	0.0%	0.0%	0.0%	4.9%	5.3%
	AT18	0.0%	0.0%	0.0%	9.6%	12.5%
	AT19	0.0%	0.0%	0.0%	9.9%	8.6%
18R	A701	0.1%	0.2%	0.2%	0.8%	1.4%
36C	AT50	0.0%	0.0%	0.0%	1.5%	1.4%
	AT51	0.9%	0.0%	1.7%	0.0%	0.0%
	AT52	3.1%	8.4%	5.0%	0.0%	0.0%
	AT53	0.8%	1.4%	1.2%	0.0%	0.0%
	AT54	2.2%	0.0%	1.2%	0.0%	0.0%
	AT55	0.0%	0.0%	0.0%	0.5%	0.9%
	AT56	0.0%	0.0%	0.0%	1.1%	1.6%
	AT57	0.0%	0.0%	0.0%	1.2%	0.9%
	AT58	0.0%	0.0%	0.0%	0.7%	0.9%
	AT59	0.0%	0.0%	0.0%	0.7%	0.9%
	AT5B	0.0%	0.0%	0.0%	0.7%	0.9%
	AT5F	0.0%	0.0%	0.0%	0.5%	0.9%
	AT5N	0.0%	0.0%	0.0%	1.1%	1.6%
	AT5V	0.0%	0.0%	0.0%	1.5%	1.4%

Table 18, *(continued)*
ARRIVAL FLIGHT TRACK UTILIZATION PERCENTAGES – FUTURE (2026) PROPOSED ACTION CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
36L	A601	0.0%	0.1%	0.0%	0.1%	0.0%
36R	AT41	6.7%	26.6%	9.6%	0.0%	0.0%
	AT42	1.9%	0.0%	2.1%	0.0%	0.0%
	AT43	4.7%	0.0%	1.5%	0.0%	0.0%
	AT44	1.6%	4.4%	2.1%	0.0%	0.0%
	AT46	0.0%	0.0%	0.0%	7.1%	6.9%
	AT47	0.0%	0.0%	0.0%	1.2%	2.2%
	AT48	0.0%	0.0%	0.0%	3.4%	5.1%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

Source: FAA radar data, Landrum & Brown analysis, 2018.

Table 19
DEPARTURE FLIGHT TRACK UTILIZATION PERCENTAGES – FUTURE (2026) PROPOSED ACTION CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
09	DT61	0.0%	0.1%	0.0%	0.0%	0.0%
	DT62	0.0%	0.0%	0.0%	0.0%	0.0%
	DT63	0.0%	0.0%	0.0%	0.0%	0.0%
27	D2G1	0.9%	0.0%	2.7%	0.0%	0.0%
	D2G2	83.5%	0.0%	42.8%	0.0%	0.0%
	D2G3	0.9%	0.0%	2.7%	0.0%	0.0%
	D2J4	0.0%	26.9%	6.3%	0.0%	0.0%
	D2J5	0.0%	32.4%	7.6%	0.0%	0.0%
	D2J6	0.0%	9.7%	2.3%	0.0%	0.0%
	DT30	0.0%	0.0%	0.0%	4.3%	5.9%
	DT36	0.0%	0.0%	0.0%	7.0%	7.9%
	DT37	0.0%	0.0%	0.0%	14.3%	11.8%
	DT38	0.0%	0.0%	0.0%	11.6%	7.2%
	DT39	0.0%	0.0%	0.0%	6.6%	5.9%
	DT3A	0.0%	0.0%	0.0%	4.6%	5.9%
	DT3R	0.0%	0.0%	0.0%	2.7%	3.9%
	DT3X	0.0%	0.0%	0.0%	8.6%	5.3%
	DT3Y	0.0%	0.0%	0.0%	3.3%	5.3%
	DT3Z	0.0%	0.0%	2.7%	1.7%	2.6%
	DTE2	0.0%	0.0%	2.7%	1.7%	3.9%
18C	D1G5	2.6%	0.0%	1.9%	0.0%	0.0%
	D1G6	0.0%	0.0%	0.0%	0.0%	0.0%
	D1J5	0.0%	1.6%	0.4%	0.0%	0.0%
	D1J6	0.0%	0.1%	0.0%	0.0%	0.9%
	DT20	0.0%	0.0%	0.0%	0.4%	0.2%
	DT28	0.0%	0.0%	0.0%	1.1%	0.4%
	DT29	0.0%	0.0%	0.0%	0.3%	0.1%
	DT2A	0.0%	0.0%	0.0%	0.3%	0.2%
	DT2Y	0.0%	0.0%	0.0%	0.2%	0.2%
	DTNW3	0.0%	0.0%	0.6%	0.0%	0.1%
	DTNW4	0.0%	0.0%	0.0%	0.0%	0.0%
18L	D1G1	0.5%	0.0%	2.0%	0.0%	0.0%
	D1G2	1.9%	0.0%	10.6%	0.0%	0.0%
	D1J1	0.0%	1.7%	0.4%	0.0%	4.6%
	D1J2	0.0%	10.6%	2.5%	0.0%	6.6%
	DT16	0.0%	0.0%	0.0%	12.8%	2.4%
	DT17	0.0%	0.0%	0.0%	7.5%	1.6%
	DTSW1	0.0%	0.0%	0.0%	0.0%	0.5%
	DTW1	0.0%	0.0%	0.0%	0.0%	0.5%
18R	D701	0.0%	0.5%	0.1%	0.1%	0.8%

Table 19, *(continued)*
DEPARTURE FLIGHT TRACK UTILIZATION PERCENTAGES – FUTURE (2026) PROPOSED ACTION CONDITIONS

Runway End	Track ID	Heavy Jets	Large Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
36C	DT51X	0.0%	3.3%	0.8%	0.0%	0.0%
	DT54	0.0%	0.0%	0.0%	1.2%	1.3%
	DT55X	0.0%	0.0%	0.0%	0.4%	0.4%
	DT56	0.0%	0.0%	0.0%	1.5%	1.1%
	DTE1	0.0%	0.0%	0.0%	0.0%	0.0%
	DTG1X	2.7%	0.0%	2.3%	0.0%	0.0%
	DTW2	0.0%	0.0%	0.0%	0.0%	0.0%
36L	D60D	0.0%	0.0%	0.0%	0.0%	0.6%
36R	D3G1	0.5%	1.8%	0.4%	0.0%	0.0%
	D3G2	2.0%	0.4%	0.1%	0.0%	0.0%
	D3G2	0.0%	0.0%	0.0%	0.0%	0.0%
	D3G3	0.5%	3.8%	0.9%	0.0%	0.0%
	D3J1	0.0%	0.0%	0.2%	0.0%	0.0%
	D3J1	0.0%	0.0%	1.5%	0.0%	0.0%
	D3J2	0.0%	0.0%	0.0%	0.0%	0.0%
	D3J2	0.1%	0.3%	0.3%	0.0%	0.1%
	D3J3	0.0%	0.0%	3.2%	0.0%	0.0%
	DT46	0.0%	0.0%	0.0%	0.3%	1.4%
	DT46	0.0%	0.0%	0.0%	2.3%	2.3%
	DT47	0.0%	0.0%	0.0%	0.1%	0.6%
	DT47	0.0%	0.0%	0.0%	0.8%	0.9%
	DT48	0.0%	0.0%	0.0%	0.1%	0.3%
	DT48	0.0%	0.0%	0.0%	0.8%	0.5%
	DT49	0.0%	0.0%	0.0%	0.4%	1.6%
	DT49	0.0%	0.0%	0.0%	3.0%	2.6%
	DTNE1	2.6%	2.2%	0.5%	0.0%	0.3%
	DTNE1	0.0%	0.0%	0.0%	0.0%	0.5%
	DTNW1	0.5%	0.0%	0.0%	0.0%	0.0%
	DTNW1	0.3%	0.0%	0.0%	0.0%	0.0%
	DTSE1	0.7%	4.7%	1.6%	0.0%	0.0%
	DTSE2	0.0%	0.0%	0.0%	0.0%	0.3%
	DTSE2	0.0%	0.0%	0.0%	0.0%	0.5%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

Source: FAA radar data, Landrum & Brown analysis, 2018.

Aircraft Weight and Trip Length: The trip lengths flown from CVG are based upon projected operations for the future conditions. There are expected to be no major changes in the destinations served by airlines at CVG from the Future (2026) No Action, however changes in the number of operations and fleet mix results in small variations in the departure trip length distributions for the Future (2026) Proposed Action conditions as shown in **Table 20.**

Table 20
DEPARTURE TRIP LENGTH DISTRIBUTION
FUTURE (2026) PROPOSED ACTION CONDITIONS

Stage Length Category	Heavy Jet	Cargo Jets	Large Passenger Jets	Propeller Aircraft	Regional / Business Jets
1	20.1%	45.6%	48.0%	100.0%	53.8%
2	31.0%	46.0%	43.0%	0.0%	38.0%
3	15.5%	2.9%	4.0%	0.0%	4.8%
4	15.2%	2.7%	4.7%	0.0%	3.3%
5	4.5%	1.0%	0.0%	0.0%	0.0%
6	6.5%	0.8%	0.3%	0.0%	0.0%
7	7.2%	1.0%	0.0%	0.0%	0.0%
8	0.0%	0.0%	0.0%	0.0%	0.0%
9	0.0%	0.0%	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Official Airline Guide, Landrum & Brown, 2018.

6.0 NOISE MODELING RESULTS

6.1 EXISTING NOISE CONTOUR

The Existing Noise Exposure Contour, showing levels of 65, 70, and 75 DNL, is presented on **Exhibit 6**. The area within each five-decibel noise exposure contour is shown in **Table 21**. The 65+ DNL of the Existing Noise Exposure Contour encompasses approximately 7.0 square miles.

The shape of the noise contours reflect the predominant use of Runway 27, Runway 18C/36C and Runway 18L/36R. During the daytime, the Airport generally operates in a south/west configuration or in a north/ west configuration. When in a south/west configuration, arrivals occur from the north to Runways 18L, 18C, and from the east on Runway 27; and departures occur to the south from Runways 18C and 18L, and to the west on Runway 27. When in north/west flow, arrivals occur to Runways 36R, 36C and 27, and departures from Runways 36R, 36C, and 27. During the nighttime, Runway 27 is the preferred departure runway due to the compatible land use corridor that has been created as a result of a land acquisition program to the west of CVG.

Due to the runway use pattern, the noise contour extends west of Runway 27 with lesser extensions to the north and south of Runway 18L/36R and Runway 18C/36C. The noise contour emanating from Runway 18R/36L is minimal due to the limited use of this runway.

Table 21
AREA EXPOSED TO VARIOUS NOISE LEVELS (IN SQUARE MILES)
EXISTING NOISE EXPOSURE CONTOUR

CONTOUR RANGE	EXISTING NOISE EXPOSURE CONTOUR (SQUARE MILES)
65-70 DNL	4.0
70-75 DNL	1.8
75 + DNL	1.1
65 + DNL	7.0

Source: AEDT Version 2d, Landrum & Brown, 2018.

6.2 FUTURE (2021) NO ACTION NOISE CONTOUR

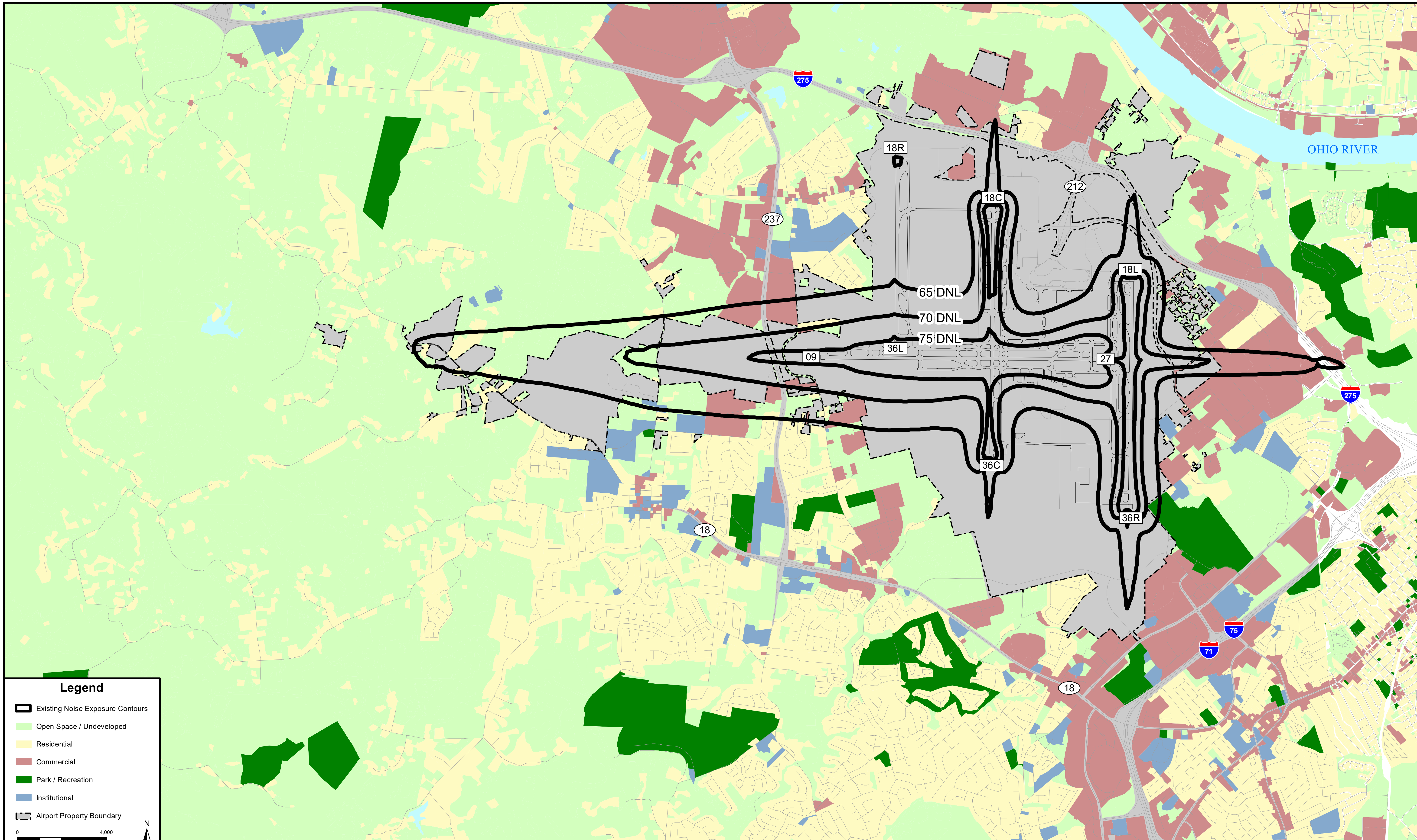
The Future (2021) No Action Noise Exposure Contour, showing 65, 70, and 75 DNL levels, is presented on **Exhibit 7**. The area within each five-decibel noise exposure contour is shown in **Table 22**. The 65+ DNL of the Future (2021) No Action Noise Exposure Contour encompasses approximately 11.2 square miles. The Future (2021) No Action Noise Exposure Contour is larger than the Existing Noise Exposure Contour due to the forecasted increase in aircraft operations, which includes general growth in aviation demand and the expected increase in cargo operations that would occur with or without the Proposed Action.

The Future (2021) No Action Noise Exposure Contour retains a similar shape as the Existing Noise Exposure contour because runway use patterns and flight tracks are expected to remain similar.

Table 22
FUTURE (2021) NO ACTION NOISE EXPOSURE CONTOUR AREAS EXPOSED TO VARIOUS NOISE LEVELS (IN SQUARE MILES)

CONTOUR RANGE	2021 NO ACTION NOISE EXPOSURE CONTOUR (SQUARE MILES)
65-70 DNL	6.6
70-75 DNL	2.7
75 + DNL	1.9
65 + DNL	11.2

Source: Landrum & Brown, 2018.



Air Cargo Facility Environmental Assessment

Existing Noise Exposure Contours

EXHIBIT: 6

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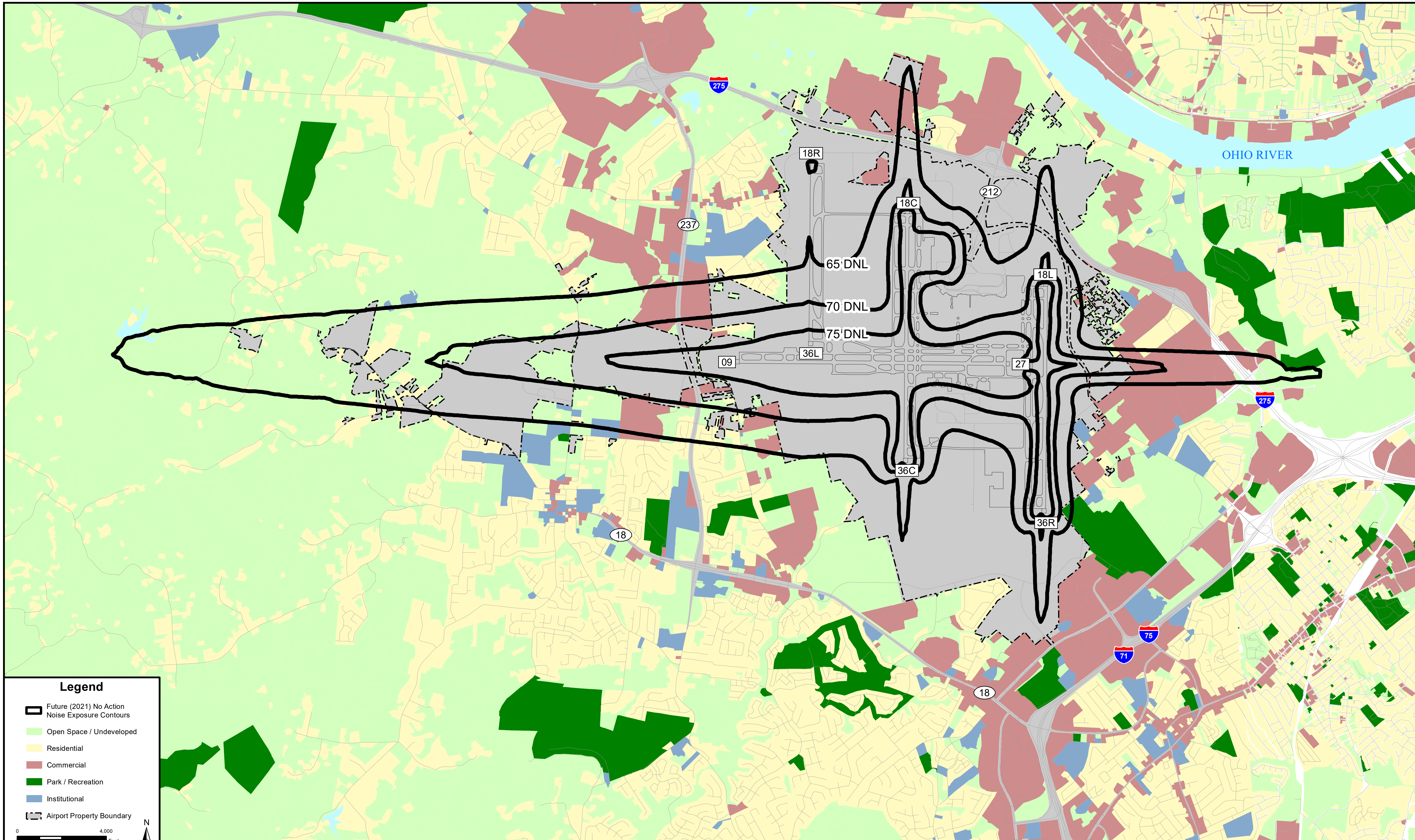

Air Cargo Facility Environmental Assessment

Future (2021) No Action Noise Exposure Contours

EXHIBIT: 7

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6.3 FUTURE (2021) PROPOSED ACTION NOISE CONTOUR

The Future (2021) Proposed Action Noise Exposure Contour, showing 65, 70, and 75 DNL levels, is presented on **Exhibit 8**. The area within each five-decibel noise exposure contour is shown in **Table 23**. The 65+ DNL of the Future (2021) Proposed Action Noise Exposure Contour encompasses approximately 11.2 square miles. The Future (2021) Proposed Action Noise Exposure Contour is similar in shape and size to the Future (2021) No Action Noise Contour. There would be no change to the number of arrivals and depa rture, nor would there be any change to runway use or flight tracks. Under th e Future (2021) No Action, run-ups would occur on th e north airfield to the east of Runway 18C. Under the Future (2021) Proposed Action, run-ups would occur at the proposed cargo facility on the south airfield. Therefore, the size of the Future (2021) Proposed Action noise contour increases within the south airfield between Runway 36C and Runway 36R and de creases within the north airfield east of Runway 18C. The Future (2021) Proposed Action, compared to the Future (2021) No Action, and the area of 1.5 DNL increase within the 65 D NL is shown on **Exhibit 9**. The 1.5 DNL increase area remains over compatible Airport-owned land.

Table 23
FUTURE (2021) NO ACTION NOISE EXPOSURE CONTOUR AREAS EXPOSED TO VARIOUS NOISE LEVELS (IN SQUARE MILES)

CONTOUR RANGE	2021 PROPOSED ACTION NOISE EXPOSURE CONTOUR (SQUARE MILES)
65-70 DNL	6.5
70-75 DNL	2.8
75 + DNL	1.9
65 + DNL	11.2

Source: Landrum & Brown, 2018.

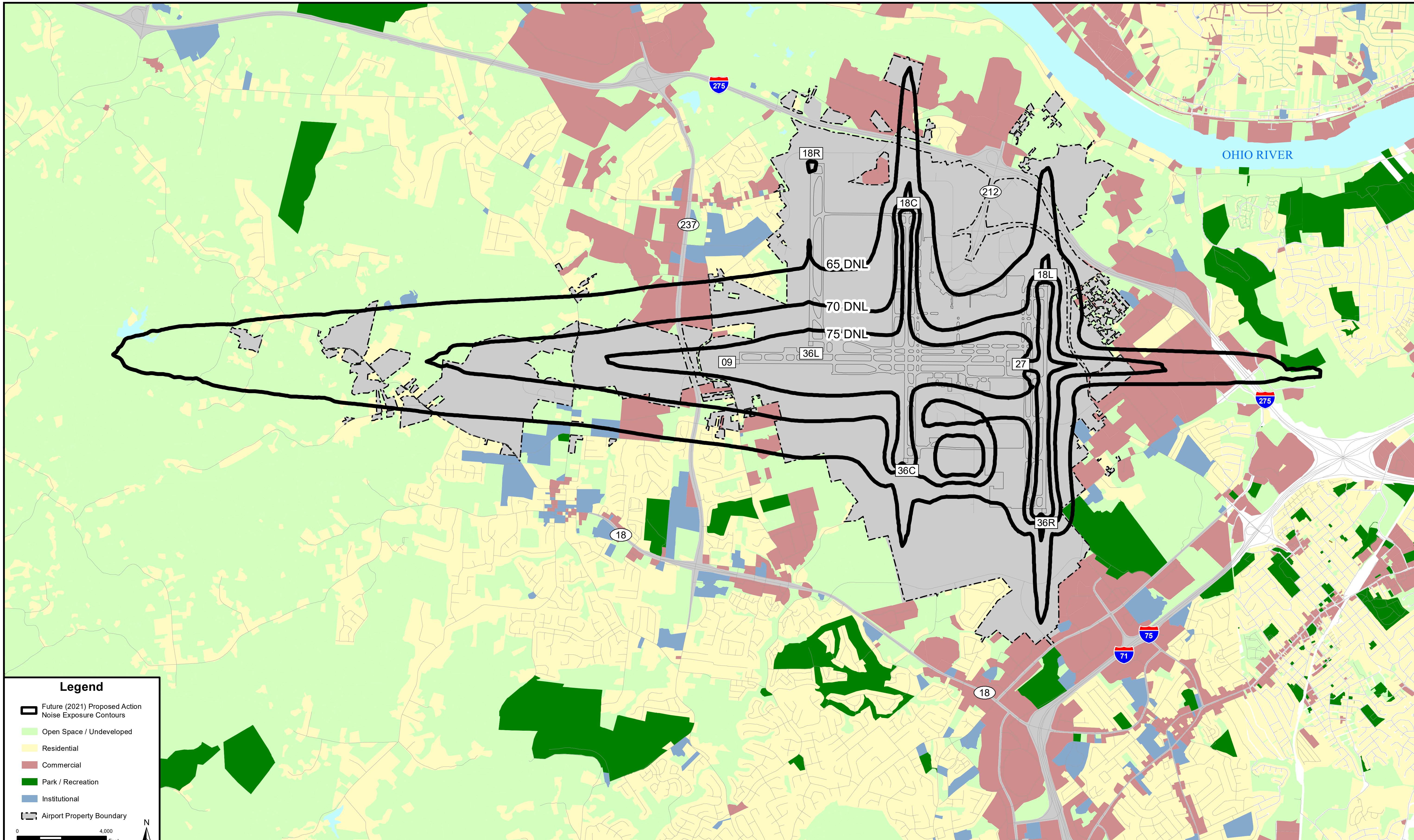
6.4 FUTURE (2026) NO ACTION NOISE CONTOUR

The Future (2026) No Action Noise Exposure Contour, showing 65, 70, and 75 DNL levels, is presented on **Exhibit 10**. The area within each five-decibel noise exposure contour is shown in **Table 24**. The 65+ DNL of the Future (2026) No Action Noise Exposure Contour encompasses approximately 13.3 square miles. The Future (2026) No Action Noise Exposure Contour retains a similar shape as the Future (2021) No Action Noise Exposure Contour, but is larger due to the forecasted increase in aircraft operations.

Table 24
FUTURE (2026) NO ACTION NOISE EXPOSURE CONTOUR AREAS EXPOSED TO VARIOUS NOISE LEVELS (IN SQUARE MILES)

CONTOUR RANGE	2026 NO ACTION NOISE EXPOSURE CONTOUR (SQUARE MILES)
65-70 DNL	7.8
70-75 DNL	3.2
75 + DNL	2.3
65 + DNL	13.3

Source: Landrum & Brown, 2018.



Air Cargo Facility Environmental Assessment

Future (2021) Proposed Action Noise Exposure Contours

EXHIBIT: 8

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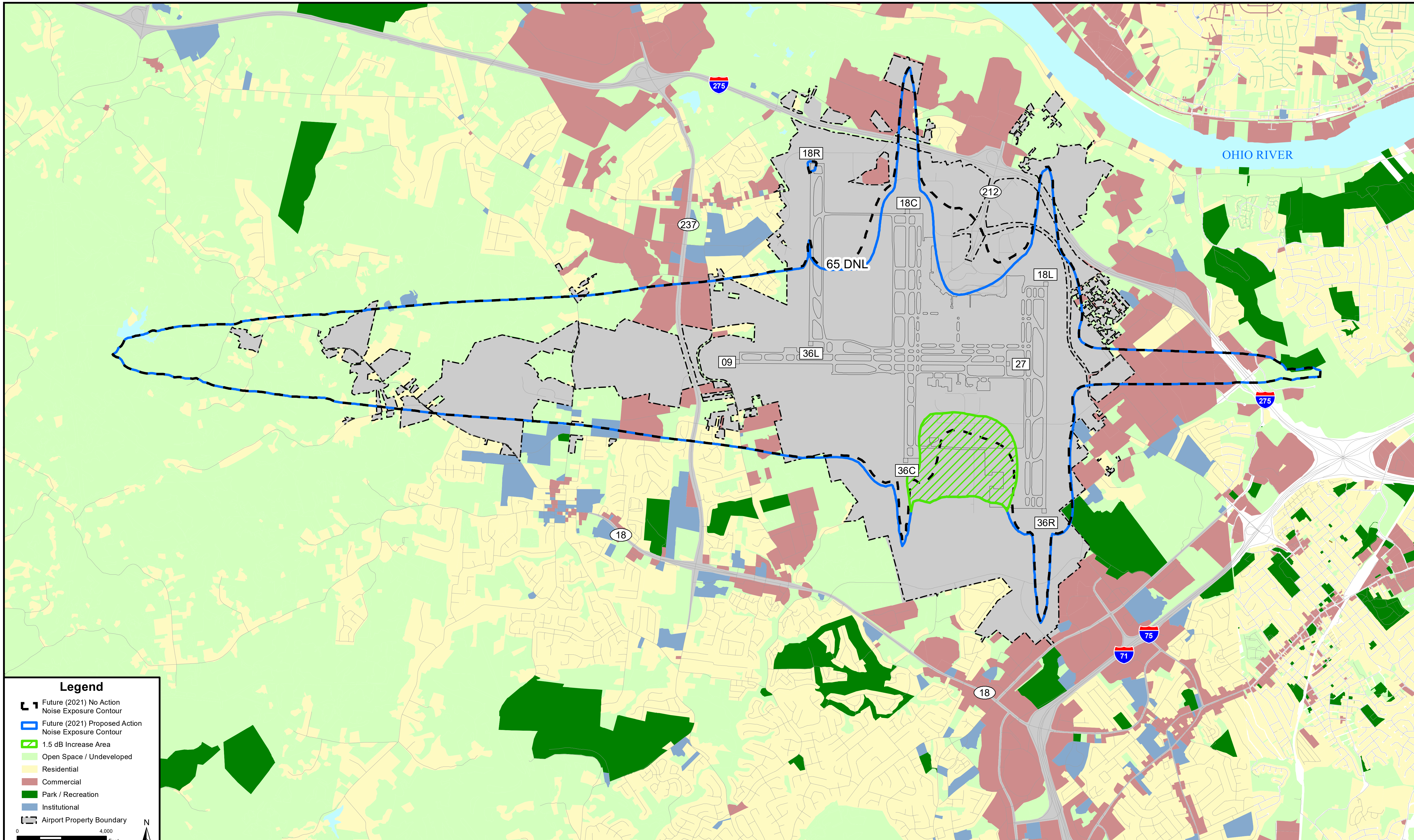

Air Cargo Facility Environmental Assessment	**Future (2021) No Action Noise Exposure Contours Compared to Future (2021) Proposed Action Noise Exposure Contours**	EXHIBIT: 9

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6.5 FUTURE (2026) PROPOSED ACTION NOISE CONTOUR

The Future (2026) Proposed Action Noise Exposure Contour, showing 65, 70, and 75 DNL levels, is presented on **Exhibit 11**. The 65+ DNL of the Future (2026) Proposed Action Noise Exposure Contour encompasses approximately 13.9 square miles.

The Future (2026) Proposed Action Noise Exposure Contour retains a similar shape as the Future (2026) No Action Noise Exposure Contour, but is larger due to the increase in aircraft operations that would occur as a result of the implementation of the Proposed Action. Similar to 2021, the primary difference in the shape of the Future (2026) Proposed Action noise contour compared to the Future (2026) No Action noise contour is due to the location of the aircraft run-ups associated with the cargo fac ility. **Exhibit 12** shows the Future (2026) Proposed Action compared to the Future (2026) No Action and the area of 1.5 DNL increase within the 65 DNL. The 1.5 DNL increase area remains over compatible Airport-owned land.

The difference in area between the Future (2026) Proposed Action Noise Exposure Contour and the Future (2026) No Action Noise Exposure Contour is shown below, in **Table 25**.

Table 25
FUTURE (2026) NO ACTION vs. FUTURE (2026) PROPOSED ACTION NOISE EXPOSURE CONTOUR AREAS EXPOSED TO VARIOUS NOISE LEVELS (IN SQUARE MILES)

CONTOUR RANGE	2026 NO ACTION NOISE EXPOSURE CONTOUR (SQUARE MILES)	2026 PROPOSED ACTION NOISE EXPOSURE CONTOUR (SQUARE MILES)	DIFFERENCE
65-70 DNL	7.8	7.9	0.1
70-75 DNL	3.2	3.5	0.3
75 + DNL	2.3	2.5	0.1
65 + DNL	13.3	13.9	0.5

Source: Landrum & Brown, 2018.

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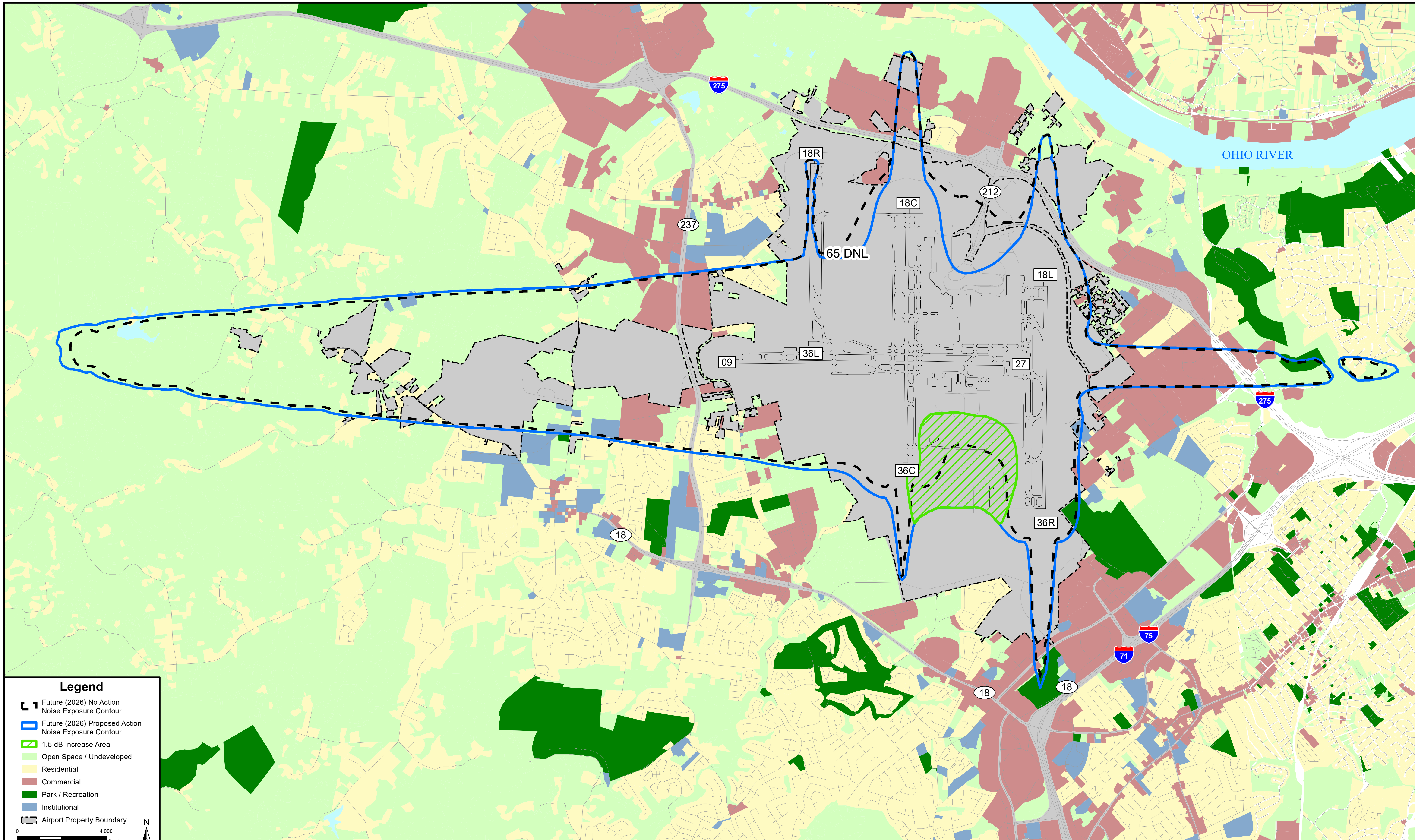

Air Cargo Facility Environmental Assessment

Future (2026) No Action Noise Exposure Contours Compared to Future (2026) Proposed Action Noise Exposure Contours

EXHIBIT: 12

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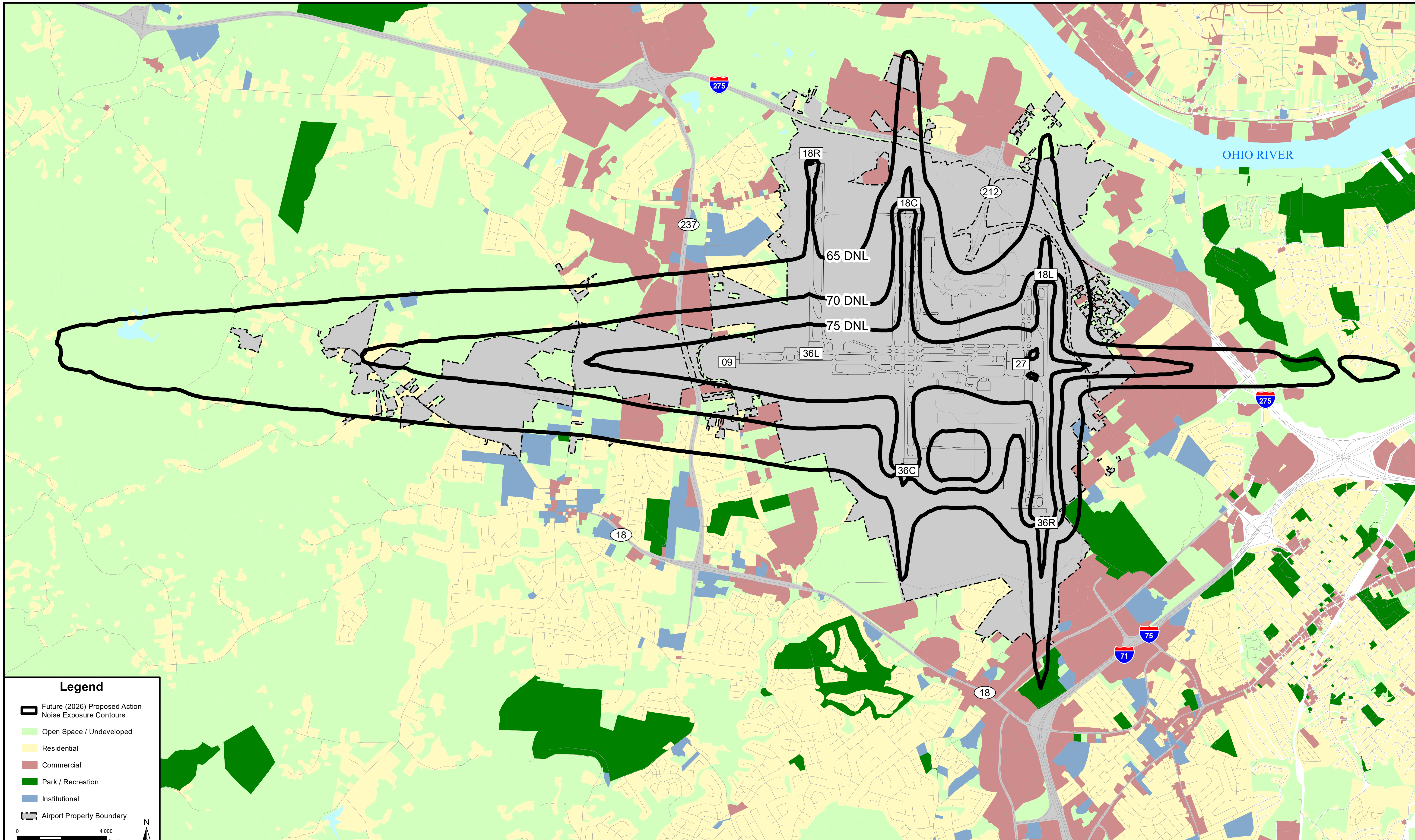

Air Cargo Facility Environmental Assessment

Future (2026) Proposed Action Noise Exposure Contours

EXHIBIT:
11

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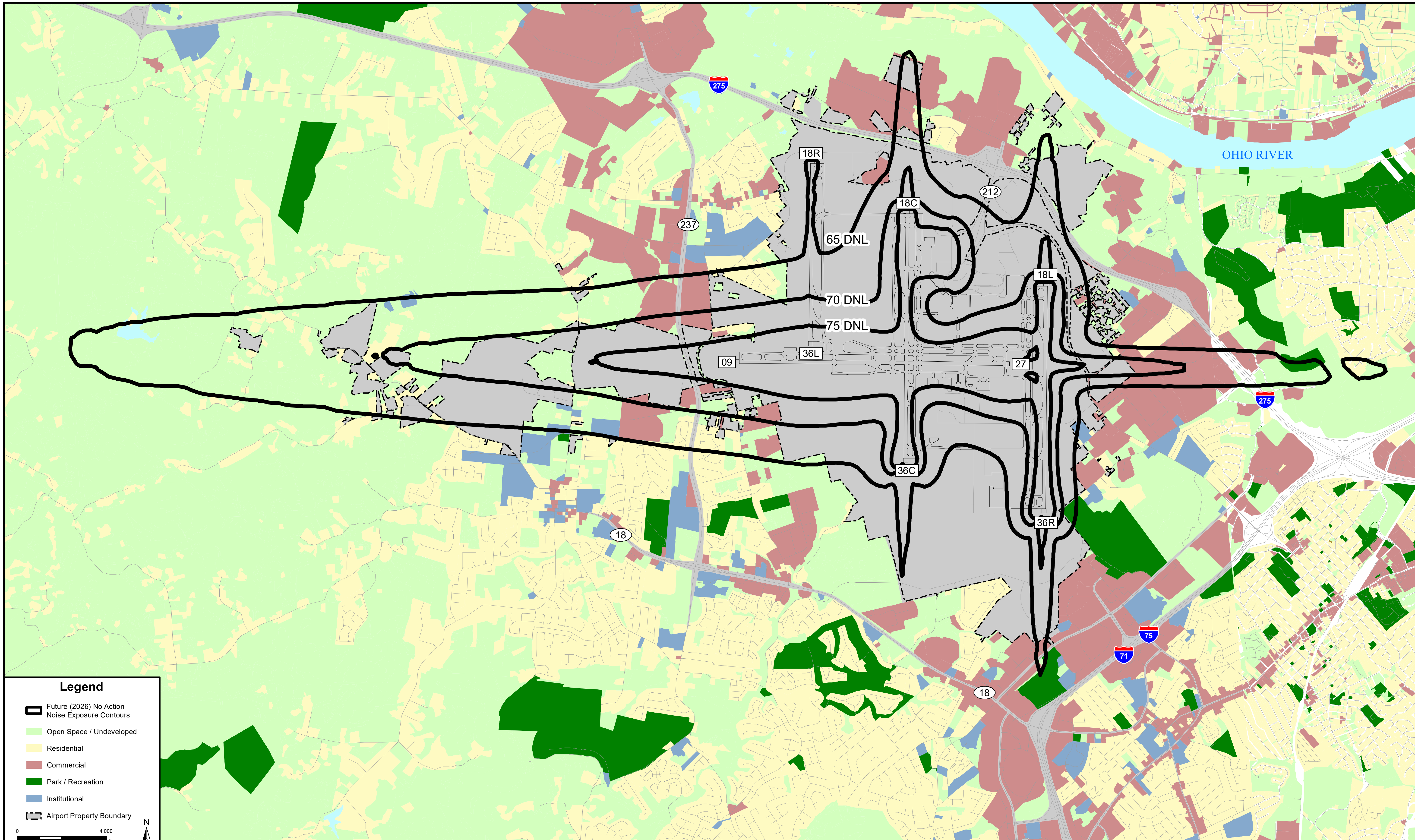

Air Cargo Facility Environmental Assessment

Future (2026) No Action Noise Exposure Contours

EXHIBIT: 10

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Appendix G

APPENDIX G
WATER RESOURCES

This appendix contains the Wetland Delineation Report and coordination with the U.S. Army Corp of Engineers and Kentucky Department of Water. The full document, including maps, was not included due to its large size. However, upon request the full document can be provided.

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JURISDICTIONAL DETERMINATION COORDINATION

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From: UPS Quantum View
To: clovins@environment-archaeology.com
Subject: UPS Delivery Notification, Tracking Number 1ZF576540191366794
Date: Monday, June 25, 2018 8:08:15 AM

UPS

Your package has been delivered.

Delivery Date: Monday, 06/25/2018
Delivery Time: 07:56 AM

At the request of ENVIRONMENT & ARCHAEOLOGY this notice alerts you that the status of the shipment listed below has changed.

Shipment Detail

Tracking Number:	1ZF576540191366794
Ship To:	Kimberly Simpson U.S. Army Corps of Engineers 600 DR MARTIN LUTHER KING PL FLOOR B ROOM 700-999 LOUISVILLE, KY 40202 US
UPS Service:	UPS NEXT DAY AIR
Number of Packages:	1
Weight:	17.5 LBS
Delivery Location:	MAIL ROOM
	JOHNSON
Reference Number 1:	E&A-2943e
Reference Number 2:	CVG Air Cargo WD

Download the UPS mobile app

June 22, 2018

Ms. Kimberly Simpson, Regulatory Branch
Department of Army Corps of Engineers
600 Martin Luther King Jr. Place
Louisville, Kentucky 40202

Re: ***Wetland and Stream Delineation Report***
Kenton County Airport Board
CVG Air Cargo Hub Development Project
ACOE Louisville District ID No. LRL-2018-00268
Boone County, Kentucky

Dear Ms. Simpson,

The Kenton County Airport Board (KCAB) is continuing to pursue development of the proposed CVG Air Cargo Development Project in Boone County, Kentucky. Please find enclosed the completed Wetland and Stream Delineation of the CVG Air Cargo Hub Development Project. This report and supportive attachments provide a summary of findings and delineated surface waters within a 1,465-acre survey area. The report enables the Louisville District and KCAB to continue to complete the request for a jurisdictional determination of "waters of the United States."

Environment & Archaeology, LLC has been actively compiling the required data to complete the delineation and address all items in an April 24, 2018 letter from the Louisville District. *Environment & Archaeology, LLC* confirmed in a June 18, 2018 telephone conversation with Mr. Greg McKay to proceed with submitting the proposed project's final delineation report in order to continue the requested Jurisdictional Determination at the project site. KCAB will be submitting the complete Individual 404/401 permit application package in the coming weeks.

We respectfully request that you review the attached information and contact us at your earliest convenience to schedule a site visit. We appreciate your assistance with this matter. If you have any questions or concerns, please do not hesitate to contact me at (513) 899-9023 or Debbie Conrad at (859) 767-7021.

Sincerely,

Christina M. Lovins

Christina Lovins
Vice President

Enclosed: Wetland and Stream Delineation Technical Letter

cc: Debbie Conrad (KCAB)
Sarah Potter (L&B)

June 22, 2018

Debbie Conrad
Kenton County Airport Board
Cincinnati/Northern Kentucky International Airport
P.O. Box 752000
Cincinnati, Ohio 45275-2000

RE: CVG Air Cargo Hub Development Project in Boone County, Kentucky
Wetland and Stream Delineation Technical Letter
ACOE Louisville District ID No. LRL-2018-00268

Dear Ms. Conrad:

Kenton County Airport Board (KCAB) has proposed development within properties and adjacent parcels of the Cincinnati/Northern Kentucky International Airport (CVG) in Florence, Boone County, Kentucky. KCAB requested a wetland and stream delineation containing the proposed development area and an approximate 1,465-acre survey area contains the project footprint referred to as the Proposed CVG Air Cargo Hub Development Project. The survey area and the proposed project's Action Area is located north of Burlington Pike/State Highway 18 and Aero Parkway, parallels Turfway Road, and extends northward toward existing airport infrastructure. The survey area spans land coverage west to east from Limaburg Creek Road to Turfway Road and State Highway 236.

The cumulative 1,465-acre survey area is a cumulation of delineations efforts within three (3) original separate survey areas and occurred within of the following dates: October 29 and 30, 2015; February 8 to 16, 2016 and September 5 to 12 and 23, 2016; and September 5 to 12, 2017. The three (3) original delineation areas were identified as the Vesper Property, the Air Cargo Hub Wetland Delineation, and the Air Cargo Hub- Additional Areas (Attachment 1- Location Maps). Re-delineation efforts of the entire 1,465-acre survey area occurred from April 24, 2018 through May 25, 2018. A variety of land types were identified within the survey area and consisted of the following: urban/industrial turf, old field, upland scrub/shrub vegetation, upland mixed deciduous forest, palustrine emergent wetland, palustrine scrub/shrub wetland, areas of palustrine forested wetland, open water wetland areas, and ponds.

The wetland and stream delineation identified 247 streams, 175 wetlands, and 11 ponds (Attachment 1 – Location maps). The delineated wetlands amounted to 28.41 acres of palustrine emergent wetland, 0.69 acres of scrub-shrub wetlands, 0.78 acres of palustrine forested wetland, 0.27 acre of open water/wetland areas, and 2.89 acres of ponds. Linear footage of streams within the survey area consisted of 15,359 feet of ephemeral streams, 75,059 feet of intermittent streams, and 24,929 feet of perennial streams.

This technical letter provides a summary of the available map reviews and data collected during the survey. Attachments 1 through 7 provide supportive mapping, waterbody summary tables, photographs, and wetland and stream data sheets documenting the vegetation communities and surface waters.

METHODOLOGY

Wetlands

Environment & Archaeology, LLC utilized the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Eastern Mountains and Piedmont Region Regional Supplement* Version 2 (U.S. Army Corps of Engineers 2012). This methodology calls for a step-by-step approach to the delineation which identifies the presence or absence of three (3) factors: hydrophytic vegetation, hydric soils, and wetland hydrology. Each factor must be present if a location is to be considered a wetland. Prior to visiting the site, relevant resource information on the survey area was reviewed to determine the potential presence of wetlands, including: U.S. Geological Survey 7.5' topographic quadrangle maps, U.S. Department of Agriculture, Natural Resource Conservation Service (USDA, NRCS) soil surveys, Federal Emergency Management Agency (FEMA) maps, and National Wetlands Inventory (NWI) maps.

After a review of the agency resource information, a field delineation of the survey area was conducted utilizing the routine on-site method for delineation. Representative plots were taken within the survey area wherever a change in the vegetation, soils, or hydrology became apparent. During sampling, a determination was made as to whether the plot was a wetland or upland site. If an area was determined to be a wetland site, additional sampling of vegetation, soils, and hydrology was performed to determine the boundaries of the wetland area.

Each wetland area was photo-documented, then described in accordance with characteristics assigned by Cowardin, et al. (1979). Dominant vegetation was determined by estimating percent areal coverage for the most prevalent species which cumulatively totaled 50 percent of the areal coverage along with any other single species accounting for at least 20 percent coverage within a plot. Each identified dominant species was assigned its pertinent wetland indicator status according to the 2016 National Wetland Plant List (http://rsgisias.crrel.usace.army.mil/NWPL/), with all field data recorded on an Eastern Mountains and Piedmont Region Routine Wetland Determination Data Form (Version 2.0). Field notes were collected on any observed runoff features, as well as conveyance channels that provided justification of ‘connectivity’ for a surface water. The total size of each identified wetland area was determined using the GPS data collected in the field and measured utilizing ArcGIS for Desktop. Wetland acreage was rounded to the nearest one-hundredth of an acre.

Streams

The project Action Area occurs within the Bluegrass Bioregion of Kentucky and the survey consisted of numerous headwater streams to Dry Creek, Gunpowder Creek and included Gunpowder Creek itself. All identified streams were assessed using the Kentucky Department of Environmental Protection Bioassessment Stream Sheets. Stream lengths were rounded to the nearest foot. All stream channels were followed in the field to their origin within the survey area to accurately classify each stream’s flow regime.

The location of the streams and wetlands within the survey area were flagged and global positioning system (GPS) data was collected at each of these points with a handheld GPS unit capable of sub-meter accuracy. GPS data points were downloaded into the ArcGIS for Desktop mapping program and then overlaid atop various resource maps - USGS topographic map, FEMA map, NWI map, USDA soil survey, and aerial imagery.

All statements presented in this report concerning potentially jurisdictional or non-jurisdictional waters of the United States are considered preliminary until the U.S. Army Corps of Engineers provides written concurrence with the report’s findings. An approximate 177-acre portion of the survey area has been documented to have already received USACE review and a preliminary jurisdictional determination; in addition, two (2) wetland features and two (2) open water features/ponds within the 177-acres were provided an approved jurisdictional determination.

AGENCY RESOURCE INFORMATION

Prior to initiation of the field survey, available agency resource information to determine the likelihood of wetlands and streams present on the site. NWI maps have been prepared for the site by the U.S. Fish and Wildlife Service. The USDA Soil Survey of Boone County, Kentucky, has also been published. FEMA flood maps are available online at https://msc.fema.gov/portal. All agency resource data has been digitized for use in GIS mapping programs and has been incorporated into the project mapping.

U.S. Geological Survey (USGS) Map

The parcel was located on the Burlington, Kentucky, USGS 7.5' topographic quadrangle (Attachment 1: Overview and Figures 1a-1c). Topography within the study area was gentle to steeply sloped. The survey area occurs within the HUC 8 watershed of Middle-Ohio Laughery (HUC 05090203). The northernmost parcel adjacent to Kenton Road was located within the immediate receiving watershed of Dry Creek-Ohio River (HUC 12: 050902030202). The remainder of the survey area occurred within the immediate receiving watershed of Gunpowder Creek (050902030806). Gunpowder Creek is defined as a warm-water aquatic habitat by the Kentucky Division of Water; the stream is not identified as a Special Resource Water. Mapped FEMA 100-year floodplain occurs along portions of Gunpowder Creek within the survey area.

The Burlington, Kentucky topo illustrated the presence of Gunpowder Creek (perennial and intermittent) and numerous unnamed intermittent and perennial headwater stream channels throughout the survey area. Topographic indications of the potential for additional channel flow was also prevalent throughout the excerpt of the quadrangle map containing the survey area. The field investigation utilized the topographic map to assist in flow regime determinations but site conditions and visual observations of stream channels were the basis of stream classification decisions.

National Wetland Inventory (NWI) Map

The survey area was located on the Burlington, Kentucky, USGS 7.5' NWI quadrangle (Attachment 1: Location Maps). Numerous mapped NWI features were shown on NWI mapping and consisted predominantly of pond features classified as palustrine, unconsolidated bottom, permanently flooded, impounded/diked (PUBHh). Palustrine emergent, persistent, seasonally flooded, dike/impoundment (PEM1Ch) was also illustrated within the survey area. All mapped NWI features were examined to determine the presence or absence of the surface waters.

Note that the NWI data does not preclude the possible existence of additional wetlands in the area. NWI maps utilize high altitude, stereoscopic, aerial photography, and is partially dependent on the conditions at the time of the photograph. NWI mapping limitations can occur in the following situations: accurately identifying locations and extents of small wetlands, wetlands within evergreen forests, some aquatic bed wetlands, and when mapping efforts were conducted during drier seasons or a period of drought conditions.

Natural Resources Conservation Service (NRCS) Soil Survey

The Soil Surveys of Boone, Campbell, and Kenton Counties, Kentucky (USDA 1973, 2015) identified nine (9) soil types within the study area (Attachment 1: Figure 2). These soil types, as well as their hydric status, are presented in Table 1. Three (3) soil types within the survey area were classified as hydric by the USDA (Table 1). Hydric soils are soils which formed under saturated conditions. The presence of hydric soils on a site indicates the historical presence of conditions which would favor the development of wetlands. The presence of hydric soil types on a site does not, however, guarantee the presence of wetlands. Due to changes in vegetation patterns and drainage, areas of hydric soils may be sufficiently modified to prevent the presence of wetland hydrology and hydrophytic vegetation.

RESULTS

Vegetation Communities

The survey area consisted of seven (7) vegetation communities: urban/industrial turf, old field, upland mixed deciduous forest, palustrine emergent wetland, palustrine forested wetland, palustrine scrub/shrub wetland, and upland scrub/shrub. Representative photos have been provided in Attachment 4. Datasheets provided in Attachment 5 provide additional vegetation information.

Urban/industrial turf: Urban/industrial turf was identified throughout portions of the survey area. These areas consisted of gravel/dirt road grades and staging areas. Maintained, monotypic grasses were also identified along paved and gravel roadways.

Table 1. Soil types located within the survey area in Boone County, Kentucky.

Symbol	Soil Type	Hydric Status	Drainage Class
Av	Avonburg silt loam (0 to 4 percent slopes)	Hydric	Somewhat poorly-drained
JeD	Jessup silt loam, 12 to 20% slopes	Non-hydric	Well-drained
JsD3	Jessup silty clay loam, 12 to 20% slopes	Non-hydric	Well-drained
Ln	Lindside silt loam (0 to 3 percent slopes, occasionally flooded	Non-hydric	Moderately well-drained
NeD	Negley silt loam, 12 to 20 percent slopes	Non-hydric	Well-drained
Nk	Newark silt loam, 0 to 2% slopes, occasionally flooded	Hydric	Somewhat poorly-drained
No	Nolin silt loam, 0 to 2% slopes, occasionally flooded	Hydric	Well-drained
RsB	Rossmoyne silt loam, 0 to 6% slopes	Non-hydric	Moderately well-drained
RsC	Rossmoyne silt loam, 6 to 12% slopes	Non-hydric	Moderately well-drained

Old field: Old field vegetation was the dominant land cover within the open portions of the survey area and was identified along vegetated two-track travel lanes and maintained corridors through upland forest. Dominant vegetation included tall fescue (*Festuca arundinacea)*, yellow foxtail (*Setaria pumila*), foxtail millet (*Setaria italica*), red clover (*Trifolium pratense*), Fuller's teasel (*Dipsacus fullonum*), late goldenrod (*Solidago altissima*), broomsedge (*Andropogon virginicus*), common ragweed (*Ambrosia artemisiifolia*), thistle (*Cirsium* sp.), Queen Anne's lace (*Daucus carota*), white clover (*Trifolium repens*), Japanese honeysuckle (*Lonicera japonica*), poison hemlock (*Conium maculatum*), field garlic (*Allium vineale*), lance-leaf plantain (*Plantago lanceolata*), sulfur cinquefoil (*Potentilla recta*), sweet woodruff (*Galium odoratum*), Indian strawberry (*Duchesnea indica*), purple deadnettle (*Lamium purpureum*), and aster (*Symphyotrichum* spp.).

Upland scrub/shrub: Upland scrub/shrub was primarily identified near roadways and along ridgetops. Vegetation included Canada goldenrod (*Solidago canadensis*), hackberry, stiff goldenrod (*Solidagao rigida*), multiflora rose, poison ivy (*Toxicodendron radicans*), calico aster (*Symphyotrichum lateriflorum*), common yarrow (*Achillea millefolium*), Fuller's teasel (*Dipsacus fullonum*), black locust, Queen Anne's lace, honeysuckle, giant ironweed (*Vernonia gigantea*), and white snakeroot.

Upland mixed deciduous forest: Upland mixed deciduous forest was identified primarily surrounding stream and drainage corridors and occupied several large sections of contiguous forest within the southern and western portions of the survey area. Dominant canopy vegetation included: sugar maple (*Acer saccharum*), honey locust (*Gleditsia triacanthos*), hackberry (*Celtis occidentalis*), black cherry (*Prunus serotina*), black locust (*Robina pseudoacacia*), green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), American elm (*Ulmus americana*), black walnut (*Juglans nigra*), and box elder (*Acer negundo*). The understory vegetation was dense and dominated by bush honeysuckle (*Lonicera maackii*), multiflora rose (*Rosa multiflora*), brambles (*Rubus* spp.), and white snakeroot (*Ageratina altissima*).

Palustrine emergent wetland: Palustrine emergent wetlands were the predominated wetland cover type on-site and occurred in depressional areas and seeps throughout the survey area. Dominant vegetation included Virginia wild rye (*Elymus virginicus*), soft stem bulrush (*Schoenoplectus tabernaemontani*), broadleaf cattail (*Typha angustifolia*), woolgrass (*Scirpus cyperinus*), arrowleaf tearthumb (*Polygonum sagittatum*), sensitive fern (*Onoclea sensibilis*), deertongue grass (*Dichanthelium clandestinum*), reed canary grass (*Phalaris arundinacea*), spotted touch-me-nots (*Impatiens capensis*), panic grass (*Dichanthelium acuminatum*), lurid sedge (*Carex lurida*), and occasional seedlings/saplings of black willow (*Salix nigra*), red maple, green ash and box elder.

Palustrine scrub/shrub wetland: Palustrine scrub/shrub wetland vegetation was located in ten (10) locations as the single wetland community type or as a component of a larger wetland complex (W-3, W-4, W-5, W-8, W-26, W-111, W-158 to W-161). Dominant vegetation included black willow, hackberry, American elm, green ash saplings, sedge (*Carex* sp.), common boneset (*Eupatorum perfoliatum*), creeping Jenny (*Lysimachia nummularia*), fowl manna grass (*Glyceria striata*), and broadleaf cattail.

Palustrine forested wetland: Palustrine forested wetland vegetation was located at six (6) locations within the survey area (W-1, W-9, W-61, W-68, W-145, W-156). Dominant canopy trees typically included silver maple (*Acer saccharinum*), green ash, box elder, and American elm (*Ulmus Americana*).

Waterbodies

The field survey identified the following waterbodies within the survey area:

- A total of 175 wetlands areas where:
    - 164 wetland areas supported palustrine emergent wetlands or were a component of a wetland complex;
    - Ten (10) features of palustrine scrub/shrub wetlands or was a component of a wetland larger wetland complex;
    - Six (6) features of palustrine forested wetland or was a component of a wetland complex;
    - Three (3) palustrine unconsolidated bottom/wetland areas;
- A total of 247 streams channels where streams reaches were entirely one flow regime of a transition of flow regime that included in the following;
    - 77 ephemeral stream reaches;
    - 190 intermittent stream reaches;
    - Eight (8) perennial stream reaches; and
- A total of 11ponds.

Refer to Attachment 2 for a complete inventory list of delineated wetlands and Attachment 3 for a complete inventory list for delineated streams. The original delineation efforts spanned from 2015 to 2017 and re-delineation efforts were conducted April and May 2018. Site conditions of the 2015 to 2017 delineation surveys differed from the April and May 2018 delineation site conditions. Drier, colder conditions occurred during February and March and September and October site investigations. Much higher vegetation was present in many of the open field and non-forested areas during the original delineations timeframe. Maintenance mowing and bush-hogging activities had occurred preceding the April and May 2018 re-delineation efforts. Early growing season herbaceous vegetation was present and identifiable and spring rains preceding the May re-delineation efforts allowed for a better determination of flow regime. The low vegetation height also allowed observation of numerous crayfish holes and crayfish chimneys in and near seep areas, as well as observations of fissures in ground surface that were investigated for groundwater discharge at headwater and seep locations.

The re-delineation efforts in April and May 2018 had been requested by the USACE on April 24, 2018 and resulted in additional field documentation early in the growing season. Documentation of base-flow conditions and better observation of groundwater discharge also occurred. Most of the streams in the survey area were low-order streams comprised of mostly straight to sinuous to some meandering channel sinuosity.

The survey area's landscape was comprised of underlying limestone and shale. Classification of flow regime was based on observations of hydrology, biology, and geomorphology. The underlying limestone shale in the survey area was found to support numerous seep areas. The extended delineation timeframe allowed for documentation of the presence of a high-water table and groundwater seepage resulting in the observation of a survey area that was dominated by an intermittent flow regime that ranged from shallow to well-developed channels, with a majority of stream channels originating at a seep area.

Grade controls, such as rock outcrops, accumulated woody debris, and head-cutting were additional indicators of a stream channel's flow regime. Stream channels with no observed supportive groundwater presence (ex., pooling) or discharge were classified as ephemeral channels. Stream channels with observed groundwater presence and holes in the stream bed indicating locations of groundwater discharge were considered of intermittent flow regime. Crayfish holes were a common occurrence in headwater seep areas at stream origins and in adjacent wetland areas. An intermittent to perennial flow regime designation was dependent upon observed flow, channel development, observation of any fish, the amount of leave litter accumulation, wrack/drift lines, and degree of rooted plants in the streambed.

All delineated streams required water quality habitat assessment and habitat scoring was conducted per the Kentucky Department of Environmental Protection Rapid Bioassessment Stream Sheets (Attachment 6).

Table 2a: Waterbodies summary of Wetlands and Streams in the Air Cargo Hub Development Survey Area - Streams.

Waterbody#	Waterbody Type[1]	RBP Score (range)[2]	Provisional Hydrologic Status	Linear Footage	Acreage
STREAMS					
S-7, S-8, S-9; S-14, S-23, S-25, S-29, S-35, S-43, S-45, S-51, S-56, S-59; S-61, S-62, S-63, S-68, S-77; S-80 to S-83, S-85, S-86, S-87, S-89; S-91, S-93, S-95; S-104, S-105, S-106, S-112, S-113, S-114, S-116; S-122, S-141, S-150, S-158, S-159; S-177, S-178, S-179; S-181, S-186 to S-189, S-191, S-194 to S-196; S-201, S-202, S-206, S-207, S-219; S-220, S-S-222, S-223, S-226, S-229; S-230 to S-233, S-235, S-236, S-237, S-239; and S-241 to S-243, S-245 to S-247	Ephemeral	43 (S-141) to - 118 (S-234)	Connected	15,359	0.80
S-1 to S-6, S-7, S-8, S-9; S-10t to S-13, S14, S-15, S-16, S-17, S-18, S-19; S-20 to S-22, S-23, S-24, S-27, S-28, S-29; S-30 to S-34, S-35, S-36 to S-42, S-43, S-44, S-46 to S-49; S-50, S-52 to S-55, S-57, S-58, S-59; S-60, S-63, S-64 to S-67, S-69 to S-76, S-78, S-79; S-84, S-86, S-88, S-89, S-90, S-92, S-94, S-96 to S-99; S-100, S-102, S-103, S-104, S-105, S-106, S-107 to S-111; S-113, S-114, S-115, S-116, S-118 to S-121; S-123 to S-140; S-142 to S-149; S-151 to S-157; S-160 to S-176, S-177, S-178; S-180, S-182 to S-185, S-190, S-192, S-193, S-197 to S-199; S-200, S-201, S-202, S-203 to S-205, S-208 to S-213, S-215 to S-218; S-219, S-224, S-225, S-227, S-228, S-229; and S-234, S-236, S-238, S-239, S-240, S-244	Intermittent	34 (S-130) to 139 (S-130)	Connected	75,059	8.08
S-17, S-19, S-26; S-101 (Gunpowder Creek), S-117; and S-214, S-221, S-239	Perennial	96 (S-19) to 166 (S-26)	Connected	24,929	10.96
TOTAL STREAMS				**115,347**	**19.84**

1 PEM = Palustrine Emergent Wetland, PSS = Palustrine Scrub-Shrub Wetland, PFO = Palustrine Forested Wetland, PUB = Palustrine Unconsolidated Bottom Wetland

2 RBP Habitat Scores for Kentucky as provided in *Methods for Assessing Habitat in Wadeable Waters* (March 01, 2011, Revision 1.0) Poor = </-141, Fair = 142-155, Good = above 156

Table 2b: Waterbodies summary of Wetlands and Streams in the Air Cargo Hub Development Survey Area - Wetlands.

Waterbody#	Waterbody Type[1]	RBP Score (range)[2]	Provisional Hydrologic Status	Linear Footage	Acreage
WETLANDS					
W-1, W-6, W-7, W-8, W-10 to W-25, W-26; W-27 to W-60, W-61, W-62 to W-67, W-68; W-69 to W-97, W-98; W-99 to W-110; W-112 to W-144, W-146 to W-155, W-157, W-158; and W-162 to W-175	PEM	---	Connected	---	28.41
W-3, W-4, W-5, W-8; W-26, W-111, W-158; and W-159 to WW-161	PSS	---	Connected	---	0.69
W-1, W-9, W-61, W-68, W-145, W-156	PFO	---	Connected	---	0.78
W-2, W-3, W-5	PUB	---	Connected	---	0.27
P-1 to P-11	Pond	---	Connected	---	2.89
TOTAL WETLANDS				**---**	**33.04**

1 PEM = Palustrine Emergent Wetland, PSS = Palustrine Scrub-Shrub Wetland, PFO = Palustrine Forested Wetland, PUB = Palustrine Unconsolidated Bottom Wetland

2 RBP Habitat Scores for Kentucky as provided in *Methods for Assessing Habitat in Wadeable Waters* (March -1, 2011, Revision 1.0) Poor = </-141, Fair = 142-155, Good = above 156

In addition, a preliminary jurisdiction form has been completed for the delineated surface waters (Attachment 7). An approximate 177-acre portion of the survey area has already received USACE review and a preliminary jurisdictional determination; in addition, two (2) wetland features and two (2) open water features/ponds within the 177-acres were provided an approved jurisdictional determination.

The full inventory of delineated waterbodies is provided in Attached 2 – Wetland Summary Table and Attachment 3 – Stream Summary. Formal determination of jurisdiction can only be determined by the USACE through submittal of a Jurisdictional Determination request submitted by KCAB.

SUMMARY

The CVG Air Cargo Hub Development survey area in Florence, Boone County, Kentucky comprised approximately 1,465 acres. A delineation of wetland and streams within the survey area resulted in the identification of the following surface waters:

- 15,359 feet of ephemeral streams;
- 75,059 feet of intermittent streams;
- 24,929 feet of perennial streams;
- 28.41 acres of palustrine emergent wetland;
- 0.69 acres of palustrine scrub/shrub wetland;

- 0.78 acres of palustrine forested wetland;
- 0.27 acres of palustrine unconsolidated bottom wetland; and
- 2.89 acres of ponds.

Impacts to surface waters of the U.S. are regulated by Section 401 and Section 404 of the Clean Water Act. Parcel projects involving surface water impacts can often qualify under Nationwide Permit (NWP) #39 – Commercial and Institutional Developments. Projects must meet the general and regional conditions of a Nationwide Permit. The Proposed Action Area, contained within the survey area of the CVG Air Cargo Hub Development does not appear to qualify under NWP#39 due to the potential impacts exceeding the following NWP #39 permit thresholds:

- Permanent loss of ½ acre or greater of waters of the US (wetlands and streams); and
- Permanent loss of greater than 300 linear feet of stream bed. NWP #39 does allow for waivers granted by the District Engineer for intermittent and ephemeral impacts and would be determined on a case-by-case basis.

An Individual Section 404 Permit is required if the above impact thresholds are exceeded. An Individual Section 401 Permit will also be required under the Kentucky Division of Water. Compliance with the Endangered Species Act and Section 106 of the Historic Preservation Act are required components of The Nationwide Permit program and Individual Section 404/401 Permit authorizations.

If you should require additional information or have any questions regarding this project, please contact me at (513) 899-9023.

Sincerely,

Christina M. Lovins

Christina Lovins
Vice President

Attachments:
Attachment 1 – Location Maps
Attachment 2 – Waterbody Summary Table – Wetlands
Attachment 3 – Waterbody Summary Table – Streams
Attachment 4 – Photolog
Attachment 5 – Wetland Datasheets
Attachment 6 – Kentucky Rapid Bioassessment Protocol Datasheets
Attachment 7 – Preliminary and Approved Jurisdictional Determination Forms

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Appendix H

APPENDIX H
TRAFFIC

This appendix contains the Executive Summary for the Draft Traffic Impact Study. The full document was not included due to its large size. However, upon request, the full document can be provided.

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NEPA Traffic Memo

To: Alison Chadwell, PE, PTOE, LEED AP (KCAB)

Cc: Adam Studt (Amazon)

From: Nathan Fischer, PE
Jon Wiley, PE

Date: August 27, 2018

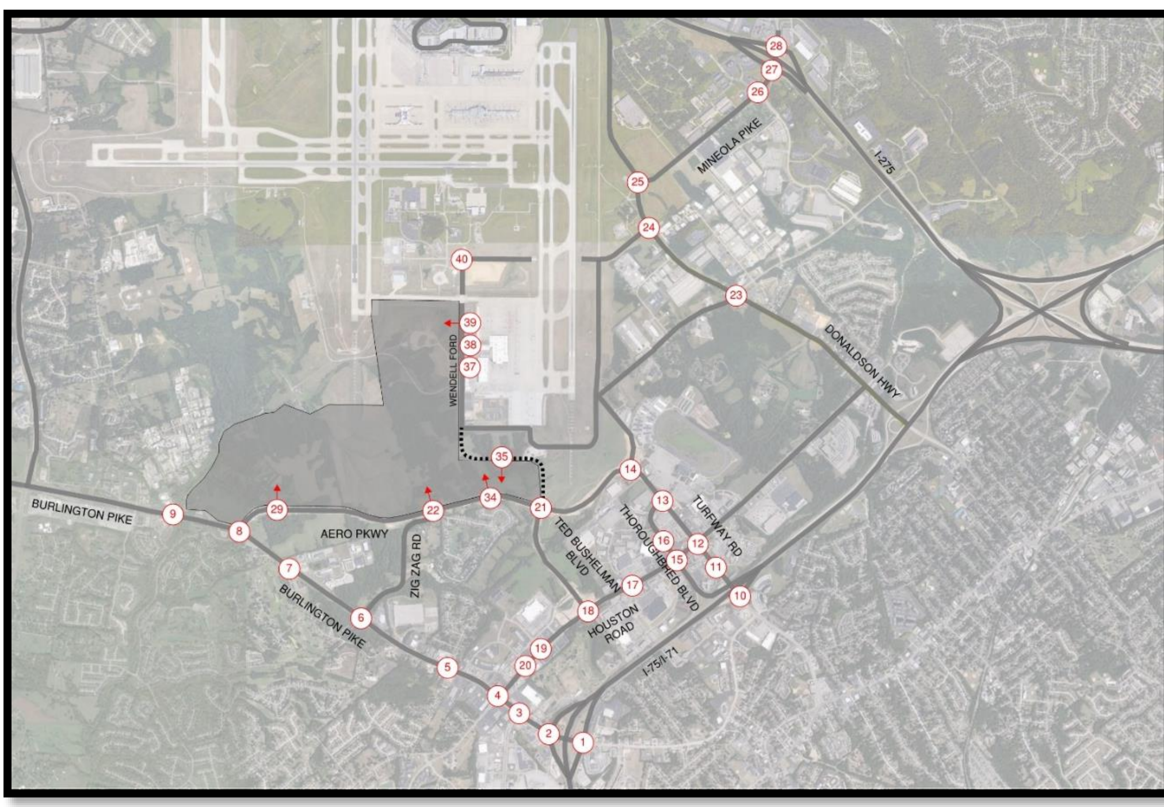
Subject: NEPA Traffic Impacts of the CVG Air Cargo Hub Development (Aero Parkway & Wendell Ford Boulevard)

Woolpert prepared this NEPA Traffic Memo to document the recommended improvements and overall intersection level of service (LOS) for the 2026 Background and Build traffic for the intersections along Aero Parkway and Wendell Ford Boulevard, in advance of the submittal of the draft Traffic Impact Study (TIS). These recommendations are preliminary and have not been submitted to KYTC or KCAB. The studied intersections are shown below but results included within this memo only include intersections which abut the site.

A timeline of the key projects and the proposed Site Access points were analyzed as follows:

- The Wendell Ford Boulevard extension is assumed to be constructed by 2021.
- The Ted Bushelman widening project is assumed to be constructed by 2021.
- Site Access 1 (GSE entrance), Site Access 8 (Truck Entrance), and Site Access 10 (North Parking Lot) are assumed to be constructed by 2021.
- Site Access 5 (South Parking Lot) and Site Access 7 (South Parking Lot) are assumed to be constructed by 2026.

Based on the capacity and queueing analysis, utilizing Synchro 10 and SimTraffic 10, recommendations for the Background and Build scenarios are detailed in the following tables and figures. In the following tables, the improvements are detailed by intersection and are split between improvements that are recommended in the Background and Build scenarios for 2026 NEPA.



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CVG Air Cargo Hub: Aero Parkway and Wendell Ford Boulevard								
Overall Level of Service Results								
2026 Background (AM | PM | SAT)			2026 Background with Improvements (AM | PM | SAT)			2026 Build (AM | PM | SAT)		
Intersection 8: Burlington Pike (KY 18) and Aero Parkway								
C	C	C	C	D	C	D	D	D
Intersection 21: Aero Parkway and Ted Bushelman Boulevard/Wendell Ford Boulevard								
C	C	C	C	C	C	D	C	C
Intersection 22: Aero Parkway and Zig Zag Road/Site Access 5								
A	A	A	A	A	A	A	B	B
Intersection 29: Aero Parkway and Site Access 1								
-	-	-	-	-	-	B	C	B
Intersection 34: Aero Parkway and Site Access 7								
-	-	-	-	-	-	A	B	B
Intersection 35: Wendell Ford Boulevard and Site Access 8								
-	-	-	-	-	-	B	B	C
Intersection 37: Wendell Ford Boulevard and DHL Truck Entrance								
A	A	A	A	A	A	A	A	A
Intersection 38: Wendell Ford Boulevard and DHL Main Entrance								
A	A	A	A	A	A	B	A	A
Intersection 39: Wendell Ford Boulevard and DHL North Access/Site Access 10								
A	A	A	A	A	A	B	C	C
Intersection 40: Wendell Ford Boulevard and South Airfield Drive								
C	A	A	C	B	A	B	D	C

Intersection #8: KY 18 & Aero Parkway/Oakbrook Drive

Scenario	2021 Background	2021 Build
Improvements	No mitigation is required.	• Stripe a second southbound (Aero Parkway) left turn lane
Scenario	**2026 Background**	**2026 Build**
Improvements	No mitigation is required.	**In addition to the previously listed Build improvements, the following mitigation is recommended:** • Construct a third eastbound (KY 18) and westbound (KY 18) through lane • Construct a second westbound (KY 18) right turn lane
Scenario	**2038 Background**	**2038 Build**
Improvements	**In addition to the previously listed Background improvements, the following mitigation is recommended:** • Construct a third eastbound (KY 18) and westbound (KY 18) through lane	**In addition to the previously listed Background and Build improvements the following mitigation is recommended:** • Construct a fourth eastbound (KY 18) and westbound (KY 18) through lane

- Note: Long Pedestrian clearance times cause capacity issues and to mitigate the traffic in the 2026 Build, 2038 Background and Build scenarios, alternative pedestrian crossings need to be considered.

Intersection #21: Aero Parkway & Ted Bushelman Boulevard/Wendell Ford Boulevard

Scenario	2021 Background	2021 Build
Improvements	• The southbound (Wendell Ford Boulevard) approach is proposed to be constructed with dual left turn lanes, an exclusive through lane, and a shared through-right lane • The northbound (Ted Bushelman Boulevard) is proposed to be constructed with dual left turn lanes, an exclusive through lane, and a shared through-right lane • Add dual left turn lanes on eastbound (Aero Parkway) approach • Construct a westbound (Aero Parkway) right turn lane	**With the previously listed Background improvements, no further mitigation is recommended.**
Scenario	**2026 Background**	**2026 Build**
Improvements	**With the previously listed Background improvements, no further mitigation is recommended.**	**In addition to the previously listed Background improvements, the following mitigation is recommended:** • Construct a third eastbound (Aero Parkway) and westbound (Aero Parkway) through lane • Construct the southbound (Wendell Ford Boulevard) right turn lane as channelized free flow including the construction of an additional lane downstream, and restripe the shared through-right lane to an exclusive through lane
Scenario	**2038 Background**	**2038 Build**
Improvements	**With the previously listed Background improvements, no further mitigation is recommended.**	**With the previously listed Background and Build improvements, no further mitigation is recommended.**

- Note: The Wendell Ford Blvd extension (led by this project) and the Ted Bushelman widening project (led by KCAB) on the southbound and northbound approaches were added to all the studied scenarios.

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Intersection #22: Aero Parkway & Zig Zag Road/Site Access 5

Scenario	2021 Background	2021 Build
Improvements	No mitigation is required.	No mitigation is required.
Scenario	**2026 Background**	**2026 Build**
Improvements	No mitigation is required.	• Construct a third eastbound (Aero Parkway) and westbound (Aero Parkway) through lane • Restripe the northbound (Zig Zag Road) right turn lane as a shared through-right lane • Construct the southbound (Site Access 5) approach with a left turn lane, through lane, and right turn lane • Construct an eastbound (Aero Parkway) left turn lane • Construct a westbound (Aero Parkway) right turn lane • Signalize the intersection
Scenario	**2038 Background**	**2038 Build**
Improvements	No mitigation is required.	**With the previously listed Build improvements, no further mitigation is recommended.**

Intersection #29: Aero Parkway and Site Access 1

Scenario	2021 Background	2021 Build
Improvements	No mitigation is required.	• Construct the southbound (Site Access 1) approach with a left turn lane and right turn lane • Construct an eastbound (Aero Parkway) left turn lane • Construct a westbound (Aero Parkway) right turn lane
Scenario	**2026 Background**	**2026 Build**
Improvements	No mitigation is required.	**In addition to the previously listed Build improvements, the following mitigation is recommended:** • Construct a second southbound (Site Access 5) left turn lane • Construct a second eastbound (Aero Parkway) left turn lane • Construct a third westbound (Aero Parkway) through lane
Scenario	**2038 Background**	**2038 Build**
Improvements	No mitigation is required.	**With the previously listed Build improvements, no further mitigation is recommended.**

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Intersection #34: Aero Parkway and Site Access 7

Scenario	2021 Background	2021 Build
Improvements	No mitigation is required.	No mitigation is required.
Scenario	**2026 Background**	**2026 Build**
Improvements	No mitigation is required.	• Construct the southbound (Site Access 7) approach with dual left turn lanes and a right turn lane • Construct an eastbound (Aero Parkway) left turn lane • Construct a westbound (Aero Parkway) right turn lane • Construct a third eastbound (Aero Parkway) and westbound (Aero Parkway) through lane
Scenario	**2038 Background**	**2038 Build**
Improvements	No mitigation is required.	**With the previously listed Build improvements, no further mitigation is recommended.**

Intersection #35: Wendell Ford Boulevard and Site Access 8 (Truck Access)

Scenario	2021 Background	2021 Build
Improvements	No mitigation is required.	• Construct an eastbound (Wendell Ford Boulevard) right turn lane • Construct a westbound (Wendell Ford Boulevard) left turn lane • Construct the northbound (Site Access 8) approach with a left turn lane and a right turn lane • Construct a second eastbound (Wendell Ford Boulevard) and westbound (Wendell Ford Boulevard) through lane
Scenario	**2026 Background**	**2026 Build**
Improvements	No mitigation is required.	**With the previously listed Build improvements, no further mitigation is recommended.**
Scenario	**2038 Background**	**2038 Build**
Improvements	No mitigation is required.	**With the previously listed Build improvements, no further mitigation is recommended.**

Intersection #37: Wendell Ford Boulevard and DHL Truck Entrance

Scenario	2021 Background	2021 Build
Improvements	No mitigation is required.	• Construct a second northbound (Wendell Ford Boulevard) and southbound (Wendell Ford Boulevard) through lane • Construct a two way left turn lane
Scenario	**2026 Background**	**2026 Build**
Improvements	No mitigation is required.	**With the previously listed Build improvements, no further mitigation is recommended.**
Scenario	**2038 Background**	**2038 Build**
Improvements	No mitigation is required.	**With the previously listed Build improvements, no further mitigation is recommended.**

Intersection #38: Wendell Ford Boulevard and DHL Main Entrance

Scenario	2021 Background	2021 Build
Improvements	No mitigation is required.	• Construct a second northbound (Wendell Ford Boulevard) and southbound (Wendell Ford Boulevard) through lane • Construct a two way left turn lane
Scenario	**2026 Background**	**2026 Build**
Improvements	No mitigation is required.	**With the previously listed Build improvements, no further mitigation is recommended.**
Scenario	**2038 Background**	**2038 Build**
Improvements	No mitigation is required.	**With the previously listed Build improvements, no further mitigation is recommended.**

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Intersection #39: Wendell Ford Boulevard and DHL north Entrance/Site 10 Access

Scenario	2021 Background	2021 Build
Improvements	No mitigation is required.	**In addition to the previously listed Background improvements, the following mitigation is recommended:** • Signalize the intersection • Construct the northbound (Wendell Ford Boulevard) approach with dual left turn lanes and a shared through-right lane • Construct the southbound (Wendell Ford Boulevard) approach with a left turn lane, through lane, and shared through-right lane • Construct the eastbound (Site 10 Access) approach with a left turn lane and shared through-right lane
Scenario	**2026 Background**	**2026 Build**
Improvements	No mitigation is required.	**With the previously listed Background and Build improvements, no further mitigation is recommended.**
Scenario	**2038 Background**	**2038 Build**
Improvements	No mitigation is required.	**With the previously listed Background and Build improvements, no further mitigation is recommended.**

Intersection #40: South Airfield Drive and Wendell Ford Boulevard

Scenario	2021 Background	2021 Build
Improvements	• Signalize the intersection • Separate the northbound (Wendell Ford Boulevard) shared left-right lane into a left turn lane and right turn lane	**With the previously listed Background improvements, no further mitigation is recommended.**
Scenario	**2026 Background**	**2026 Build**
Improvements	No mitigation is required.	**In addition to the previously listed Background improvements, the following mitigation is recommended:** • Construct a westbound (South Airfield Drive) left turn lane
Scenario	**2038 Background**	**2038 Build**
Improvements	• Construct a westbound (South Airfield Drive) left turn lane	**With the previously listed Background and Build improvements, no further mitigation is recommended.**