DFW DALLAS FORT WORTH INTERNATIONAL AIRPORT

Final Environmental Assessment Ramp Efficiency Improvements Project

SUBMITTED BY:

Dallas Fort Worth International Airport

July 20, 2022

U.S. Department of Transportation
Federal Aviation Administration
Southwest Region

Finding of No Significant Impact (FONSI)

Ramp Efficiency Improvements Project
Dallas/Fort Worth International Airport
Tarrant County, Texas

July 2022

1. INTRODUCTION

This document serves as a Finding of No Significant Impact (FONSI) for the proposed Federal Aviation Administration (FAA) actions necessary for the implementation of the Ramp Efficiency Improvements Project at Dallas/Fort Worth International Airport (DFW), in DFW, Texas. The Cities of Dallas and Fort Worth, as owners of the airport, are the airport sponsors and proponent of the proposed airport improvements.

The Federal Aviation Administration (FAA) is the federal agency responsible for the approval of the Proposed Action analyzed in the Environmental Assessment (EA). The FAA has determined that the Proposed Action will have no significant impact to the human environment.

2. PROPOSED FEDERAL ACTION

The federal actions necessary for implementation of the Proposed Action include:

1. Determination under 49 U.S. Code (USC) §§40103(b) and 47107(a)(16), relating to the eligibility of the Proposed Action for federal funding under the Airport Improvement Program (AIP),

2. Determination under 49 USC §40117, as implemented by 14 CFR §158.25, to impose and use passenger facility charges (PFC) collected at the airport to assist with construction of potentially eligible items shown on the Airport Layout Plan (ALP),

3. Unconditional approval of the ALP portion depicting the Proposed Action as described in the EA within Section 3.3.

3. PURPOSE AND NEED

Pursuant to the National Environmental Policy Act (NEPA) and FAA Orders 1050.1F, Environmental Impacts: Policies and Procedures and 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions, an EA must include a description of the purpose of a proposed action and the reasons it is needed. The purpose of and the need for the Proposed Action are discussed below.

The project purpose is to improve operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to/from the existing terminal area from five infield areas.

The project is needed to because the current infield configuration causes terminal area congestion, which results in longer taxiing times, limits maneuverability, and aircraft parking. The existing Northeast Airfield Lighting Vault building is outdated and requires replacement. An electrical assessment found that the building does not currently meet building codes and DFW building standards.

4. ALTERNATIVES

The FAA orders require a thorough objective assessment of the Proposed Action, No Action alternative, and all "reasonable" alternatives that would achieve the stated purpose and need of the Proposed Action. The Alternatives analysis is consistent with the requirements of FAA Orders 1050.1F and 5050.4B.

4.1 No Action Alternative

Under the NAA, DFW would keep its existing infrastructure and would not implement the Proposed Action. The NAA does not meet the stated purpose and need for this project but is carried forward in the analysis of environmental consequences in accordance with Council on Environmental Quality requirements.

4.2 Proposed Action Alternative

The Proposed Action Alternative, which is the Sponsor's Preferred Alternative, would include demolition of existing above ground infrastructure located within five infield areas (**Figures 3-1** and **3-2**), the creation or relocation of AEP along Taxiways G, K, and Z; infill of five infield areas with heavy-duty concrete apron pavement, underground utility work related to these improvements, and relocation of Taxiway JY to improve aircraft operations and optimize utility service connections at the terminals for the renewable fuels and electricity. Additionally, because of the anticipated change in depth and strength of concrete associated with the new pavement surfaces, multiple infrastructure systems would need to be relocated, such as stormwater collection, electrical, and telecommunications. For a complete list of items in the Proposed Action, please see Section 3.3 of the attached EA.

5. ENVIRONMENTAL CONSEQUENCES

The environmental impacts, if any, of the proposed alternatives were examined in the EA according to the FAA Orders 5050.4B and 1050.1F. The environmental impacts of the No Action and the Proposed Action alternatives are presented in this section.

A number of resources will not be impacted by implementation of the Proposed Action and will not be further discussed in detail in this FONSI.

5.1 Air Quality

Construction Emissions
The Proposed Action construction emissions were analyzed for anticipated construction years 2022 through 2025. The Proposed Action would result in temporary air quality effects during the construction and demolition phases of the proposed project.

Operational Emissions
The Proposed Action would improve operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to/from the existing terminal area relative to the No Action Alternative. Specifically, the Proposed Action would improve access to and from Terminals A, B, and C. Therefore, modified taxi times resulting from the Proposed Action were only applied to operations originating and terminating at these terminals.

To identify potential air emissions from the Proposed Action, an emissions inventory was prepared and contrasted with the *de minimis* levels for an ozone non-attainment area; per the Clean Air Act general conformity rule, the *de minimis* for an ozone serious non-attainment area is 50 tons per year (tpy) each for NO_X and VOC, the precursors to ozone formation. Collectively, the operational and construction emissions of each pollutant would be well below the 50 tpy *de minimis*. Because emissions from the Proposed Action are lower than the *de minimis* for the ozone non-attainment area, no further analysis is required.

5.2 Hazardous Materials, Solid Waste, and Pollution Prevention

Construction activities associated with the Proposed Action are expected to include the short-term use of hazardous and non-hazardous materials and generate wastes common to construction including reclaimed concrete, concrete wash-out liquids, petroleum hydrocarbon-based fuels, lubricants, oils, paints, and cleaning solvents. These materials would be handled and stored in accordance with all applicable federal, state, or local regulations. DFW would comply with all federal, state, and local requirements with regard to generation, handling, and disposing of any waste produced during construction.

DFW staff or contractors have found Asbestos Containing Materials (ACM) in the generator room, including the pipe insulation mastic and elbows, and thermal body insulation and wrap in the Northeast Lighting Vault. A comprehensive asbestos assessment has informed the process of abating any ACMs within the project area; abatement actions would be handled by HP EnviroVision in compliance with all applicable federal and state regulations. In additional areas where ACMs are uncovered, no work would be permitted until the materials in question have been abated or are found to be non-asbestos containing. All abatement will conform to the Texas Department of State Health Services Asbestos Program rules and guidelines.

6. AGENCY COORDINATION AND PUBLIC INVOLVEMENT

Agency coordination with Texas Commission on Environmental Quality (TCEQ) and the U.S. Environmental Protection Agency (USEPA), consisted of scoping letters submitted to various divisions within the USEPA and TCEQ on 14 February 2022 (**Appendix E**). TCEQ provided

comments on 01 March 2022, indicating that there would be no significant long-term effects so long as BMP were in place for construction and waste disposal activities. TCEQ requested an analysis of potential air quality effects, which were performed for this EA and found to be below the *de minimis* thresholds. No comments were received from USEPA.

The Texas Historical Commission (THC) was provided information through a cultural resources assessment associated with the Ramp Efficiency Improvements project site in late March 2022. THC provided concurrence on 20 April 2022 that no adverse effects to historic resources would result from the proposed project activities.

Because the Proposed Action is not controversial, no significant adverse impacts were identified, and no special purpose laws were triggered that require public participation it was determined that public participation was not necessary.

7. CONDITIONS AND MITIGATION

As prescribed by 40 CFR §1505.3, the FAA shall take steps as appropriate to the action, such as through special conditions in grant agreements, property conveyance deeds, releases, airport layout plan approvals, and contract plans and specifications and shall monitor these as necessary to assure that representations made in the EA and FONSI will be carried out. Specific conditions of approval associated with this project are listed below:

Mitigation measures shall be incorporated into the project to include use of best management practices (BMPs) during construction to minimize erosion and sedimentation; controlling runoff; controlling waste and spoils disposal to prevent ground contamination; minimize fugitive dust; and minimize mobile and stationary emissions sources.

8. FINDINGS

Throughout the development of the airport, including the proposed improvements described above, the FAA has made every effort to adhere to the policies and purposes of NEPA, as stated in the NEPA implementing regulations. The FAA has concentrated on the truly significant issues related to the action in question. The FAA determined that the Proposed Action is in compliance with FAA Order 1050.1F 6-3.b(2). In its determination on whether to prepare an Environmental Impact Statement (EIS) or process the EA as a FONSI, the FAA weighed its decision based on an examination of the EA, and comments from Federal and state agencies, as well as all other information available to the FAA.

As required by 40 CFR 1506.5, the FAA has independently and objectively evaluated this proposed project. As described in the Final EA, the Proposed Action and the No Action Alternative were studied to determine the potential impacts and appropriate mitigation for those impacts. The FAA provided input, advice, and expertise throughout the analysis, along with administrative and legal review of the project.

The following determinations are prescribed by the statutory provisions set forth in the Airport and Airway Improvement Act of 1982, as codified in 49 U.S.C. §§ 47106 and 47107. They are

preconditions of FAA's approval of airport funding applications for AIP eligible airport development.

a. 49 U.S.C. § 47106(a)(1). The Proposed Action is reasonably consistent with existing plans of public agencies for the development of the area surrounding the airport.

b. 49 U.S.C. § 47106(b)(2). The interests of the communities in or near which the project may be located have been given fair consideration.

c. 49 U.S.C. § 47107(a)(10). Appropriate action, including the adoption of zoning laws, has been or will be taken to the extent reasonable to restrict the use of land next to or near the airport to uses that are compatible with normal airport operations.

Under the authority delegated by the Administrator of the FAA, the undersigned finds that the Proposed Action, Ramp Efficiency Improvements Project, is reasonably supported. Therefore, the following agency actions discussed in this FONSI, are directed to be taken including:

1. The FAA directs that actions be taken to:

   A. Determinations under 49 U.S.C. §§ 47106 and 47107 relating to the eligibility of the Proposed Action for federal funding under the Airport Improvement Program;

   B. Determinations under 49 U.S.C. § 40117, as implemented by 14 CFR 158.25, to impose and use passenger facility charges (PFC) collected at the airport to assist with construction of potentially eligible items shown on the ALP; and/or

   C. Unconditional approval of the portion of the ALP depicting the Proposed Action as described in Chapter 1 of the EA, including the all proposed project components listed in Chapter 1.4 of the attached EA to 49 U.S.C. §§ 40103(b) and 47107(a)(16).

After careful and thorough consideration of the facts contained herein, the undersigned finds that the proposed Federal action is consistent with existing national environmental policies and objectives of Section 101 of NEPA and other applicable environmental requirements and, with the required mitigation referenced above, will not significantly affect the quality of the human environment or otherwise include any condition requiring any consultation pursuant to section 102(2)(C) of NEPA. As a result, FAA has determined that preparation of an EIS is not necessary for this proposed action and is therefore issuing this FONSI.

The undersigned, therefore, now approve and direct action as needed, to carry out the agency action outlined above under Proposed FAA Actions required for the Ramp Efficiency Improvements Project described under the Proposed Action in the attached EA and this FONSI. These actions are directed to be taken, and determinations and approvals are made, under the authority of 49 U.S.C. §§ 40101, 40113, 44502, 44701, 47101, 47105, 47106, 47107, 47120, and 47122.

RECOMMENDED FOR APPROVAL: JOHN J MACFARLANE Digitally signed by JOHN J MACFARLANE Date: 2022.07.25 10:45:49 -05'00' Date: _____

John MacFarlane
Environmental Protection Specialist
Texas Airports District Office

APPROVED: KIMBERLY M BROCKMAN Digitally signed by KIMBERLY M BROCKMAN Date: 2022.07.26 13:20:05 -05'00' Date: _____

Kim Brockman
Acting Manager
Texas Airports District Office

Right of Appeal

This order constitutes final agency action and final order of the Administrator under 49 U.S.C. § 46110. Any party having a substantial interest in this order may appeal this order to the United States Court of Appeals for the District of Columbia Circuit or in the Circuit Court of Appeals of the United States for the circuit in which the person resides or has its principal place of business, upon petition, filed no later than 60 days after the order is issued in accordance with the provisions of 49 U.S.C. § 46110.

FINAL ENVIRONMENTAL ASSESSMENT

Ramp Efficiency Improvements Project

Dallas Fort Worth International Airport

Dallas and Tarrant County, Texas

Prepared for:

Texas Airport Development Office [ASW-650]

Federal Aviation Administration

10101 Hillwood Parkway

Fort Worth, TX 76177

Prepared by:

Environmental Affairs Department

Dallas Fort Worth International Airport

PO Box 619428

DFW Airport, TX 75261

This Environmental Assessment becomes a federal document when evaluated, signed, and dated by the Responsible FAA official.

Responsible FAA Official

07/25/2022

Date

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ACRONYMS AND ABBREVIATIONS

µg	micrograms
µg/m^3	micrograms per cubic meter
AA	American Airlines
AC	Advisory Circular
ACI	Airport Council International
ACM	asbestos-containing materials
ACT	Antiquities Code of Texas
ADG	Aircraft Design Group
AEP	apron entry point
AIP	Airport Improvement Program
ALP	Airport Layout Plan
AOA	Aircraft Operations Area
APE	Area of Potential Effects
APU	Auxiliary Power Unit
AQCR	Air Quality Control Region
AQS	Air Quality System
ARC	A.R. Consultants, Inc.
ARFF	aircraft rescue and fire fighting
BMP	best management practices
CAA	Clean Air Act
CAP	Criteria Air Pollutants
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CGP	Construction General Permit
CH_4	methane
CLSM	controlled low strength material
CMMP	Contaminated Media Management Plan
CNG	compressed natural gas
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_{2e}	Carbon Dioxide equivalent
COMP HIST	Compliance History
CWA	Clean Water Act
CZM	Coastal Zone Management
dB	decibels
DART	Dallas Area Rapid Transit
DFW	Dallas Fort Worth International Airport
DNL	Day Night Level
DPS	Department of Public Safety
DSHS	Texas Department of State Health Services
EA	Environmental Assessment
EAD	Environmental Affairs Department
EAT	End-Around Taxiway
ECHO	Enforcement and Compliance History
eCUP	Electric Central Utility Plan
EIS	Environmental Impact Statement
ENF	Notice of Violation Listing
EO	Executive Order
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FINDS	Facility Index System/Facility Registry System
FIRM	Flood Insurance Rate Map
FM	Farm-to-Market Road
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
FTA	Federal Transit Authority
GHG	Greenhouse Gases
GSE	ground support equipment
GWP	Global Warming Potential
H_2O	Water
HAP	hazardous air pollutants
HFC	Hydrofluorocarbons
HOV	high-occupancy vehicle
IH	Interstate Highway
IHW	Industrial Hazardous Wastes
IPCC	International Panel on Climate Change
LED	light emitting diode
LPST	Leaking Petroleum Storage Tanks

MOVES3	USEPA Motor Vehicles Emissions Simulator, version 3
MSW	Municipal Solid Waste
N_2O	Nitrous Oxide
NAA	No Action Alternative
NAAQS	National Ambient Air Quality Standards
NCTCOG	North Central Texas Council of Governments
NE	northeast
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	Nitrogen Dioxide
NOMS	Noise and Operations System
NOx	Nitrogen Oxides
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRI	National River Inventory
NSR	New Source Review
NW	northwest
O_3	Ozone
OPSNET	Operational Network
PALM	Potential Archeological Liability Map
Pb	Lead
PFC	Passenger Facility Charges
PFC1	Perfluorinated Compounds
PIO	Project Integration Office
PM	Particulate Matter
PM_{10}	Particulate matter with a diameter less than 10 micrometers
$PM_{2.5}$	Particulate matter with a diameter less than 2.5 micrometers
POTW	Publicly Owned Treatment Works
PPA	Pollution Prevention Act
ppb	parts per billion
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RLIM	runway light intensity monitor
RNG	renewable natural gas
SADF	Spent Aircraft Deicing Fluid
SE	southeast
SF_6	Sulfur Hexafluoride
SH	State Highway
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO_2	Sulphur Dioxide
SPCC	Spill Prevention, Control, and Countermeasures
SMP	Sustainability Management Plan
SW	southwest
SW3P	Stormwater Pollution Prevention Plan
SWF/LF	Permitted Solid Waste Facility/Landfill
TASA	Texas Archeological Sites Atlas
TARL	Texas Archeological Research Laboratory
TCEQ	Texas Commission on Environmental Quality
TexN2.2	Texas Nonroad version 2
THC	Texas Historical Commission
THSA	Texas Historic Sites Atlas
TPDES	Texas Pollution Discharge Elimination System
tpy	tons per year
TRA	Trinity River Authority
TSCA	Toxic Substances Control Act
TxDOT	Texas Department of Transportation
US	U.S. Highway
USC	U.S Code
USEPA	U.S. Environmental Protection Agency

USFWS	U.S. Fish and Wildlife Services	VOC	Volatile Organic Compounds
UST	underground storage tank	WOUS	Waters of the United States
VCP	Voluntary Clean-up Program		

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1.0 INTRODUCTION

1.1 National Environmental Policy Act Authority

This Environmental Assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, and the President's Council on Environmental Quality (CEQ) regulations to implement NEPA (40 Code of Federal Regulations [CFR] §1500 to 1508). NEPA requires federal agencies to analyze and consider alternatives to the environmental impacts of their proposed actions, to disclose and consider mitigation for those impacts, and to provide interested parties with an opportunity to participate in the environmental review process.

All airport improvement projects that are major federal actions, including through the receipt of federal funding, must be examined from an environmental standpoint, to comply with NEPA, the Airport and Airway Improvement Act of 1982, as amended, and other pertinent laws, and regulations. Guidance in the Federal Aviation Administration (FAA) consideration of environmental impacts is provided in FAA Order 1050.1F, Environmental Impacts: Policies and Procedures (FAA, 2015), FAA Order 1050.1F Desk Reference (FAA, 2020), and FAA Order 5050.4B, NEPA Implementing Instructions for Airport Actions (FAA, 2006).[1]

This EA purpose is to analyze the potential environmental impacts of the Proposed Action. This EA also includes public and agency coordination documents used to communicate the Proposed Action and results of the environmental analyses, as well as to gather input from the public and regulatory agencies consulted. FAA will use the findings in the EA to determine whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI).

1.2 Project Sponsor

The Project Sponsor is the Dallas Fort Worth International Airport (DFW), located in Dallas and Tarrant Counties, Texas.

1.3 Background

DFW is a commercial service airport that currently encompasses 17,207 acres (approximately 27 square miles) in Dallas and Tarrant Counties, Texas (**Figure 1-1**). DFW has five passenger terminals (A, B, C, D, and E) and its airfield system consists of seven runways separated by a spine road, International Parkway, into the east and west airfield complexes.

The Central Terminal Area includes the ramp area around each terminal to allow for movement of aircraft to and from the terminals as well as airline and ramp support infrastructure. Between the airfield and terminal ramp area are infield areas that house much of the support infrastructure. The Airfield Ramp Efficiency Improvements Project is located primarily in these infield areas surrounding Terminals A and C, with additional infield modifications around Terminal B (Infield Area #5). The study or project area includes primarily the east airfield with the inclusion of Infield Area #5 on the west airfield, and several supporting areas north and south of the current east airfield (**Figure 1-2**).

[1] FAA reviewed the Proposed Action relative to Section 163 of Public Law 115-224 (known as the FAA Reauthorization Act of 2018). FAA has authority over the Proposed Action and thus, compliance with NEPA is required.

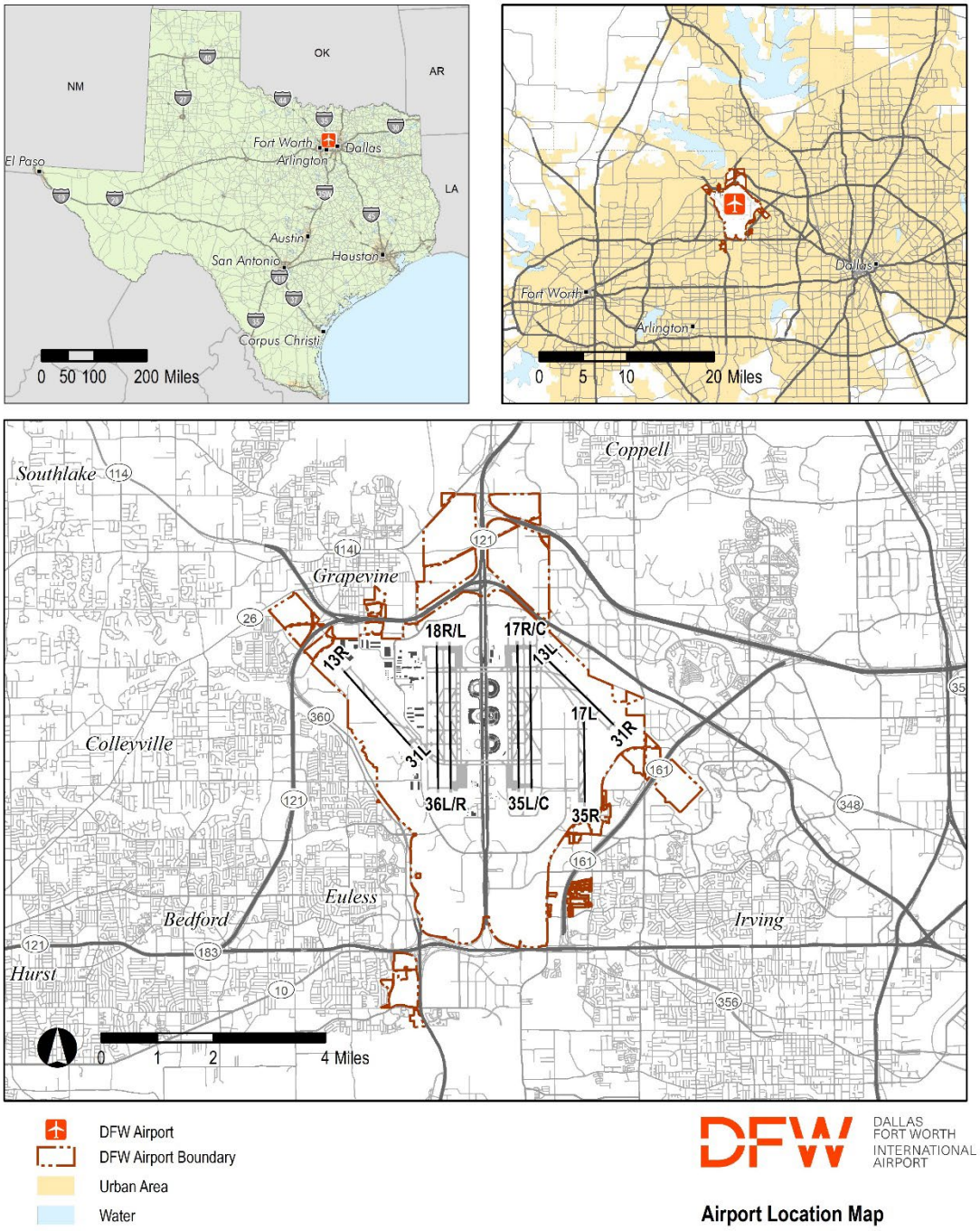

Figure 1-1. DFW General Location

Figure 1-2. Proposed Action Study/Project Areas

1.4 Proposed Action

The Proposed Action consists of airside improvements that would increase operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to and from the existing terminal area. The project would add heavy-duty aircraft pavement in strategic locations near the terminal buildings; thereby, increasing the number of Apron Entry Point (AEP) locations available for passenger aircraft traveling to and from the terminal buildings, reducing "choke points," and increasing operational flexibility, efficiency, and capacity. The new AEP locations would increase aircraft taxi movement efficiency and provide additional flexible space during non-standard operations. Currently, these areas are being used for a variety of purposes including airfield lighting infrastructure, airline support facilities including ground support equipment (GSE) parking, aircraft hardstands, and other functions, including deicing.

The Proposed Action would remove existing infrastructure, as appropriate, and modify the subject locations for aircraft taxiing and aircraft parking. Actions supporting these efficiency modifications would include demolition of existing aboveground infrastructure; demolition and abandonment of underground utility infrastructure, minor expansion and modification of existing taxiways; abandonment, reallocation, and expansion of deicing pads and associated Spent Aircraft Deicing Fluid (SADF) infrastructure; relocation of lighting and signage; new underground utility infrastructure; new underground stormwater collection system infrastructure; and infill of previous aboveground infrastructure and grassed areas with heavy-duty concrete pavement to support widebody Aircraft Design Group (ADG) V class aircraft.

Connected action associated with the Proposed Action include the relocation of the Northeast Lighting Vault to the southeastern airport quadrant to accommodate the infill of ramp areas and to increase maintenance accessibility in addition to the optimized aircraft movement adjacent to the terminals. The current Northeast Lighting Vault, which is one of four vaults located within the airport, is within Infield #4. The Ogden-Allied Building within Infield #2 is being demolished and the Corporate Aviation Building is being renovated for the relocated fueling support staff. The Ogden-Allied Building is being removed to accommodate the infill of ramp areas. Additionally, Terminal A South (Infield #3) will have the demolition of an existing triturator and fueling station as part of the Proposed Action. These features will be relocated in the future, with the locations within the ramp areas determined at a later date.

Section 3.3 provides a detailed description of the Proposed Action Alternative along with figures showing the specific larger components. **Figure 1-2** shows the specific study/project area locations associated with the Proposed Action described in **Section 3.3,** which are collectively called the study/project area throughout this EA.

1.5 Federal Action

The federal actions necessary for implementation of the Proposed Action are,

1. Determination under 49 U.S. Code (USC) §§ 40103(b) and 47107(a)(16), relating to the eligibility of the Proposed Action for federal funding under the Airport Improvement Program (AIP),
2. Determination under 49 USC §40117, as implemented by 14 CFR 158.25, to impose and use passenger facility charges (PFC) collected at the airport to assist with the construction of potentially eligible items shown on the Airport Layout Plan (ALP), and
3. Unconditional approval of the ALP portion depicting the Proposed Action as described in **Section 3.3** (*see* **Figure 1-2**).

DFW Airport is requesting FAA approval of the proposed modifications to the ALP to reflect the airfield ramp efficiency project including the relocation of the Northeast Lighting Vault, the demolition and future relocations of the Terminal A South triturator and fueling station, and the demolition of the Ogden-Allied Building and associated renovation of the Corporate Aviation Building, the project, within this EA.

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2.0 PURPOSE AND NEED

2.1 Proposed Action

As mentioned previously, the Proposed Action consists of airside improvements that would increase operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to and from the existing terminal area. This will require demolition of existing above and below ground utility and specialized infrastructure, modification, expansion, and relocation of utility and specialized infrastructure, and infill of both previously developed and grassed areas with heavy-duty concrete pavement to support widebody ADG V aircraft movements to and from AEP. Connected actions are associated with relocations of supporting facilities that, if left in their current locations, would interfere with improved aircraft movements to and from the AEP.

2.2 Purpose

The project purpose is to improve operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to/from the existing terminal area from five infield areas. As stated previously, the project would add heavy-duty aircraft pavement in strategic locations near the terminal buildings; thereby, increasing the number of AEP locations available for passenger aircraft traveling to and from the terminal buildings, reducing "choke points," and increasing operational flexibility, efficiency, and capacity. The new AEP locations would increase aircraft taxi movement efficiency and provide additional flexible space during non-standard operations. In association with the AEP, supporting deicing pads and associated SADF infrastructure which are used on average 5 months per year, would be modified to reduce choke points, increasing efficiency, flexibility, and safety of aircraft movements.

Connected actions being undertaken concurrently, include the relocation of the Northeast Lighting Vault to the southeast side of Airport due to aging infrastructure as well as update and expand outdated deicing infrastructure in the ramp area. The new utility ductbank connections to the Northeast Lighting Vault will services not only the relocated electrical utility from the Ramp Efficiency Improvements, but other projects being conducted with the east airfield area. Additionally, due to the infill areas, the Ogden-Allied Building is being demolished and the staff relocated to the Corporate Aviation Building, which will undergo renovations to provide adequate and appropriate tenant space.

2.3 Need

Currently, five infield areas on the east and west airfield complexes are used for airline support activities, including GSE stand-by parking, support personnel, deicing activities, and lighting infrastructure, which leads to inefficient transition of aircraft between the taxiway system and the ramp area and terminal congestion, and presents safety hazards to support personnel and aircraft operations. Potential safety conflicts exist, due to aircraft movement around these infield areas, that contain supporting infrastructure, instead of a clear AEP. The current infield configuration causes terminal area congestion, which results in longer taxiing times, limits maneuverability, and aircraft parking.

The existing Northeast Airfield Lighting Vault building is outdated and requires replacement. An electrical assessment found that the building does not currently meet building codes and DFW building standards. Its current location is adjacent to aircraft maneuvering areas, making access difficult and creates a potential safety hazard. Relocation of the Northeast Airfield Lighting Vault to a more accessible location would provide safer access for maintenance personnel and enhance airfield operational efficiency. It would also enhance safety by reducing potential conflicts between aircraft operations and vault facility access. The removal of the structure would allow aircraft better maneuverability and parking for passenger loading and unloading. A new vault building would be required for code compliance and would maintain redundancy in case of a major outage.

The existing Terminal A South aircraft lavatory waste triturator station and fueling station present a safety issue between vehicles and aircraft movements due to its location in a densely developed area between Terminals A and C and adjacent to the terminal access taxiways. This location conflicts with aircraft maneuverability and parking for passenger loading and unloading.

DFW conducted a SADF Treatment and Recovery Program Master Plan and determined that most of the deicing infrastructure needs to be demolished and replaced due to age and deterioration. Several structures were observed with deficiencies such as cracking, spalling, and water infiltration, and the existing pipes are not sized properly sized for the expanded deicing ramp. With the current deicing operations, if precipitation intensity greater than 0.5 inch per hour occurs or is expected to occur, deicing operations are suspended until more favorable weather conditions are present. In addition, the existing deicing pads would need to be modified, including the removal of the Zulu Deicing Pad and the Taxiway JY Deicing Pad and the renovation and expansion of the Taxiways EK and HY Deicing Pads, based on the proposed changes in pavement or the changing ramp geometry for the safety areas.

3.0 ALTERNATIVES

FAA Orders 1050.1F and 5050.4B set forth policies and procedures to be followed when assessing the environmental impacts of aviation-related projects, in compliance with NEPA. The FAA orders require a thorough objective assessment of the Proposed Action, No Action Alternative (NAA), and all "reasonable" alternatives that would achieve the stated purpose and need of the Proposed Action. The alternatives analysis presented in this EA is consistent with the requirements of FAA Orders 1050.1F and 5050.4B.

3.1 Alternatives Evaluation Process

As indicated in **Section 2.0**, the purpose and need for the Proposed Action has been carefully examined and documented. This alternatives analysis was prepared to determine which alternatives might feasibly meet the purpose and need statement.

For these improvements, only two alternatives were considered: the Proposed Action Alternative and NAA. Other alternatives were not considered reasonable, as modifications to AEP cannot be substantially modified, as they are fixed by their relationship to terminal gates. In addition, infill of infield areas is fixed by function and alternatives are not feasible. Underground utility work related to the Proposed Action is similarly fixed by function and alternatives are not feasible.

3.2 No Action Alternative

Inclusion of a NAA in the environmental analysis and documentation is required under NEPA. The NAA is used to evaluate the effects of not constructing the project, thus, providing a benchmark against which action alternatives may be evaluated. Under the NAA, DFW would keep its existing infrastructure and would not implement the Proposed Action. The NAA does not meet the stated purpose and need for this project but is carried forward in the analysis of environmental consequences in accordance with CEQ requirements.

To satisfy the intent of NEPA, FAA Order 1050.1F: *Environmental Impacts Policies and Procedures* and FAA Order 5050.4B: *Implementing Instructions for Airport Actions*; and other special purpose environmental laws, the NAA is carried forward in the analysis of environmental consequences.

3.3 Proposed Action Alternative

The Proposed Action Alternative, which is the Sponsor's Preferred Alternative, would include demolition of existing above ground infrastructure located within five infield areas (**Figures 3-1** and **3-2**), the creation or relocation of AEP along Taxiways G, K, and Z; infill of five infield areas with heavy-duty concrete apron pavement, underground utility work related to these improvements, and relocation of Taxiway JY to improve aircraft operations and optimize utility service connections at the terminals for the renewable fuels and electricity. Additionally, because of the anticipated change in depth and strength of concrete associated with the new pavement surfaces, multiple infrastructure systems would need to be relocated, such as stormwater collection, electrical, and telecommunications.

The expansion of the Taxiways EK and HY Deicing Pads would be sufficient to compensate for the removal of the Taxiway JY SADF system and its associated Deicing Pads. This reconfiguration would minimize the potential for leaks via the connections to the stormwater collection system, which is known to create adverse environmental effects to the local surface water systems.

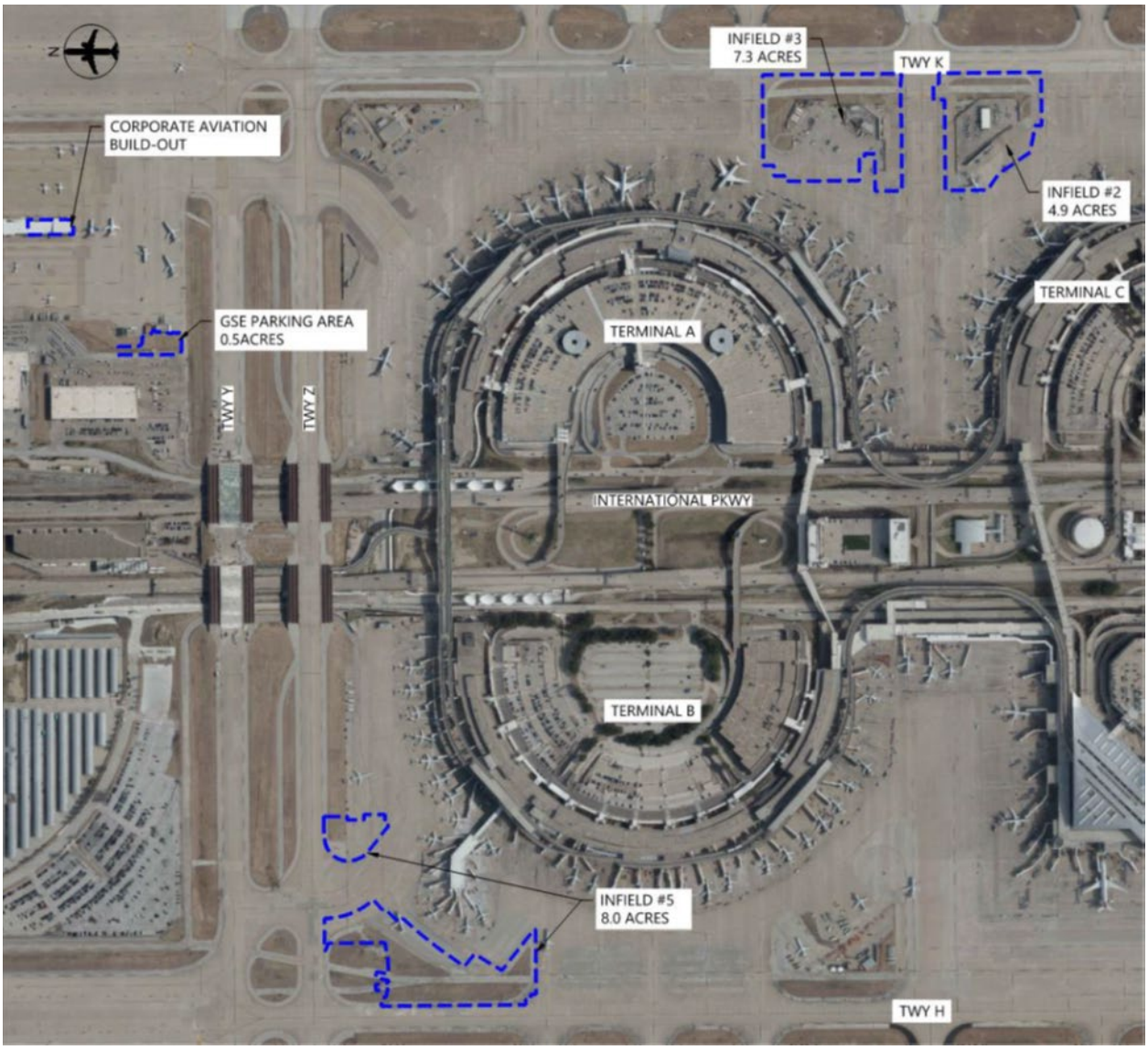

Figure 3-1. Infield Areas 2, 3, and 5, Corporate Aviation Build Out and GSE Relocated Parking Area

Existing GSE parking and storage is located within all the listed infield areas. The parked and stored GSE would be relocated to a more defined location at the Aircraft Operations Area (AOA) perimeter. This location would provide greater safety to the staff and aircraft components during movement operations.

3.3.1 Proposed Action Alternative and Connected Actions Anticipated Construction Duration

The Proposed Action construction is anticipated to take 24 months starting in January 2023. The relocation of the Northeast Airfield Lighting Vault and construction associated with the new location and utility corridor ductwork is anticipated to take 18 months beginning in December 2022 through May 2024.

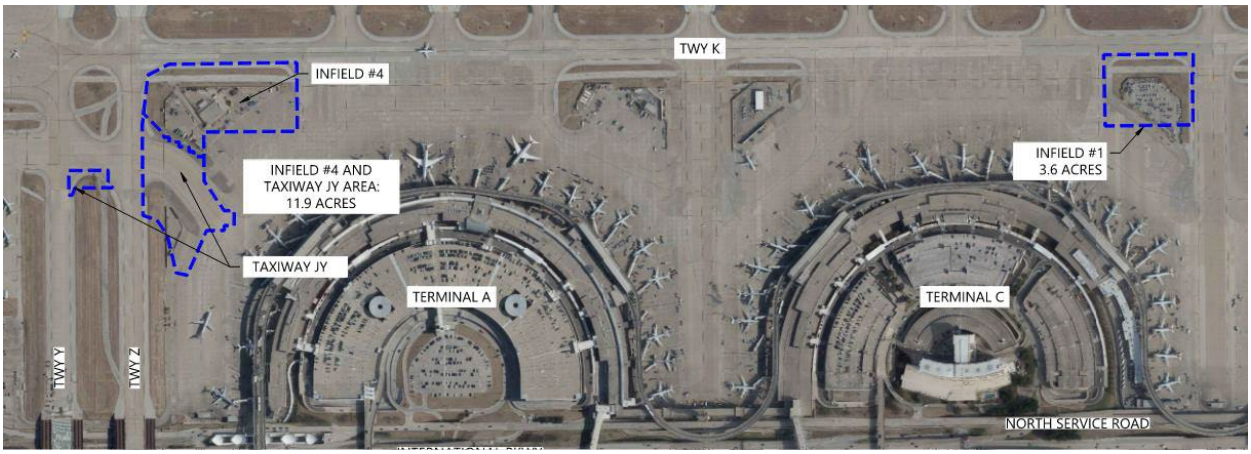

Figure 3-2. Infield Areas 1 and 4 and Taxiway JY Expansion Area.

3.3.2 Proposed Action Alternative Specific Components by Location

Specific components that make up the scope of the Proposed Action project area are summarized in the following sections.

Infield #1 – 3.9 acres located southeast of Terminal C between Terminals C and E (**Figure 3-3**)

- Current use – GSE parking, hardstand positions, and Aircraft rescue and firefighting (ARFF) road.
- Demolition of existing light-duty pavement.
- Demolition of existing ARFF road.
- Demolition of existing grassed medians.
- Stormwater collection and drainage system to include two, 100-foot trench drain systems, which would consist of two, 45-foot trench drains with an inlet drain in the center.
- Demolition and abandonment of existing utility locations that would conflict with the new usage and aircraft rated pavement.
- Relocation of airfield lighting and signage with new utility connections.

Figure 3-3. Infield Area #1

Infield #2 – 5.1 acres located northeast of Terminal C between Terminals A and C (**Figure 3-4**)

- Current use – Allied Aviation Building, which houses fueling support personal, deicing pads, and hardstand areas
- Demolition of the existing Allied Aviation Building.
- Demolition of existing light-duty pavement.
- Demolition of existing ARFF road.
- Demolition of existing grassed medians.
- Renovation and Expansion of the EK Deicing Pad for optimization of ADG III aircraft.[2]
- Demolition of SADF system, including demolition of all above-grade control racks, panels, canopies, conduits, and wire associated with the Taxiway Zulu Deicing Pad system as well as demolition of all below-grade SADF infrastructure including, valves, valve vaults, tanks, pumps, and wet wells. Capping and abandoning in place communication and electrical duct banks associated with the SADF system would be included.
- Demolition of existing airfield lighting and signage.
- Relocation of airfield lighting and signage with new utility connections.
- Installation of five each new 75-foot-high mast light poles with light-emitting diode (LED) luminaries in Infield #2 and #3.
- Demolition and abandonment of existing utility locations that would conflict with the new usage and aircraft rated pavement.
- Construction of stormwater collection and drainage system to include, two, 100-foot trench drain systems, which consists of two, 45-foot trench drains with an inlet drain in the center, and two, 60-foot trench drain systems.

[2] FAA ADG III generally consists of aircraft with a wingspan of 79-118 feet or tail height from 30-45 feet, such as the Boeing 737-700, Airbus A-320, and Embraer RJ 190.

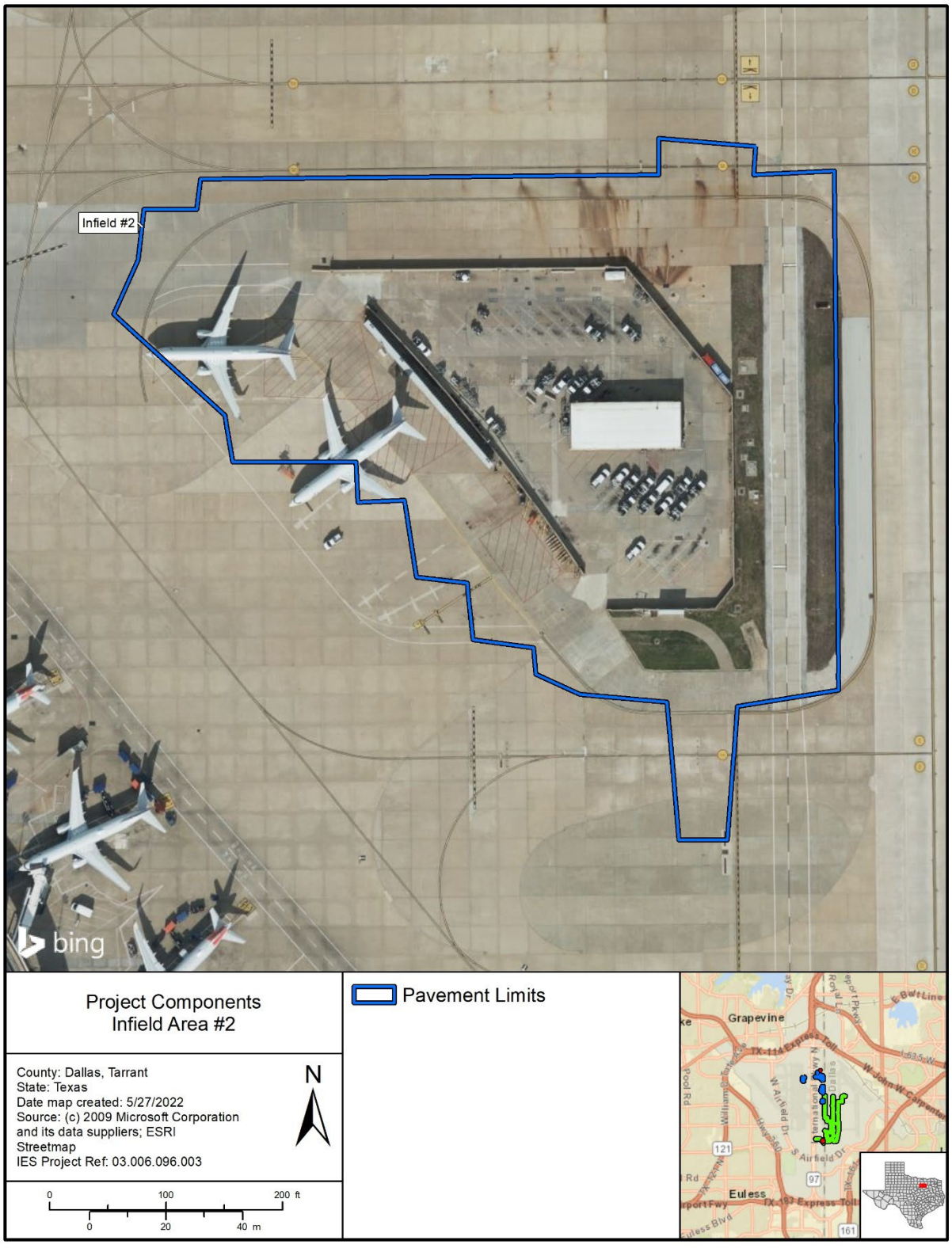

Figure 3-4. Infield Area #2

Infield #3 – 5.7 acres located southeast of Terminal A between Terminals A and C (**Figure 3-5**)

- Current use – Southeast Terminal A Aircraft Waste Triturator, Fueling Station, GSE parking, ARFF road, deicing pads, and hardstand positions.
- Demolition of existing triturator.
- Demolition of existing light-duty pavement.
- Demolition of the existing ARFF road.
- Demolition of existing grassed median.
- Demolition of existing airfield lighting and signage.
- Relocation of airfield lighting and signage with new connections to the proposed Airfield Lighting Vault.
- Installation of five each new 75-foot-high mast light poles with LED luminaries in Infield #2 and #3.
- Removal of two existing SADF tanks and all associated existing piping.
- Renovation of the Taxiway EK Deicing Pad for optimization of ADG III aircraft.
- Demolition and abandonment of existing utility locations that would conflict with the new usage and aircraft rated pavement.
- Construction of stormwater collection and drainage system to include, three, 100-foot trench drain systems, which consists of two, 45-foot trench drains with an inlet drain in the center, and three area inlets.

Figure 3-5. Infield Area #3

Infield #4 – 13.3 acres located northeast of Terminal A (**Figure 3-6**)

- Current use – Northeast Lighting Vault (underground), GSE parking, ARFF road, deicing pads, and hardstands.
- Removal of the existing Northeast Lighting Vault, after the new vault is constructed at the south end of the Airport,
    - Located 12 feet underground.
    - All existing infrastructure would be salvaged for reuse by DFW or disposed of by the contractor.
    - Vault would be filled and compacted below the proposed pavement sections.
    - ACM abatement would be required for door caulking at three specific locations within the existing vault doorways.
- Expansion of Taxiway JY adjacent to this Infield area, which would be sub-phased for construction.
- Demolition of grassed median between Taxiways Y and Z and infill within these areas with heavy duty concrete for unrestricted aircraft geometry movements, including necessary ADG VI setbacks so very large aircraft (e.g., Airbus A380 and Boeing 747-8) can taxi on neighboring existing Taxiways K and G without restriction,
- Construction of stormwater collection and drainage system to include, three, 100-foot trench drain systems, which consists of two, 45-foot trench drains with an inlet drain in the center, and three area inlets.
- Demolition and abandonment of existing utility locations that would conflict with the new usage and aircraft rated pavement.
- Demolition of the SADF collection system within Infield #4/Taxiway JY, including all below-grade SADF infrastructure (i.e., valves, valve vaults, tanks, pumps, and wet wells). The existing communication and electrical duct banks would either be removed or capped, filled with controlled low strength material (CLSM) and abandoned in place.
- Relocation of airfield lighting and signage with new utility connections.

GSE Parking Area – 0.5 acre

- Demolition of existing grassed area (23,400 square feet) to be infilled with heavy duty concrete pavement to facilitate safe GSE parking away from aircraft movement areas.

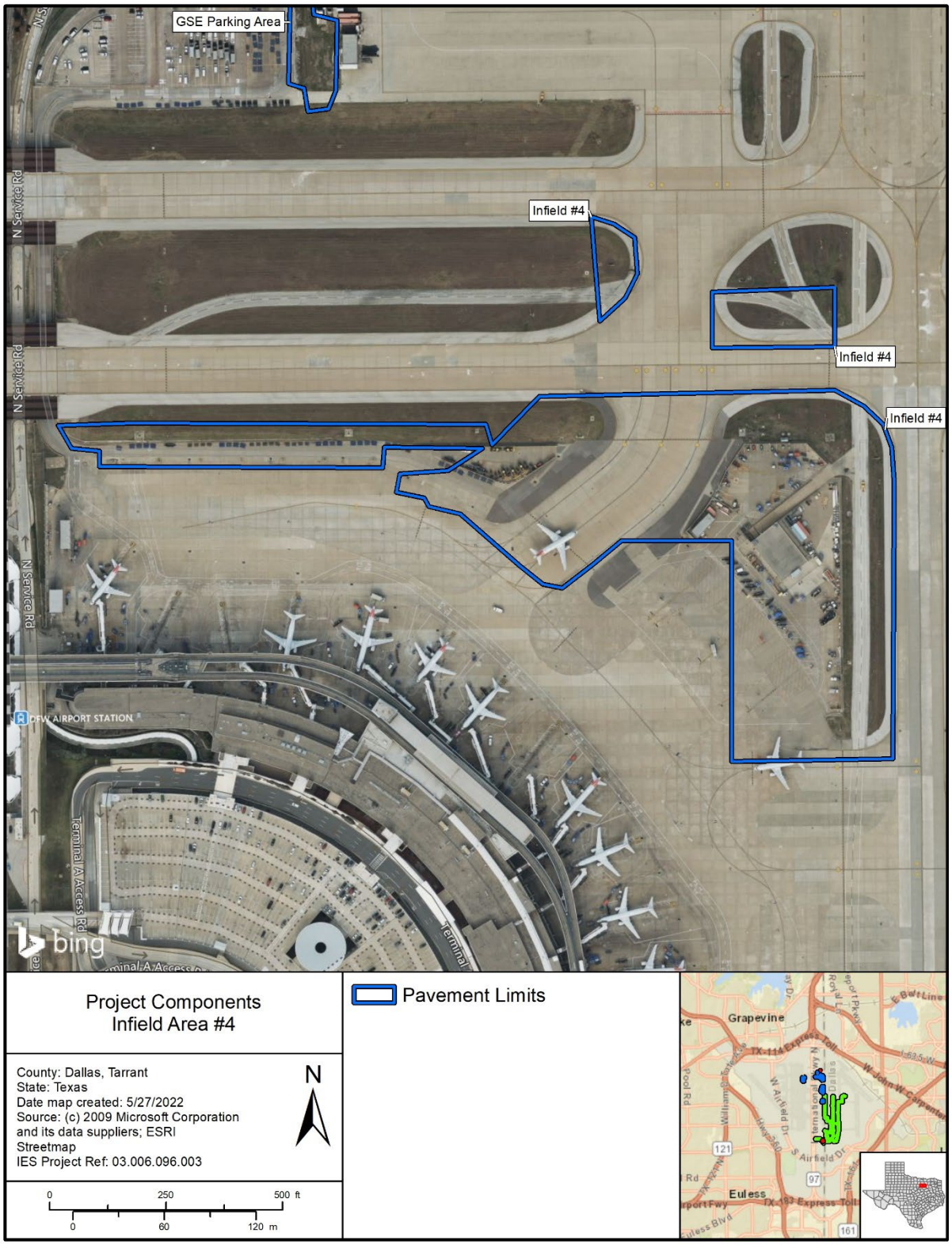

Figure 3-6. Infield Area #4

Infield #5 – 6.2 acres near Terminal B (**Figure 3-7**)

- Current use – primarily grassed median and service roads.
- Demolition of existing light-duty pavement.
- Demolition of existing service roads.
- Demolition of existing grassed medians.
- Demolition of existing airfield lighting and signage.
- Relocation of airfield lighting and signage with new utility connections.
- Removal of two existing glycol tanks.
- Demolition of SADF system, including demolition of all above-grade control racks, panels, canopies, conduits, and wire associated with the HY Deicing Pad system as well as demolition of all below-grade SADF infrastructure including, valves, valve vaults, tanks, pumps, and wet wells. Capping and abandoning in place communication and electrical duct banks associated with the SADF system are included.
- Renovation of the HY Deicing Pad by possibly removing all deicing from the infield and installing two to four deicing positions.
- Demolition and abandonment of existing utility locations that would conflict with the new usage and aircraft rated pavement.
- Construction of stormwater collection and drainage system to include three each 100-foot trench drain systems, which consists of two, 45-foot trench drains with an inlet drain in the center, and two area inlets.

Figure 3-7. Infield Area #5

3.4 Connected Actions

As previously mentioned, demolition activities for certain above and below ground infrastructure are included as part of the Proposed Action Alternative to facilitate overall ramp efficiency. Connected actions, which are being included as part of this EA due to concurrent timing include the relocation of the Northeast Lighting Vault to the southeast quadrant, the relocation of GSE parking, the Corporate Aviation Building renovations, and the future relocation of the triturator and fueling station that were located at Terminal A Southeast. The following paragraphs describe the connected actions in greater detail. Because the relocation of the triturator and fueling station are currently in the planning stage, their exact location within the ramp area will be determined at a future date.

Relocated Lighting Vault – 1.4 acres for the building and 192.8 acres for the utility corridor to be located south of the terminal complex immediately west of the Southeast End-Around Taxiway (*see* **Figure 1-2**, **Figure 3-8**).

Figure 3-8. Approximate Relocation Distance from Northeast Lighting Vault / Infield Area #4 to new Lighting Vault Location

- Demolition of approximately 280 feet of existing asphalt shoulder along the Airfield Perimeter Road Outer Loop.
- Demolition of approximately 280 feet of existing AOA perimeter fence (**Figure 3-9**).
- Modification of the crash cable barrier and anchor system to coincide with the new AOA barrier fence (*see* **Figure 3-9**).
- Existing Airfield duct bank system vacated or abandoned in place.
- Installation of new electrical ductbank to connect the new lighting vault with the east airfield complex (**Figure 3-10**).
- New vault located 0.5 mile southwest of Runway 35L threshold between the Airfield Perimeter Road Outer Loop and West Walnut Hill Lane. AOA fence would be relocated to enclose this new vault,
- Proposed Airfield Lighting Vault would be a single-story 8,050 square feet with a cast-in-place concrete retaining wall around the building's perimeter.
- Installation of a small-diameter sanitary sewer line, approximately 1,600 feet, along the north side of West Walnut Hill Lane from the new vault westward to International Parkway Service Road.
- Installation of redundant electrical feeds from International Parkway Service Road to the new vault on the south side of West Walnut Hill Lane.
- Installation of a new looped water line connected to the DFW-owned water main and a self-contained stormwater collection and conveyance system.
- Relocation of FAA Runway Light Intensity Monitor (RLIM) Equipment.

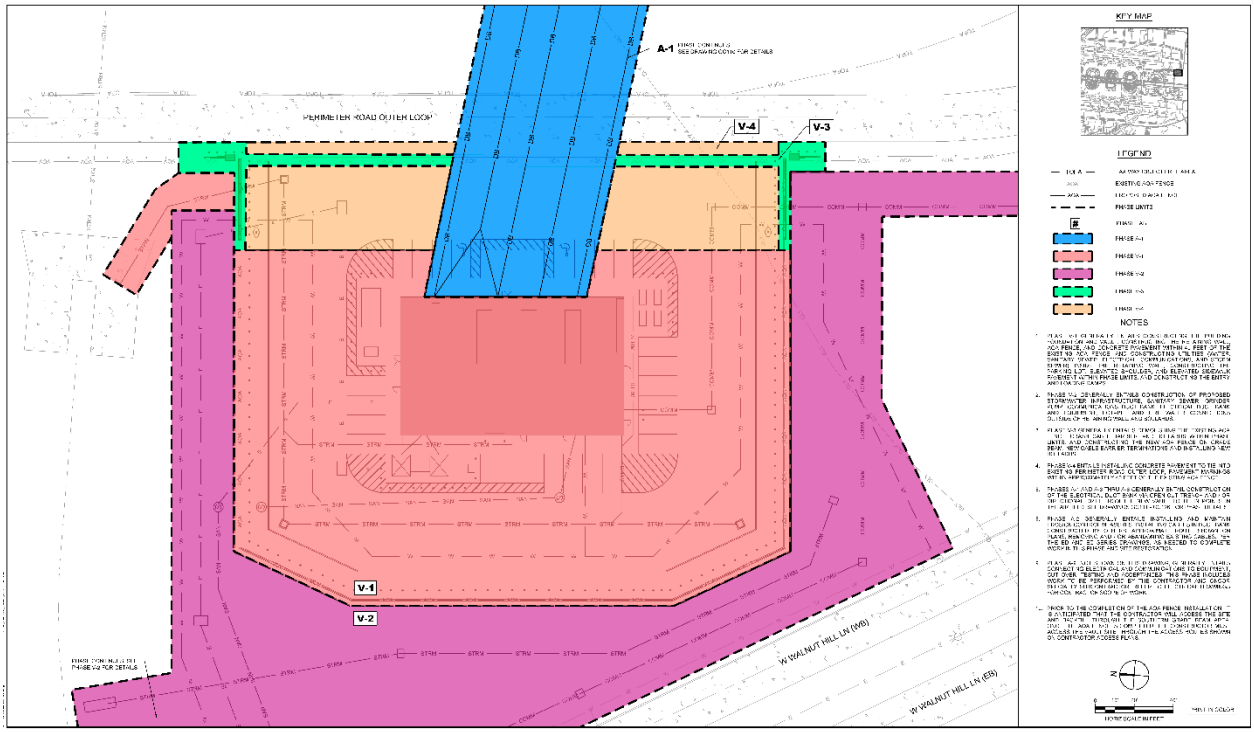

Figure 3-9. Close-up of Relocated Northeast Lighting Showing the Existing AOA Fencing along Perimeter Road Outer Loop and New Fencing Around the Vault Area

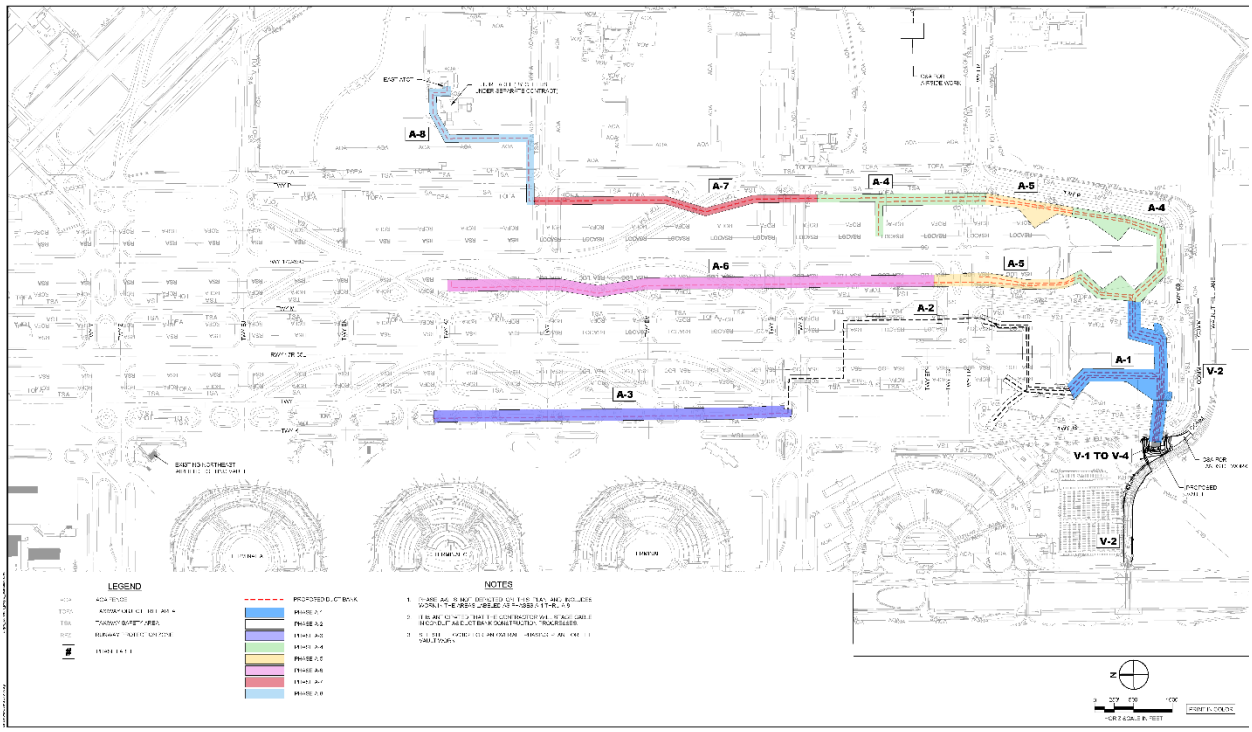

Figure 3-10. Proposed New Electrical Ductbank Lines

Corporate Aviation Build Out – 0.2 acre (see **Figures 1-2, 3-1,** and **3-4**)

- The Ogden-Allied Building, where Allied Aviation on-site fueling service staff are located, is currently within Infield #2. This building would be demolished and would require Allied Aviation's staff to be temporarily relocated to the existing Corporate Aviation building that would be renovated. The ARFF road parallel to Taxiway K would also be relocated to outside the Taxiway Object Free Area.
- Build out of approximately 5,300 square feet for an in-kind replacement of the demolished Allied Aviation building. Build out would include a Break room, Manager's office, Training office, Locker room with uniform storage, etc.

3.5 Alternatives Comparison

The NAA does not meet the purpose and need. It would not improve airfield safety, or reduce terminal area congestion, which would continue less than efficient airfield operations, and the inefficient transition of aircraft between the taxiway system and the ramp area would remain. The current safety hazards would persist and the potential conflicts between aircraft operations and vault access would remain. The existing aircraft lavatory waste triturator system would remain in the densely developed area between Terminals A and C adjacent to the terminal access taxiways, continuing to cause conflicts with airfield operations. The NAA would not meet the purpose and need; therefore, only the Proposed Action Alternative is being carried forward for detailed analysis in this EA. However, the NAA has been carried forward to enable comparison with the potential impacts of the Proposed Action.

The Proposed Action Alternative meets the purpose and need. Negative impacts to environmental resources would be minimal; however, hazardous materials remediation (i.e., asbestos) would be required during the demolition of the Northeast Airfield Lighting Vault; the demolition is required to establish connectivity to the new service lines. Detailed discussions of the hazardous materials and remediation are in **Sections 4.4** and **5.4**. No loss of land, habitat, waters of the United States, or other natural resources would occur, as the proposed action would be conducted within DFW previously developed areas. Additionally, since all demolition and construction activities would be contained to DFW interior infrastructure, there would be no temporary or permanent noise effects to sensitive receivers outside the DFW boundaries. Likewise, demolition, construction, and operation of the new infrastructure would not trigger adverse air quality impacts, as it was determined that all emissions would be below *de minimis* levels. Operational modeling and evaluation showed a reduction in daily aircraft delay and congestion, providing a reduction in emissions and operational time.

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4.0 AFFECTED ENVIRONMENT

This section describes the environmental conditions potentially affected within the Proposed Action study/project area (*see* **Figure 1-2**) and related regulations. Where potential impacts exist, conditions or mitigation measures to offset these impacts are detailed in **Section 5**.

4.1 Resources Categories Not Carried Forward for Detailed Analyses

The CEQ regulations (§1501.7) state that the lead agency shall identify and eliminate from detailed study the issues which are not important, or which have been covered by prior environmental review, narrowing the discussion of these issues in the document to a brief presentation of why they would not have a substantial effect on the human environment. **Table 4.1** illustrates the rationale behind the elimination of the resources/impact areas that were not included in the detailed study, in accordance with CEQ §1501.7.

Table 4-1. Resources/Impact Areas Not Carried Forward for Detailed Analysis

Area	Significance Threshold	Rationale for Elimination
Biological Resources	• The U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS) determines that the action would be likely to jeopardize the continued existence of a federally listed threatened or endangered species or would result in the destruction or adverse modification of federally designated critical habitat.	No impact. The project area is currently within a fully developed urban setting with only small pockets of urban herbaceous landscaping. There is not potential habitat for any state or federally listed protected species and there are no state listed unique vegetation communities present. Desktop Protected Species Habitat Assessments for both Dallas and Tarrant Counties is included in **Appendix A**.
Coastal Resources	• A determination by a State having an approved Coastal Zone Management (CZM) program that the proposed action would not be consistent with the applicable CZM plan, which cannot be avoided, minimized, or mitigated	No Impact. There are no coastal resources located within or adjacent to the proposed project area.
Department of Transportation Act, Section 4(f)	• Potential for more than a minimal physical use or deemed "constructive use" substantially impairing the use of an existing Section 4(f) property.	No Impact. There are no Section 4(f) properties within or adjacent to the proposed project area.
Prime or Unique Farmland	• Alteration of a property with a total combined score between 200 to 260 on Form AD 1006	No Impact. According to the Part 523 – Farmland Protection Policy Act (FPPA) Manual, construction within an existing right-of-way purchased on or before 04 August 1984 is not subject to provisions of FPPA (Natural Resources Conservation Services [NRCS] 2012).
Land Use	• Existence of noise sensitive receptors adjacent to the project area • Potential for impacts that have land use ramifications, for example, disruption of communities or induced socioeconomic impacts	No Impact. All surrounding land uses adjacent to the proposed site are currently compatible to the proposed activities and are planned to be compatible with all reasonably foreseeable future developments in the area. Project would be developed entirely on airport property and is compatible with DFW's on-airport land use plans.
Natural Resources and Energy Supply	• There are no significance thresholds for natural resources and energy supply.	No Impact. Construction related materials would be locally available in sufficient quantity to supply the project. Additionally, project-related operational efficiencies would reduce long-term fossil fuel use in combination with DFW's aggressive measures to become carbon neutral.

Area	Significance Threshold	Rationale for Elimination
Noise and Noise-Compatible Land Use	• The action would increase noise by day-night level (DNL) 1.5 decibels (dB) or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that would be exposed at or above the DNL 65dB level due to a DNL 1.5dB or greater increase, when compared to the no action alternative for the same timeframe.	No Impact. Because there would be no change in daily aircraft operations, use of larger/noisier aircraft, air traffic procedures, in airport arrivals and departures above 3,000 feet, or runway utilization, there would be no change in noise impact and thus no significant impact. Anticipated construction noise impacts would be negligible, temporary, and mostly restricted to areas within the airport boundary
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks	• Extensive relocation of residents is required, but sufficient replacement housing is unavailable • Extensive relocation of community businesses that would create severe economic hardship for the affected communities • A substantial loss in the community tax base • Disproportionately high and adverse human health or environmental effects on minority and low-income populations • Disproportionate health and safety risks to children	No Impact. Implementation of the proposed action would be unlikely to substantially change the prevailing socioeconomic conditions, because there would not be any relocation of residents, relocation of businesses located within or adjacent to the project area due to the proposed action, or a substantial loss in the tax base of any community, which would not create a disproportionately high and adverse human health or environmental effect on minority or low-income populations, as such, both an analysis of the socioeconomic conditions and environmental justice are excluded from further detailed analysis. Additionally, implementation of the proposed action would not increase outdoor or indoor air pollutants above ambient levels, would not pollute drinking water sources adjacent to the proposed site, would not increase the level of pesticides in food crops or animals, and would not increase the level of lead contamination adjacent to areas where children are likely to be located. Also, due to restricted access, the proposed action would not pose an attractive nuisance hazard that could endanger the health and safety of local children. As a result, this issue is being excluded from detailed study.
Visual Effects (Including Light Emissions)	• The degree that the proposed action would create an annoyance or interfere with normal activities from light emissions. • Affect the visual character of the area due to light emissions, including the importance, uniqueness, and aesthetic value of the affected visual resources. • Contrast with the visual resources and/or visual character in the project areas. • Block or obstruct the views of visual resources, including whether those resources would still be viewable.	No Impact. The features being replaced would be similarly situated within the AOA and not create any viewshed obstructions. Additionally, any new lighting would be LED and generally, brighter and more efficient.
Water Resources – Waters of the United States, including Wetlands	• Adversely affect a wetland's function to protect the quality or quantity of municipal water supplies, including surface waters and sole source and other aquifers. • Substantially alter the hydrology needed to sustain the affected wetland system's values and	No impact. There are no waters of the United States or wetlands located within the Ramp Efficiency Improvements project area. A desktop waters of the United States assessment is included as **Appendix B**.

Area	Significance Threshold	Rationale for Elimination
	functions or those of a wetland to which it is connected. • Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety or welfare (the term welfare includes cultural, recreational, and scientific resources or property important to the public). • Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically important timber, food, or fiber resources of the affected or surrounding wetlands. • Promote development of secondary activities or services that would cause the circumstances listed above to occur. • Be inconsistent with applicable state wetland strategies.	
Water Resources – Floodplains	• The action would cause notable adverse impacts on natural and beneficial floodplain values. Natural and beneficial floodplain values are defined in Paragraph 4.k of DOT Order 5650.2, Floodplain Management and Protection.	No Impact. The entire Ramp Efficiency Improvements area is located within Zone X, outside the 0.2 percent annual chance flood (Federal Emergency Management Agency [FEMA] Flood Insurance Rate Map [FIRM] Panels 4439C0120K, 48113C0145K, 48439C0235L, and 48113C0285L). The FEMA FIRM can be viewed in the Waters of the United States Desktop Assessment included in **Appendix B**. Additionally, detailed drainage studies have be undertaken to ensure that sufficient capacity will be created within the stormwater collection system to create no adverse impacts to any downstream receiving waters.
Wild and Scenic Rivers	• A determination that the effects on a National River Inventory (NRI) river segment are significant, or would preclude inclusion in the Wild and Scenic River System or downgrade its classification	No Impact. According to the National Wild and Scenic Rivers System (2016), there are no wild or scenic rivers or eligible rivers located within or adjacent to the proposed project area.

4.2 Air Quality

4.2.1 Regulatory Background

The FAA 1050.1F Desk Reference defines the study area for air quality as the entire geographic area that could be either directly or indirectly affected by the proposed project. It requires the document to discuss the current National Ambient Air Quality Standards (NAAQS), state ambient air quality standards, the attainment status of the study area, a summary of recent measured air pollutant concentrations, a description of the meteorological and topographical conditions of the study area, other conditions relevant to the study area, and any permits required (FAA, 2020).

The Clean Air Act (CAA) requires that states adopt Ambient Air Quality Standards. The standards have been established to protect the public from potentially harmful amounts of pollutants. Under the CAA, the United States Environmental Protection Agency (USEPA) established the NAAQS, which include standards for several criteria pollutants. NAAQS have been set for the following six pollutants, carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), and sulfur dioxide (SO_2) (**Table 4-2**). Based on air monitoring data and in accordance

with the CAA, areas within the United States are designated with respect to their attainment status with the NAAQS. Areas that meet the NAAQS are designated as attainment, those that do not meet the standards are designated as nonattainment, and those that are in transition from nonattainment to attainment are designated as maintenance. Ozone nonattainment areas are further classified as extreme, severe, serious, moderate, and marginal by the degree of non-compliance with the NAAQS.

Table 4-2. National Ambient Air Quality Standards

Pollutant	Averaging Time	Standard	Type of Standard	Form
CO	1-hour	35 ppm	Primary	Not to be exceeded more than once annually
	8-hour	9 ppm	Primary	
Pb	Rolling quarter	0.15 µg/m^3	Primary Secondary	Not to be exceeded
NO_2	1-hour	100 ppb	Primary	98thpercentile of 1-hour daily maximum concentrations, averaged over 3 years
	1 year	53 ppb	Primary Secondary	Annual Mean
O_3	8-hour	0.070 ppm	Primary Secondary	Annual 4thhighest daily maximum 8-hour concentration, averaged over 3 years
PM_{10}	24-hour	150 µg/m^3	Primary Secondary	Not to be exceeded more than once annually on average over 3 years
$PM_{2.5}$	1 year	12.0 µg/m^3	Primary	Annual mean, averaged over 3 years
	1 year	15.0 µg/m^3	Secondary	Annual mean, averaged over 3 years
	24-hour	35 µg/m^3	Primary Secondary	98thpercentile, averaged over 3 years
SO_2	1-hour	75 ppb	Primary	99thpercentile of 1-hour daily maximum concentrations, averaged over 3 years
	3-hour	0.5 ppm	Secondar	Not to be exceeded more than once annually

Notes:
ppm= parts per million; ppb= parts per billion; µg/m^3= micrograms per cubic meter; $PM_{2.5}$= particulate matter with a diameter less than 2.5 micrometers (µm); PM_{10}= particulate matter with a diameter less than 10 micrometers (µm)
Primary standards provide public health and safety protection, including protecting the health of sensitive populations such as asthmatics, children, and the elderly.
Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.
Source: USEPA, 2021c

4.2.2 Existing Conditions

The Dallas-Fort Worth metropolitan area (Air Quality Control Region [AQCR] 215) has been designated as an attainment area for all USEPA criteria pollutants except for ozone based on air quality monitoring data collected by the Texas Commission on Environmental Quality (TCEQ) (TCEQ, 2021a). The Proposed Action is in Dallas and Tarrant Counties, which are part of the Dallas-Fort Worth metropolitan ozone nonattainment area (**Figure 4-1**). This metropolitan area is treated as the study area for air quality for this Project. The Dallas-Fort Worth metropolitan area is designated as a "serious" non-attainment area for the 2008 8-hour, 0.075 parts per million (ppm) ozone standard, as of 23 August 2019, effective 23 September 2019. It is also designated as a "marginal" nonattainment area under the 2015 8-hour, 0.070 ppm ozone standard as of 05 May 2021 with a design value of 0.076 ppm for 2018 to 2020 (USEPA, 2021a) (**Table 4-3**).

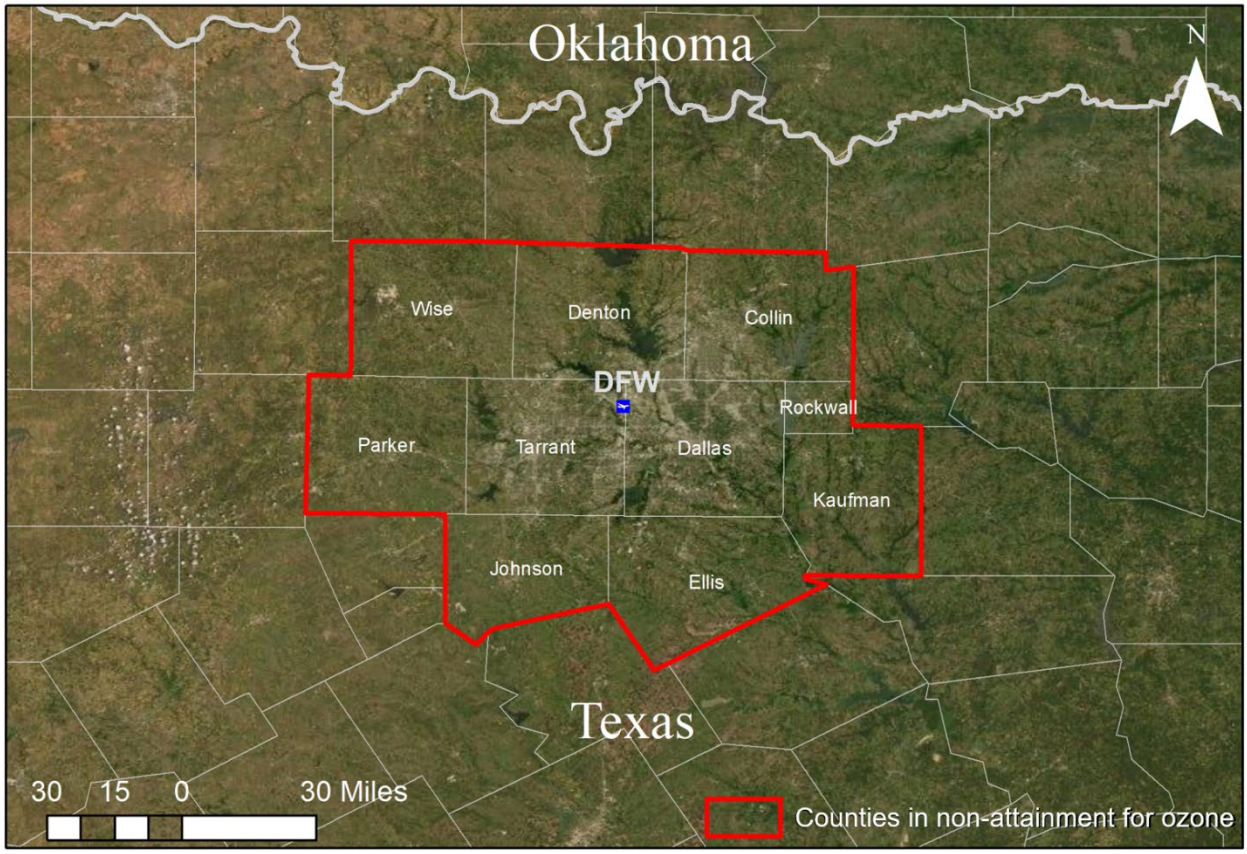

Figure 4-1. DFW and AQCR 215 Ozone Non-Attainment Area

The State Implementation Plan (SIP) is the cumulative record of all air pollution control strategies, emission budgets, and timetables implemented or adopted by government agencies within Texas to bring nonattainment areas into compliance with the NAAQS by a designated deadline. The SIP focuses on reducing the two primary pollutants volatile organic compounds (VOCs) and nitrogen oxides (NO_x), which mix in sunlight to form ozone.

4.2.3 General Conformity

The General Conformity Rule established a process based on emissions analysis to determine whether a federal action conforms to the SIP. General Conformity refers to the requirements under Section 176(c) of the CAA for federal agencies to show that their actions conform to the purpose of the applicable SIP. As described in 40 CFR 51 and 93, issued by the USEPA, the General Conformity analysis evaluates both direct emissions and indirect emissions, as defined by the 40 CFR 93.152. "Direct emissions" are those that occur at the same time and place as the federal action. As stated in 40 CFR 93.152, "indirect emissions" are defined as emissions or precursors that are caused or initiated by the federal action and originate in the same nonattainment or maintenance area but occur at a different time or place from the action, are reasonably foreseeable, that the agency can practically control, and for which the agency has continuing program responsibility.

When developing the General Conformity Rule, the USEPA recognized that many actions conducted by federal agencies do not result in substantial increases in air pollutant emissions in nonattainment and maintenance areas. Therefore, the USEPA established threshold levels (also referred to as de minimis levels) for emissions of each of the criteria pollutants. If the sum of the

Table 4-3. Recent Air Quality at Dallas-Fort Worth-Arlington, Texas

Pollutant	Federal Standard	Design Value[2]	Monitoring Years	Current Status
CO	9 ppm (1-hour)	1.3 ppm	2019-2020	Attainment[3]
	30 ppm (8-hour)	1.8 ppm	2019-2020	Attainment
Pb	0.15 µg/m³ (3-month)	0.02 µg/m³	2018-2020	Attainment
NO_2	53 ppb (annual)	11 ppb	2018-2020	Attainment
	100 ppb (1-hour)	40 ppb	2018-2020	Attainment
O_3	0.070 ppm (8-hour)	0.08 ppm	2014-2016	Nonattainment[4]
PM_{10}	150 µg/m³ (24-hour)	N.A.[5]	N.A.	Attainment
$PM_{2.5}$	12 µg/m³ (annual)	9.2 µg/m³	2017-2019	Attainment
	35 µg/m³ (24h primary)	20 µg/m³	2017-2019	Attainment
SO_2	75 ppb (1-hour)	7 ppb	2018-2020	Attainment
	0.5 ppm (3-hour)	N.A.	N.A.	Attainment

Notes:
ppm = parts per million; ppb = parts per billion; µg/m³ = micrograms per cubic meter; $PM_{2.5}$ = particulate matter with a diameter less than 2.5 micrometers (µm); PM_{10} = particulate matter with a diameter less than 10 micrometers (µm)
[1] Design values shown in the table are from available Air Quality System (AQS) sites closest to the DFW. Design values for CO and $PM_{2.5}$ are based on AQS site 481130069 in Dallas County; design value for Pb is based on AQS site 482570020 in Kaufman County; design value for NO_2 is based on AQS site 481131067 in Dallas County; design value for O_3 is based on AQS site 481130075 in Dallas County; design value for SO_2 is based on AQS site 482570005 in Kaufman County.
[2] Design values are commonly used to classify nonattainment areas and are defined as statistics that describe the air quality status of a given location relative to the level of the NAAQS.
[3] An attainment area is a geographic area that meets or does better than the primary standard defined in the NAAQS.
[4] A nonattainment area is a homogeneous geographical area (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.
[5] N.A.= Not available; no design value is available for the monitoring location. An area with no design value available is automatically in attainment since design values are used to classify non-attainment areas.
Source: USEPA, 2015a; USEPA, 2015b; USEPA, 2021a; USEPA, 2021b

increases in direct and indirect emissions caused by a project is calculated to be below the *de minimis* levels, no further air quality analysis is needed, and the project would not require a General Conformity Determination. The Dallas-Fort Worth metroplex is currently classified as a "serious" nonattainment area under the 2008 Ozone standard, and the resulting *de minimis* level is 50 tons per year (tpy) for NOx or VOCs.

4.2.4 Sources of Airport Air Emissions

Emissions from the Proposed Action are expected to include construction emissions, including emissions from construction equipment, motor vehicles (employee commute and material delivery), and nonpoint source emissions (e.g., fugitive dust and asphalt drying). Temporary construction and operational emissions are subject to the CAA General Conformity requirements. For this reason, a construction emissions inventory analysis was completed for the Proposed Action.

4.3 Climate

4.3.1 Regulatory Background

The Intergovernmental Panel on Climate Change (IPCC, 2021) has concluded that it is unequivocal that human influence has warmed the atmosphere, ocean, and land and that human activities have caused concentrations of greenhouse gases (GHG) to increase since mid-18th century. The increase in well-mixed GHG concentrations has caused widespread changes in the earth's climate systems, which include, but not limited to, successively warmer global surface temperature and increasing global averaged precipitation. Research has shown that there is a direct link between fuel combustion and GHG emissions; sources that require fuel or power at an airport are key sources of GHGs. Aircraft jet engines, like many other vehicle engines, produce carbon dioxide (CO_2), water (H_2O) vapor, nitrous oxide (N_2O), CO, oxides of sulfur, unburned or partially combusted hydrocarbons or VOCs, particulates, and other trace compounds.

There are currently no significance thresholds for aviation GHG emissions (FAA, 2020). Exhibit 3-1 of the FAA 1050.1F Desk Reference (FAA, 2020) lists the general statutes and regulations related to climate. President Biden's January 27, 2021, Executive Order (EO) on Tackling the Climate Crisis at Home and Abroad notes that it will be a United States priority to press for integration of climate considerations across a wide range of international fora that address aviation, clean energy and related topics. On 09 September 2021, the Biden administration announced a series of sustainability initiatives in the aviation industry including scaling sustainable aviation fuel production to 3 billion gallons per year by 2030 by supporting producers and research to improve air traffic and airport efficiency.

4.3.2 Existing Conditions

Airport development has the potential to both affect climate change and to be affected by it. Changes in resource categories such as air quality, natural resources, and energy supply can potentially contribute to climate change by increasing the amount of GHGs emitted. The USEPA indicates that transportation activities accounted for the largest portion of total U.S. GHG emissions in 2019 at 28.6 percent. Commercial aviation contributed 7.2 percent of total GHG emissions in 2019, compared to 23.6 percent from freight trucks, 17.2 percent from light-duty trucks, 2.4 percent from other aircraft, and 2.2 percent from rail (USEPA, 2021d).

The characteristics of GHGs and their rapid dispersion into the global atmosphere makes GHGs different from other air pollutants evaluated in federal environmental reviews because the impacts are not localized or regional. It is difficult to isolate the GHG emissions impacts for a particular aviation project. Uncertainties are too large to accurately predict the timing, magnitude, and location of aviation's climate impacts; however, it is clear that minimizing GHG emissions and identifying potential future impacts of climate change are important for a sustainable national airspace system (FAA, 2020).

Recognizing the imperative to measure and reduce GHG emissions generated through airport operations, DFW became the first airport in North America to be carbon neutral in 2016 and achieved 4+ level in Airports Council International's (ACI) Airport Carbon Accreditation program in 2020. The new level 4+ recognizes DFW's commitment to decarbonization across operations. In 2017, DFW Airport implemented the Renewable Natural Gas Initiative, with the goal of transitioning 100 percent of DFW's compressed natural gas (CNG) vehicle fleet to renewable natural gas (RNG), waste energy recovered from a local landfill. As of December 2021, over 70 percent of the natural gas used in the DFW's vehicle fleet came from RNG. DFW's Net Zero Roadmap details strategies to eliminate the use of fossil fuels for heating, cooling, electricity, and vehicle use by continuing to improve energy efficiency while transitioning most of the heating, refrigerants and fuel to carbon-free sources. DFW completed design of a "Electric Central Utility Plant" in December 2020. This project is the cornerstone of DFW's Net Zero Roadmap. By transitioning terminal heating from natural gas to renewable electricity (electric heat pumps and chillers), DFW's largest sources of emissions will be reduced significantly.

Sources of GHG emissions for Proposed Action include emissions of GHG from construction operations including construction equipment, motor vehicles, and nonpoint sources, as well as operational emissions from aircraft emissions, GSE, and auxiliary power unit (APU). These sources contribute to GHGs such as CO_2, methane (CH_4), and N_2O, primarily due to fuel combustion. While emissions of hydrofluorocarbons (HFCs), perflorinated compounds (PFC1s), and Sulfur Hexafluoride (SF_6) linked with refrigeration, air conditioning, and other coolants also occur at airports, these are at far lesser amounts (FAA, 2015) and are expected to be relatively negligible for this Proposed Action.

4.4 Hazardous Materials, Solid Waste, and Pollution Prevention

4.4.1 Regulatory Background

The handling and disposal of hazardous materials, chemicals, and wastes, are governed by four primary laws, which include the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (more commonly known as "Superfund"), Pollution Prevention Act (PPA), Toxic Substances Control Act (TSCA), and Resource Conservation and Recovery Act (RCRA), as amended. RCRA governs the generation, treatment, storage, and disposal of solid and hazardous wastes. CERCLA provides for consultation with natural resources trustees and cleanup of any release of a hazardous substance (excluding petroleum) into the environment. In addition to these laws, three EO have been designated to ensure federal compliance with pollution control standards, federal right-to-know laws, and Superfund implementation. FAA Orders 1050.1F and 5050.4B do not provide a specific threshold of significance for hazardous material and solid waste impacts. However, the FAA Orders suggest factors to be considered such as identifying if the action involves property listed (or potentially listed) on the National Priorities List (NPL).

Solid waste is generally defined in RCRA as any discarded material that is abandoned, recycled, considered inherently waste-like, or a military munition (refer to 40 CFR 261.2 for further details). The definition of a hazardous material, hazardous substance, and a hazardous waste follow:

- *Hazardous Material* – any substance or material that has been determined to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce (49 CFR §172, Table 172.101). This includes hazardous substances and hazardous wastes.
- *Hazardous Substance* – any element, compound mixture, solution, or substance defined as a hazardous substance under the CERCLA and listed in 40 CFR §302. If released into the environment, hazardous substances may pose substantial harm to human health or the environment.
- *Hazardous Waste* – a waste is considered hazardous if it is listed in RCRA regulations, or meets the characteristics described in 40 CFR §261, including ignitability, corrosivity, reactivity, or toxicity.

4.4.2 Existing Conditions

Since the disruption of sites and facilities containing hazardous materials (including hazardous wastes, hazardous substances, environmental contamination, and other regulated substances such as asbestos, fuel and waste oil) can potentially impact soils, surface/groundwater, and air quality, this section provides an overview of what is known about these areas located in the vicinity of the proposed project area. This information is presented to help determine what effect, if any, the proposed project would have on these sites and vice versa.

For the purpose of this analysis, the identification of sites known, suspected, or with the potential, to contain hazardous materials and/or environmental contamination was conducted by accomplishing the following: visual observations of existing conditions; consultation and discussions with DFW staff; review of current aerial photos; and an electronic database search of available regulatory agency records. The sampling and testing of environmental media (e.g., soils, surface/groundwater, building materials, etc.) was only conducted for asbestos inspection.

4.4.2.1 Hazardous Materials, Substances, and Waste

Per the USEPA's NPL database, there are no properties listed (or proposed) on the NPL in the project area.

The presence of asbestos containing materials (ACM) has been confirmed in the Northeast and East Airfield Lighting Vaults by the DFW Environmental Affairs Division (EAD). ACMs have been identified in the generator room, including the pipe insulation mastic and elbows, and thermal body insulation and wrap. According to the DFW, there were no additional known hazardous substance investigation and cleanup sites and there are no additional known ongoing corrective actions being conducted within the project area. **Table 4-4** lists the federal and state-listed database sites near the Proposed Action.

4.4.2.2 Solid Waste

Solid waste in the project area is generated by various activities associated with the demolition and construction projects. DFW collects this solid waste and evaluates it to determine where it is to be disposed. Waste Management of Texas collects and transports DFW's municipal solid waste (MSW) to the Dallas Fort Worth Landfill in Lewisville, Texas. This landfill is appropriately permitted and located approximately 9 miles north-northeast of DFW. This landfill is consistent with guidance provided in FAA Advisory Circular (AC) 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports and FAA Order 5200.5A, Waste Disposal Sites on or Near Airport.

DFW Airport also has a recycling program and provides recycling containers[3] for construction projects. DFW Airport recycles a variety of materials including but not limited to construction and demolition waste, paper, cardboard, wood, metal, concrete, soil, and tires. DFW Airport proposes through the Sustainability Management Plan (SMP) to decrease the generation of MSW and hazardous materials by establishing targets while increasing recycling efforts in the terminals and airport offices.

Hazardous wastes generated at DFW Airport are handled in compliance will all applicable federal and State regulations. Wastes are profiled and packaged prior to being transported to an adequately permitted hazardous waste disposal facility. Asbestos containing hazardous waste generated during the demolition of Proposed Action will be handled in accordance with all applicable rules and regulations. In compliance with Texas Department of State Health Services (DSHS) requirements, an asbestos abatement specification will be developed and implemented by the designated contractor.

4.5 Historical, Architectural, Archeological, and Cultural Resources

4.5.1 Regulatory Background

The National Historic Preservation Act (NHPA) requires federal agencies to identify significant cultural resources that may be affected by their actions and mitigate adverse effects to those resources. The NHPA (54 USC 300101), specifically Section 106 of the NHPA (54 USC 306108) requires the State Historic Preservation Office (SHPO), represented by the Texas Historical Commission (THC), to administer and coordinate historic preservation activities, and to review and comment on all actions licensed by the Federal government that will have an effect on properties listed in the National Register of Historic Places (NRHP), or eligible for such listing. 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, archaeological, and other cultural resources. The assessment of significance of a cultural resource is based on federal guidelines and regulations.

[3] DFW Airport provides recycling containers and hauling services to all operational terminals and provides concrete washout recycling containers for construction projects.

Table 4-4. Federal and States Database Sites Located on DFW Property Near the Project Area

Site Name	Address	Database Type
DFWEAD2017036 - Terminal C (FID#33054)	2333 N International Parkway	Asbestos
DFW Terminal C	2330 N International Parkway	Asbestos
Terminals A, B, C, E Central Utilities	Unmapped, in proximity	Asbestos
Delta Airlines Incineration Facility	Unmapped, in proximity	Permitted Solid Waste/Liquified Waste Facility (SWF/LF), Central Registry
Central Utilities Plant Upgrade	Unmapped, in proximity	Central Registry
Transportation Security Administration (TSA)	Terminal C Lower Level	Notice of Violation Listing (ENF)
TSA	Terminal C Lower Level	Compliance History Listing (COMP HIST)
DFW Terminal C 0-5	2330 N. International Parkway	Asbestos
DFWEAD2019089 – Terminal C (FID#33054)	2330 N International Parkway	Asbestos
Terminal C High Gates Demolition and Rebuild	Terminal C Gates 33-39	Central Registry
Terminal C (HP#7080)	2330 N International Parkway	Asbestos
Terminal C – High Bay Building (FID#33043)	2500 N International Parkway	Asbestos
TSA	Terminal C Lower Level	Facility Index System/Facility Registry System (FINDS)
DFW Terminal C High Gates	2400 N International Parkway	Enforcement and Compliance History (ECHO)
Terminal C FID NO.	2330 N International Parkway	Asbestos
DFW Terminal C High Gates	2400 N International Parkway	FINDS
TSA	Terminal C Lower Level	Industrial Hazardous Wastes (IHW)
Terminal C High Gates Demolition and Rebuild	Terminal C Gates 35-39	FINDS, ECHO
DFWEAD2019026 - Terminal C (FID#33054)	2330 N International Parkway	Asbestos
TSA	Terminal C Lower Level	Central Registry
TSA	Terminal C Lower Level	FINDS, ECHO
DFW	American Airlines Incineration, Terminal 3E Near Gate No. 1	SWF/LF
American Airlines	2E 3E Connector Building	Underground Storage Tank (UST), Financial Assurance
American Airlines	2W AUTOMOTIVE	Leaking Petroleum Storage Tank (LPST)
D10 Terminal Radar Approach Control	2401 N International Parkway	UST
DFW	5E Support Area	IHW
DFW	3122 E 30th Street	LPST, IHW, IHW Corrective Actions
DFW FLQ LOC 17L	DFW Airport	UST
DFW JHZ LOC 17R	DFW Airport	UST
DFW FLQ GS 17L	DFW Airport	UST
Runway 35R ALSF 2	DFW Airport	UST
DFW	DFW Airport	UST
National Car Rental	DFW Airport North	UST, Financial Assurance
DFW VORTAC	DFW Airport	UST
DFW CIX SSALR 18L	DFW Airport	UST
DFW JHZ SSALR 17R	DFW Airport	UST
American Airlines	HANGAR II	LPST, UST, Financial Assurance
American Airlines Old Air Freight	Unmapped, in proximity	LPST
General Telephone Southwest	Unmapped, in proximity	LPST
National Car Rental Facility	Unmapped, in proximity	LPST
National Car Rental System Inc.	Unmapped, in proximity	LPST
Texaco Service Station	Unmapped, in proximity	LPST, UST, Financial Assurance

Source: EDR 2021a, b

The criteria for evaluating properties for inclusion in the NRHP are codified under the authority of the NHPA, as amended (36 CFR Part 60.4 [a–d]), and the Advisory Council on Historic Preservation has set forth guidelines to use in determining site eligibility. Federal regulations indicate that "[t]he term 'eligible for inclusion in the National Register' includes both properties formally determined as such by the Secretary of the Interior and all other properties that meet National Register listing criteria" (36 CFR 800.2[e]). Based on Advisory Council guidelines, any cultural resource that is included in or eligible for inclusion in the NRHP is a historic property.

As a political subdivision of the State of Texas, DFW Airport is required to comply with the Antiquities Code of Texas (ACT) passed in 1969. The ACT requires state agencies and political subdivisions to notify the THC of ground-disturbing activities on public land that have the potential to impact archeological sites. Advance project review and coordination by the THC is required only for undertakings with more than 5 acres or 5,000 cubic yards of ground disturbance. However, if the activity occurs inside a designated historic district, affects a recorded archeological site, or requires onsite investigations the project would need to be reviewed by the THC regardless of project size.

4.5.2 Existing Conditions

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 CFR. 800.16(d)) (**Figure 4-2**). For purposes of Section 106, the term "historic properties" can include architectural, archeological, or cultural resources. The cultural resources report associated with the Proposed Action is included within **Appendix C**.

4.5.2.1 Architectural and Historic-Period Resources

A file search within the Texas Historic Sites Atlas (THSA) electronic database, maintained by the THC, identified that there are no previously recorded National Register properties, historical markers, or cemeteries located within the proposed APE (THSA 2021). It was determined that ground-disturbing activities have transpired within the APE related to past land use. Prior to DFW construction in the early 1970s, the APE was primarily used for agricultural and ranching purposes as early as 1942 and presumably since the late 19th and early 20th centuries. Most of the APE has been cleared of woody vegetation at various points through the 20th century, although small portions of the APE have become overgrown with secondary tree growth.

Since 1969, significant ground disturbances have transpired throughout the APE related to broad-scale surface grading and transportation development. Aerial photographs from 1970 indicate that once DFW construction began, ground disturbances associated with large-scale grading for the terminals, runways, and International Parkway occurred within the center of DFW property and all structures in the vicinity of the APE were demolished. APE portions were further disturbed by previous taxiway improvements and recent installation of materials storage areas within the APE and on surrounding properties. Based on this background research and identified past disturbances, there is a low potential for encountering historic-age resources within the APE.

4.5.2.2 Archeological Resources

A file search within the Texas Archeological Sites Atlas (TASA) electronic database, maintained by the THC and the Texas Archeological Research Laboratory (TARL), identified that there are no previously recorded archeological sites, National Register properties, or cemeteries located within the proposed APE (TASA 2021).

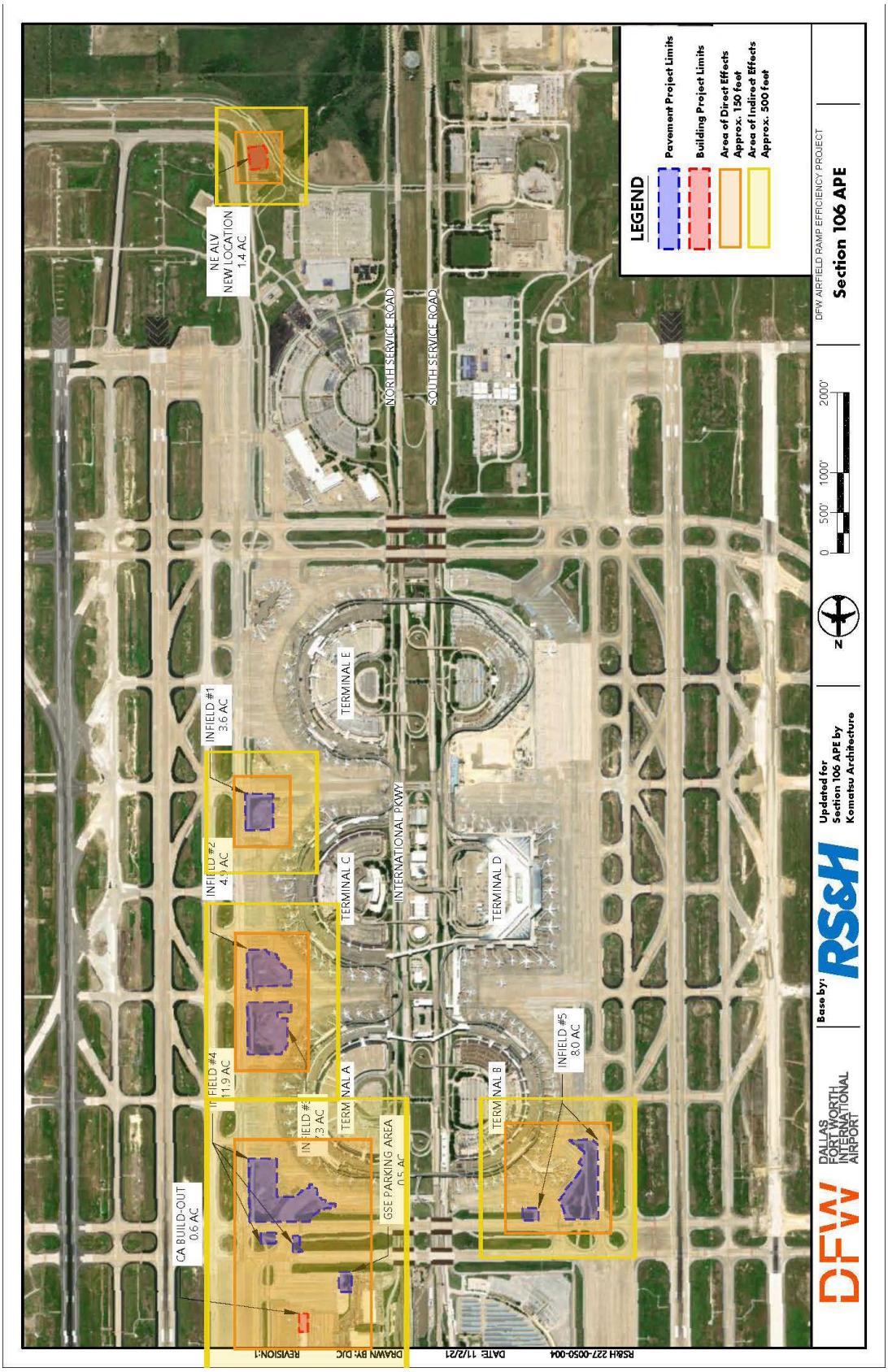

Figure 4-2. NHPA Section 106 Ramp Efficiency APE

Data presented within the Texas Department of Transportation (TxDOT) Potential Archeological Liability Map (PALM) for Dallas and Tarrant counties indicates the entire APE featured a low potential for shallow or deeply buried cultural materials within areas that have retained a reasonable contextual setting. In 2007 and 2008 AR Consultants, Inc. (ARC) conducted intensive pedestrian surveys of 1,210 acres of the airport and found that there was a low probability for containing prehistoric sites (Shelton et al. 2008:17). THC concurred with ARC's findings. Therefore, based on previous research and THC coordination, as well as current observations, the APE has a negligible potential to contain prehistoric archeological resources.

4.6 Waters Resources – Surface Water and Stormwater Treatment

4.6.1 Regulatory Background

The Federal Water Pollution Control Act, commonly known as the Clean Water Act (CWA), passed in 1972 and last amended in 2002 was enacted to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. The CWA established a federal permitting system to regulate discharges into waters of the United States (WOUS), certify the protection of water quality, implement and enforce the National Pollutant Discharge Elimination System (NPDES) program, and identify and characterize impaired water bodies that do not meet, or are not expected to meet, water quality standards. The TCEQ's 2020 Integrated Report for CWA Sections 303(d) and 305(b) characterizes the quality of Texas surface waters and identifies those waters that do not meet water quality standards on the Section 303(d) list, an inventory of impaired waters.

4.6.2 Existing Conditions

Surface water runoff on DFW flows into one of six sub-watersheds (Hackberry Creek, South Hackberry Creek, Estelle Creek, Grapevine Creek, Bear Creek, or Cottonwood Creek) or directly into two larger watersheds (West Fork Trinity River or Elm Fork Trinity River). Field surveys of WOTUS have been conducted on a large portion of DFW property. These field surveys have identified jurisdictional waters, tributaries, man-made drainage channels, ponds, and potential wetlands on various portions of DFW's property. No tributaries, wetlands, or water bodies were located in or adjacent to the proposed project area; furthermore, no tributaries or water bodies located on DFW Airport were listed on the TCEQ Section 303(d) list (TCEQ 2020).

Currently, drainage is managed for the Landside and the AOA through separate systems. Landside drainage, including some of the water that drains off the roof of the facility, is directed to stormwater collection pipes and storm drains. It then is managed as part of DFW's overall stormwater management system. On the AOA side, water is collected in a series of storm drains. This stormwater is directed to an oil/water separator before it is drained into the stormwater system.

DFW operates a stormwater pretreatment collection system and retreatment facility for stormwater associated with industrial activity. The stormwater associated with industrial activity includes first-flush stormwater discharge from the aircraft parking aprons, gates, hangars, maintenance areas, fuel farm, and parking lots. The first-flush stormwater is directed by diverter boxes to the on-site pretreatment facility. After pretreatment, stormwater is conveyed to the Trinity River Authority (TRA) Central Plant in Irving, Texas, although there is an option to discharge to Bear Creek.

DFW has constructed four, 3-million-gallon glycol detention basins as a result of aircraft de-icing activities utilizing glycol. These basins hold the SADF and allow for a gradual treatment through the reverse osmosis plant, or publicly owned treatment works (POTW) flow.

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5.0 ENVIRONMENTAL CONSEQUENCES

The potential environmental impacts resulting from the construction and operation of the reasonable alternatives and measures taken for mitigation of these effects are presented in this section. The following alternative scenarios are examined:

Alternative	Description
No Action	The NAA assumes the Proposed Project would not be implemented at the DFW Airport.
Proposed Action	The Proposed Action Alternative, the sponsor's preferred alternative, includes the project as identified in **Sections 1.4 Proposed Action, 2.0, Purpose and Need,** and **3.2 Proposed Action**. The Proposed Action would include creation or relocation of AEP along Taxiways G, K, and Z; infill of five infield areas with heavy-duty concrete apron pavement, underground utility work related to these improvements, and relocation of Taxiway JY to improve aircraft operations and optimize utility service connections at the terminals for the renewable fuels and electricity. Connected actions include the replacement and relocation of existing Northeast Airfield Lighting Vault, Terminal A South Triturator and Fueling Station, and the Corporate Aviation Building renovation.

The Proposed Action is not expected to result in a change in the number of aircraft operations or passengers when compared to the NAA.

5.1 Summary of Environmental Consequences

Potential environmental effect resulting from the construction and operation of the Proposed Action and measures taken for mitigation of these effects are presented and evaluated in this EA. A summary of evaluated environmental effects on each applicable resource category are summarized in **Table 5-1**.

Table 5-1. Summary of Environmental Consequences

Impact Area	Significance Threshold	No Action Alternative	Proposed Action Alternative	Connected Actions
Air Quality	• Pollutant concentrations to exceed one or more of the NAAQS for any of the time periods analyzed • Increase the frequency or severity of any such existing violations.	No Impact. Since there would be no construction related emissions, there would be no additional air quality effects, other than those currently produced through existing operational emissions.	Operational emissions would be expected to decrease based on an overall projected decrease in congestion and delay. Construction-related activities and equipment would cause a short-term increase in air emissions that would be below the *de minimis* threshold.	Operational emissions would not be changed due to the construction of the proposed connected actions. Construction-related activities and equipment would cause a short-term increase in air emissions that would be below the *de minimis* threshold.
Climate	• There are no significance thresholds for aviation or commercial space launch GHG emissions.	No Impact. There would be no further impacts to climate change, as no construction or other activities resulting in air emissions would occur.	Emissions of GHGs from use of construction equipment is anticipated for the Proposed Action. DFW has implemented aggressive measures to be carbon neutral and because the Proposed Action is focused improving aircraft movement efficiency in the terminal area, continued emission reductions are expected.	No impact. Emissions of GHGs are not projected to significantly increase as a result of the construction and utilization of the connected actions.
Hazardous Materials	• There are no significance thresholds for hazardous materials, solid waste, or pollution prevention.	No Impact. There are no impacts from hazardous materials are expected as no construction or other activities would occur.	No Impact. A database review revealed there are no known hazardous materials sites or sites of potential releases of hazardous substances, pollutants, or contaminants into to the environment in the project area. There are no reported landfills or related facilities at the airport. Known areas of ACM would be remediated and disposed of in accordance with all federal, state, and local regulations.	No impact. The construction and operation of the connected actions are not located in any areas with known subsurface contamination at DFW. The structures would be built with materials that meet the DFW Green Building standards, which limit the number of hazardous materials and wastes generated from construction and operational activities.

Impact Area	Significance Threshold	No Action Alternative	Proposed Action Alternative	Connected Actions
Solid Waste	• There are no significance thresholds for solid waste.	No Impact. The NAA would not generate solid waste impacts or increase the amount of waste generated beyond that expected from airport activity levels.	No Impact. Since the project is not expected to induce activity, the generation of MSW attributable to the project is not expected to be materially different from the NAA. No impacts from construction and demolition wastes are expected.	No Impact. Under the connected actions the triturator would be relocated and would be used similar to existing conditions which controls solid waste generation.
Historical Architectural, Archeological, and Cultural Resources	• There are no significance thresholds for historical, architectural, archeological, or cultural resources.	No Impact. No construction or other activities would occur that could potentially disturb cultural resources.	No Impact. Based on research, field observation, and coordination with the SHPO, no impacts to cultural resources are anticipated under the Proposed Action.	No impact. A background review revealed that the connected actions will impact APE portions that have been heavily disturbed by previous activities at DFW. As such, no cultural resources are anticipated to be affected by the connected actions.
Water Resources	• Exceed water quality standards established by Federal, state, local, and tribal regulatory agencies • Contaminate public drinking water supply such that public health may be adversely affected	No Impact. There would be no impacts on water quality, as no construction or other activities would occur.	Potential impacts to surface water quality are associated with soil erosion during the construction phase and the added volume of stormwater runoff from new impervious surfaces following project completion. These actions are being minimized through new stormwater collection systems, which are being built to incorporate the additional impervious surfaces.	Potential impacts to surface water quality are associated with soil erosion during the construction phase and the added volume of stormwater runoff from new impervious surfaces following project completion. These actions are being minimized through new stormwater collection systems, which are being built to incorporate the additional impervious surfaces.

5.2 Air Quality

5.2.1 Significance Thresholds

As identified in FAA Order 1050.1F, the threshold for significance for air quality impacts is defined as when "the action would cause pollutant concentrations to exceed one or more of the NAAQS, as established by the USEPA under the CAA, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations."

Because DFW is located in a non-attainment area for ozone and a federal action is proposed, the FAA is required under the CAA General Conformity regulation to ensure that the action conforms to the applicable SIP. Under the General Conformity rules, if the air quality assessment for the Proposed Action were to show that any of the federal *de minimis* thresholds established under the CAA were equaled or exceeded, more detailed analyses to demonstrate conformity with the SIP would be required. This more detailed analysis process is known as a General Conformity Determination. Conversely, if the analysis were to show that none of the relevant thresholds were equaled or exceeded, the Proposed Action at DFW would not require a determination and FAA does not require any further analysis under NEPA.

5.2.2 No Action Alternative

The NAA would not involve any Proposed Action related construction activities. Since there would be no construction related emissions, there would be no additional air quality effects, other than those currently produced through existing operational emissions. Aircraft operational emissions include taxi-in, taxi-out, and in-flight operations below mixing height. The NAA aircraft operational emissions are presented in **Table 5-2**.

Table 5-2. 2024 Aircraft Operational Emissions for the NAA

Year	Emissions Sources	Emissions (short tpy)					
		NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
2024	Aircraft Operations	4,131	3,836	487	400	39	39

Source: HMMH and Ramboll, 2022

5.2.3 Proposed Action Alternative

Emissions from the Proposed Action are expected to include construction emissions, including emissions from construction equipment, motor vehicles (employee commute and material delivery), and nonpoint source emissions (e.g., fugitive dust and asphalt drying), as well as operational emissions from stationary source boilers. Pollutants expected from the Project include ozone precursors and criteria air pollutants such as VOCs, CO, NO_x, $PM_{2.5}$, PM_{10}, SO_2, and hazardous air pollutants (e.g., benzene, toluene, ethylbenzene, and xylene[4]). Temporary construction emissions and operational emissions are subject to the CAA General Conformity requirements.

5.2.3.1 Construction Related Emissions

The Proposed Action construction emissions were analyzed for anticipated construction years 2022 through 2025 (**Appendix D**). The Proposed Action would result in temporary air quality effects during the demolition and construction activities. An air quality analysis was completed to determine the Proposed Action's potential emissions-related impacts. The methodology used to

[4] Per FAA guidance, in line with the FAA Air Quality Handbook, a Hazardous Air Pollutant (HAP) emissions inventory has not been developed for this Project. The FAA Air Quality Handbook lists HAP emission inventory development for "New of Modified Taxiway" projects as "medium" importance. Given that taxi time decreases are expected for the Proposed Action which decreases operational emissions, a HAP emission inventory was not developed.

prepare the DFW emissions inventories is consistent with the requirements outlined in the latest FAA Aviation Emissions and Air Quality (Version 3, Update 1) Handbook, which provides both regulatory context and technical direction for completing airport-related air quality impact assessments.

The Proposed Action would generate criteria air pollutant (CAP) emissions from heavy-duty construction equipment activity, truck haul trips, and construction worker and vendor truck trips to and from the project areas. Construction emissions include both on-road mobile and off-road source categories.

Mobile source exhaust and fugitive dust emissions would be generated from on-road vehicles and construction equipment, including but not limited to dump trucks, mixers, passenger vehicles, flatbed trucks, and tractor trailers. Fugitive VOC emissions would be generated by asphalt drying. Emissions of NO_X, CO, SO_2, VOC, PM_{10}, and $PM_{2.5}$ were evaluated. Of these, NO_X and VOC are the two primary precursors to ozone formation.

Construction equipment usage would cause a short-term increase in air emissions. The estimated construction emissions from diesel-powered on-road vehicles and off-road construction equipment were modeled using the TCEQ Texas NONROAD version 2 (TexN2.2) and USEPA Motor Vehicles Emissions Simulator, version 3 (MOVES3). The TexN2 model is used to estimate Texas-specific (at the county level) emissions from nonroad mobile sources, excluding commercial marine vessels, locomotives, drilling rigs, and aircraft. TexN2.2 uses USEPA's MOVES2014b Nonroad model. MOVES is required by the USEPA for developing nonroad emissions estimates for state implementation plan revisions, national emissions inventories, and reasonable further progress analyses. Emissions were calculated using the activity estimates for each project component combined with the most recent emission factors from the USEPA MOVES3 and USEPA AP-42 guidance.

Table 5-3 shows the estimated construction emissions of NO_X, CO, VOC, SO_2, PM_{10}, and $PM_{2.5}$ by emissions sources. Proposed Action construction activities are anticipated from March 2022 through December 2025. The Proposed Action-related construction emissions would be below the *de minimis* levels of 50 tpy for NO_X or VOC. A single concrete batch plant is considered necessary for the Proposed Action. The batch plant would be authorized as a stationary source under the TCEQ New Source Review (NSR) permitting program and are not required for evaluation under the General Conformity requirements (40 CFR 93.153 (d)(1)).

Table 5-3. Proposed Action Construction Emissions

Year	Emissions Sources	Emissions (short tpy)					
		NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
2022	On-road	2.41	1.43	0.09	0.003	0.17	0.06
	Non-road	0.75	3.43	0.13	0.001	0.06	0.06
	Fugitives			0.04		0.33	0.05
	Total	**3.16**	**4.87**	**0.26**	**0.004**	**0.56**	**0.17**
2023	On-road	16.63	11.00	0.63	0.024	1.20	0.41
	Non-road	5.08	25.12	0.91	0.009	0.42	0.41
	Fugitives			0.44		3.94	0.58
	Total	**21.71**	**36.11**	**1.97**	**0.033**	**5.56**	**1.40**
2024	On-road	9.23	7.04	0.35	0.014	0.69	0.22
	Non-road	2.46	13.03	0.45	0.008	0.32	0.19
	Fugitives			0.44		3.89	3.89
	Total	**11.69**	**20.07**	**1.24**	**0.019**	**4.78**	**0.99**
2025	On-road	1.42	2.49	0.09	0.003	0.13	0.04
	Non-road	0.34	1.91	0.06	0.001	0.03	0.02
	Fugitives					2.84	0.42
	Total	**1.76**	**4.40**	**0.37**	**0.004**	**3.00**	**0.48**

Source: HMMH and Ramboll, 2022

5.2.3.2 Operational Related Emissions

The Proposed Action would improve operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to/from the existing terminal area relative to the NAA. Specifically, the Proposed Action would improve access to and from Terminals A, B, and C. Therefore, modified taxi times resulting from the Proposed Action were only applied to operations originating and terminating at these terminals. For all other operations, the same taxi times as the NAA given were applied. In 2024, approximately 630,000 operations (1,722 average annual day operations, approximately 89 percent) are assumed to be performed through Terminals A, B, and C, based on existing conditions per radar data from DFW Noise and Operations System (NOMS) and the FAA's Operational Network (OPSNET) for 16 March 2019, to 15 March 2020.

Mobile sources associated with the DFW's day-to-day operations include landside and airside vehicles owned and operated by DFW and by third parties, such as on-site maintenance trucks, shuttle services, employee and passenger transportation, and other off-road equipment not included in GSE listed. The Proposed Action would not increase passenger throughput or the number of workers at DFW and thus would not increase mobile source emissions. Therefore, the Proposed Action would not increase operational emissions from this source category.

Stationery and area sources may include heaters/boilers, emergency generators, gasoline and diesel dispensing facilities, fuel storage tanks, cooling towers, coating and painting operations, incinerators, live-fire training facilities, solvent degreasers, and sand/salt piles. The Proposed Action would not create an increase in operational emissions from stationary source emissions.

Table 5-4 compares the 2024 aircraft operational emissions between the NAA and Proposed Action. Aircraft operational emissions include taxi-in, taxi-out, and inf-flight operations below mixing height. Overall, aircraft operational emissions would decline based on greater efficiencies which would reduce taxi times. There would be no difference between the GSE and APU emissions between the NAA and the Proposed Action, so those metrics were not included in **Table 5-4**.

Table 5-4. 2024 Aircraft Operational Emissions Comparison between the Proposed Action and NAA

Mode	Emissions (short tpy)					
	NOx	CO	VOC	SO_X	PM_{10}	$PM_{2.5}$
NAA Emissions	4,131	3,836	487	400	39	39
Proposed Action Emissions	4,125	3,806	484	399	39	39
Project-related Difference	**-7**	**-30**	**-3**	**-2**	**0**	**0**

Source: HMMH and Ramboll, 2022

5.2.4 Conformity Conclusion

Because a federal approval is required for the proposed actions, the approval must be preceded by a CAA General Conformity evaluation. The General Conformity rule begins by agency determining if the Proposed Action is on the list of actions presumed to conform (their emissions are small). The Proposed Action is not on the list of actions presumed to conform, so an applicability analysis is conducted to determine if emissions are below *de minimis* for the non-attainment/maintenance designation for the region. If above *de minimis*, a General Conformity Determination is required. If emissions are less than *de minimis*, no further analysis is needed.

To identify potential air emissions from the Proposed Action, an emissions inventory was prepared and contrasted with the *de-minimis* levels for an ozone non-attainment area; per the CAA general conformity rule, the *de minimis* for an ozone serious non-attainment area is 50 tpy each for NO_X and VOC, the precursors to ozone formation. The analysis in **Table 5-5** shows that the project-related emissions would be below the CAA defined *de-minimis* threshold, and thus the planned projects do not require a conformity determination. Using the project-related emissions, the peak project-related emissions would occur during construction. In 2023, construction emissions would generate 21.71 tpy of NO_X. Peak year of VOC emissions would occur in 2023 at 1.97 tpy. Project-related operational emissions would reduce emissions of the precursor pollutants once the project is complete. Collectively, the operational and construction emissions of each pollutant would be well below the 50 tpy *de minimis*. Because emissions from the Proposed Action are lower than the *de minimis* for the ozone non-attainment area, no further analysis is required.

Table 5-5. Project-related Construction and Operational Emissions

Year	Emissions (short tpy)					
	NOx			VOC		
	Project-related Emissions	De Minimis Threshold	Would Project-related Emissions Exceed De Minimis	Project-related Emissions	De Minimis Threshold	Would Project-related Emissions Exceed De Minimis
2022	3.16	50	No	0.26	50	No
2023	21.71	50	No	1.97	50	No
2024	11.69	50	No	1.24	50	No
2025	-5.24	50	No	-2.63	50	No

Source: HMMH and Ramboll, 2022

The FAA recognizes that the USEPA has announced a redesignation of the Dallas-Fort Worth region to severe, which when enacted, would lower the *de minimis* threshold to 25 tpy for the ozone precursor emissions. Even at the lower designation, the Proposed Action would not require a General Conformity Determination.

5.2.5 Mitigation

Construction and additional operational emissions from the Proposed Action do not exceed the General Conformity Rule applicability *de minimis* levels of 50 tpy for either NO_X or VOC (see **Table 5-5**). Thus, the Proposed Action does not exceed the significance threshold for air quality and mitigation measures for the pollutants VOC and NO_X (as precursors to ozone formation) would not be necessary.

The Proposed Action would include construction activities that would result in temporary air quality effects due to tailpipe emissions and fugitive dust. Standard applicable engineering controls and best management practices (BMP) would be implemented to reduce air quality effects. All construction activities would be conducted consistent with all pertinent federal, state, and local laws, regulations, and standards as appropriate and/or adopted by DFW. On-airport construction activities should adhere to the FAA AC 150/5370-10H Standards for Specifying Construction of Airports. Mitigation and control measures are available and would be implemented, as needed, to mitigate construction air quality impacts.

5.3 Climate

5.3.1 Significance Thresholds

According to the 1050.1F Desk Reference (February 2020), the FAA has not determined a specific set of thresholds associated with aviation or commercial space launch GHG emissions and has not determined specific factors to consider in making the significance determination for GHG emissions. The CEQ indicates in the Draft Guidance, *Consideration of the Effects of Climate Change and Greenhouse Gas Emissions* (2010), that, "*it is not currently useful for the NEPA analysis to attempt to link specific climatological changes, or the environmental impacts thereof, to the particular project or emissions, as such direct linkage is difficult to isolate and understand*."

Climate change is a global phenomenon that can have local impacts. As discussed in **Section 4.3**, scientific measurements show that Earth's climate is warming, with concurrent impacts including warmer air temperatures, increased sea level rise, increased storm activity, and an increased intensity in precipitation events. Research has shown there is a direct correlation between fuel combustion and GHG emissions.

5.3.2 No Action Alternative

Under the NAA, the existing airport facilities would remain in place and there would not be any additional construction activities and operational activities would remain consistent. Therefore, there would be no additional climate-related effects.

5.3.3 Proposed Action Alternative

Sources of emissions for the Proposed Action include emissions of GHG from construction operations including construction equipment, motor vehicles, and nonpoint sources, as well as operational emissions from stationary source boilers. These sources contribute to GHGs such as CO_2, CH_4, and N_2O, primarily due to fuel combustion. While emissions of HFCs, PFC1s, and SF_6 linked with refrigeration, air conditioning, and other coolants also occur at airports, these are at far lesser amounts (FAA, 2015) and are expected to be relatively negligible for this Project.

The Proposed Action construction emissions were analyzed for anticipated construction years 2022 through 2025 (**Appendix D**)**.** The Proposed Action would result in GHG emissions during the demolition and construction activities. A GHG emissions analysis was completed to determine the Proposed Action's potential GHG emissions-related impacts. The methodology used to prepare the DFW GHG emissions inventories is consistent with that described in **Section 5.2.3** above for air quality.

The Proposed Action would generate GHG emissions from heavy-duty construction equipment activity, truck haul trips, and construction worker and vendor truck trips to and from the project areas. Construction emissions include both on-road mobile and off-road source categories.

Mobile source exhaust emissions would be generated from on-road vehicles and construction equipment, including but not limited to dump trucks, mixers, passenger vehicles, flatbed trucks, and tractor trailers. GHG emissions of CO_2, CH_4, and N_2O were evaluated.

The estimated construction GHG emissions from diesel-powered on-road vehicles and off-road construction equipment were modeled using the MOVES3. Emissions were calculated using the activity estimates for each project component combined with the most recent emission factors from the USEPA MOVES3.

Table 5-6 shows the annual GHG emissions summary in metric tons per year, **Appendix D**.

Table 5-6. Proposed Action Construction GHG Emissions

Year	Emissions Sources	Emissions (metric tpy)			
		CH_4	N_2O	CO_2	CO_{2e} [5]
2022	On-road	0.01	0.002	937	939
	Non-road	0.01	0.021	442	449
	Total	**0.03**	**0.023**	**1,379**	**1,388**
2023	On-road	0.10	0.014	6,800	6,812
	Non-road	0.09	0.157	3,283	3,333
	Total	**0.19**	**0.170**	**10,083**	**10,146**
2024	On-road	0.06	0.009	3,963	3,970
	Non-road	0.05	0.082	1,724	1,751
	Total	**0.11**	**0.091**	**5,687**	**5,721**
2025	On-road	0.01	0.003	781	783
	Non-road	0.01	0.012	256	260
	Total	**0.02**	**0.015**	**1,037**	**1,043**

Source: HMMH and Ramboll, 2022

5.3.4 Mitigation

An estimate of project construction greenhouse gas emissions is provided for informational purposes only; FAA has not identified specific factors to consider in making a significance determination for GHG emissions. There are currently no accepted methods for determining significance applicable to aviation or commercial space launch projects given the small amount of emissions they contribute. Therefore, no mitigation measures are. As noted in **Chapter 4**, DFW has implemented aggressive measures to be carbon neutral and because the Proposed Action is focused improving aircraft movement efficiency in the terminal area, continued emission reductions are expected.

5.4 Hazardous Materials, Solid Waste, and Pollution Prevention

5.4.1 Significance Thresholds

According to the FAA Order 1050.1F (July 2015), the FAA has not established a significance threshold for hazardous materials, solid waste, or pollution prevention. Order 1050.1F provides additional factors to consider, such as would the action have the potential to violate applicable federal, state, tribal, or local laws or regulations regarding hazardous materials or solid waste management.

[5] CO_{2e} emissions were estimated based on 20-year global warming potential (GWP) estimates for CH_4 (82.5) and N_2O (273) from the IPCC Sixth Assessment Report, conservatively, as 20-year GWPs would result in higher CO_{2e} estimates compared to 100-year GWP estimates.

5.4.2 No Action Alternative

Under the NAA, there would be no project-related demolition or construction activities; thereby, resulting in no project-related impacts from hazardous materials or solid wastes. The existing conditions, which fully comply with DFW policies on hazardous materials and solid wastes generated would remain in place.

5.4.3 Proposed Action Alternative

5.4.3.1 Hazardous Materials

Construction activities associated with the Proposed Action are expected to include the short-term use of hazardous and non-hazardous materials and generate wastes common to construction including reclaimed concrete, concrete wash-out liquids, petroleum hydrocarbon-based fuels, lubricants, oils, paints, and cleaning solvents. These materials would be handled and stored in accordance with all applicable federal, state, or local regulations. DFW would comply with all federal, state, and local requirements with regard to generation, handling, and disposing of any waste produced during construction. As part of the DFW construction permitting process, DFW would require all contractors to submit detailed waste management reports and abide by those plans along with all applicable regulatory requirements. DFW maintains a Contaminated Media Management Plan (CMMP) that provides information and guidance on potential environmental concerns that may be encountered during the disturbance, excavation, and relocation of soils. All activities that involve disturbing or excavating soils would be performed in accordance with the CMMP and other applicable requirements.

DFW staff or contractors have found ACMs in the generator room, including the pipe insulation mastic and elbows, and thermal body insulation and wrap in the Northeast Lighting Vault. A comprehensive asbestos assessment has informed the process of abating any ACMs within the project area; abatement actions would be handled by HP EnviroVision in compliance with all applicable federal and state regulations. In additional areas where ACMs are uncovered, no work would be permitted until the materials in question have been abated or are found to be non-asbestos containing.

5.4.3.2 Solid Waste

Solid waste would be generated from construction and demolition debris associated with the Proposed Action. The Proposed Action would neither generate an unmanageable volume of solid waste nor affect DFW's existing solid waste management program. This solid waste would be disposed of in compliance with all applicable regulations. Waste management and disposal facilities are available in the Dallas Fort Worth area to accommodate the proper disposal of solid waste. There are several active, permitted landfills near DFW. Recycling of materials from demolition activities would be utilized to the extent possible.

5.4.3.3 Pollution Prevention

A Spill Prevention, Control, and Countermeasures (SPCC) Plan would be developed to document the measures that would be taken to prevent accidental release of any hazardous or regulated substances to the environment. In the event of a release, the SPCC would also include the corrective actions that would be deployed to minimize the environmental impact. Furthermore, appropriate materials management measures would be followed to prevent pollution and to minimize the use and manage disposal of hazardous and non-hazardous substances. With these measures, no significant impacts related to hazardous materials would occur because of the Proposed Action.

5.4.4 Mitigation

No significant impacts related to hazardous materials or solid waste would occur as a result of the Proposed Action due to DFW's robust hazardous material, hazardous wastes, and soldi wastes policies, which would be in place for the project-related activities, as such, the Proposed Action would not have the potential to 1) violate applicable laws and regulations; (2) the Proposed Action does not involve a site listed on the NPL; (3) the Proposed Action does not produce an appreciably different quantity or type of hazardous waste; (4) generate an appreciably different quantity or type of solid waste or use a different method of collection or disposal and/or would not exceed local capacity; or (5) adversely affect human health and the environment.

DFW would comply with all federal, state, and local requirements with regard to generation, handling, and disposing of any waste produced during the construction of the proposed project. As part DFW's construction permitting process, DFW would require all contractors to submit detailed soil management and waste management plans and abide by those plans along with all applicable regulatory requirements. The contractor would develop a waste management plan and any contaminated media encountered during the construction of Proposed Action would be handled in accordance with the CMMP. All activities that involve disturbing or excavating soils would be performed in accordance with all federal, state, and local regulations.

All asbestos abatement activities would be monitored by an Asbestos Inspector licensed by the DSHS to aid identification methods and procedures. The construction contractor would take appropriate measures to prevent, minimize, and control spills and release of hazardous materials in the construction staging yards and throughout the project area. Special provisions and contingency language would be included in the project's construction plans and specifications to manage hazardous materials and/or petroleum contaminated media according to applicable federal, state, and local regulations.

The Proposed Action would not have a significant impact on solid waste collection, landfill capacity, and waste disposal operations; therefore, mitigation is not required.

5.5 Historical, Architectural, Archeological, and Cultural Resources

5.5.1 Significance Thresholds

According to the FAA Order 1050.1F (July 2015), the FAA has not established a significance threshold for historical, architectural, archeological, and cultural resources. The FAA Order does note that a factor to be considered is whether the Proposed Action would result in an Adverse Effects finding through the NHPA Section 106 process.

5.5.2 No Action Alternative

Under the NAA, no impacts would occur to cultural resources because no construction or other activities would occur to potentially disturb cultural resources.

5.5.3 Proposed Action Alternative

For this analysis, the APE for the project encompassed approximately 69 acres across 14 tracts, containing all project sites within the urbanized eastside of DFW. Ground disturbances associated with the Proposed Action would vary across the 14 tracts, but would include general land clearing, grading, and erosion control. Depths of impacts associated with the proposed project would generally be within a few feet of the current ground surface.

A NHPA Section 106 Consultation for Historic Properties was completed for the Proposed Action (**Appendix C**). Based on the results of this analysis and previous investigations, the proposed project area has been exposed to previous ground disturbance and contains a low potential for containing either prehistoric or historic-age cultural resources. A Section 106 analysis was

conducted of the project area's APE (*see* **Figure 4-2**). The analysis concluded that there was no adverse effect from the project. The SHPO concurred on April 20, 2022 with the findings of the report which cited that no historic properties were present or affected by the project.

5.5.4 Mitigation

No mitigation measures are proposed for historic or archeological resources. If any cultural resources are unearthed during construction, DFW would require that the operators should immediately stop construction activities in that area. The project environmental consultant should then be contacted to initiate further consultation with THC prior to resuming construction activities.

5.6 Waters Resources – Surface and Stormwater Treatment

Consistent with FAA guidelines from the FAA Order 1050.1F (July 2015) and FAA Order 1050.1F Desk Reference (February 2020), this assessment was conducted with the primary aim of identifying the principal sources of water pollution and/or consumption connected with the construction and operation of the Proposed Projects (FAA, 1985).

5.6.1 Significance Thresholds

The FAA's significance threshold for surface water is presented in the following statement:

A significant impact exists if the action would: exceed water quality standards established by Federal, state, local, and tribal regulatory agencies; or contaminate public drinking water supply such that public health may be adversely affected. In addition to the threshold above, Exhibit 4-1 of FAA Order 1050.1F provides additional factors to consider when evaluating the context and intensity of potential environmental impacts for surface waters. Please note that these factors are not intended to be thresholds. If these factors exist, there is not necessarily a significant impact; rather, the FAA must evaluate these factors in light of context and intensity to determine if there are significant impacts. Factors to consider that may be applicable to surface waters include, but are not limited to, situations in which the proposed action or alternative(s) would have the potential to: adversely affect natural and beneficial water resource values to a degree that substantially diminishes or destroys such values; adversely affect surface waters such that the beneficial uses and values of such waters are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or present difficulties based on water quality impacts when obtaining a permit or authorization.

5.6.2 No Action Alternative

Under the NAA, there would be no project-related impacts on water quality, as no project-related construction activities would occur. As a result, the quantity and quality of stormwater runoff, impacts to groundwater, and production of wastewater would remain largely unaffected. Therefore, there would be no impacts to stormwater treatment, as no construction or other activities would occur.

5.6.3 Proposed Action Alternative

The greatest potential impacts to surface water quality connected to the Proposed Action are associated with soil erosion, materials staging, and batch plant operations during the construction phase. Short-term impacts to surface waters can result from construction activities creating increases in sedimentation and turbidity levels downstream. These construction activities may include pavement demolition, grading, and excavation of subsurface utilities.

The proposed project areas are primarily located within existing impervious area associated with the runways and paved AOA surfaces. Since most of the project areas are adjacent to existing buildings, impervious surface, and highly maintained mixed herbaceous cover, the construction of the Proposed Action would not be expected to result in a material change in the stormwater

runoff rates, discharge volumes, and pollutant characteristics of the stormwater runoff. DFW's existing stormwater treatment facilities (the first flush stormwater pre-treatment system) would be able to accommodate the stormwater runoff quantities.

The DFW Floodplain Manager reviewed all design plans and determined that effects from the Proposed Action would result in only minimal increases in stormwater discharge, which would not adversely affect the existing velocities contributed to Tributary TA of Big Bear Creek at Outfalls 23 and 73, nor create adverse conditions within the existing conveyance piping system, nor increase the 100-year floodplain inundation.

5.6.3.1 Anticipated Construction Effects

Temporary impacts to surface water quality, though unlikely, could result from erosion and siltation generated from site disturbance activities. Water quality impacts would be minimized to the fullest extent possible through the development and implementation of a Storm Water Pollution Prevention Plan (SW3P), BMP, and structural controls, in compliance with the CWA Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit (CGP) requirements as well as any other federal, state, and local requirements. Therefore, no significant adverse impacts would occur relative to surface waters.

5.6.3.2 Anticipated Operational Effects

The drainage system for the Proposed Action would be connected to the existing first-flush stormwater treatment system prior to discharging to the stormwater sewer system. The Proposed Action would comply with the guidelines and recommendations contained in the FAA AC 150/5320-5D Surface Drainage Design. Maintenance activities would include controls to clean pavement surface from any leaked fluids to reduce contamination of stormwater. The Proposed Action would have no impacts to water quality, wetlands and/or waters of the United States because the Proposed Action would take place on existing DFW interior imperious surfaces and developed areas and would use the existing stormwater management system that was designed to accommodate these activities.

5.6.4 Mitigation

At DFW, construction-related surface water quality impacts from stormwater runoff are minimized by BMPs as required by DFW's Design Criteria Manual Revision 2 with Updates through 2022 (DFW 2022). These BMPs are designed to minimize soil erosion and the transport of debris and sediment in stormwater runoff. Implemented BMPs include silts fences, rock check dams, settling ponds, and good general housekeeping practices. In addition, all stormwater discharges from construction activities at DFW that result in the disturbance of 1 or more acres must comply with the TPDES permit conditions already established for DFW. A CGP SW3P, and all associated requirements would be implemented for the Proposed Action. Because of these water resource management policies and programs that are already in place at DFW, impacts to surface waters associated with the Proposed Action would not be expected to be significant; therefore, no mitigation would be required.

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6.0 CUMULATIVE IMPACTS

According to the CEQ, a cumulative impact is "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. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period time" (40 CFR §1508.7).

6.1 Past, Present, and Reasonably Foreseeable Future Actions

Past, present, and reasonably foreseeable future actions must be considered in determining whether there are potential cumulative impacts. Past actions are actions that occurred in the past and may warrant consideration in determining the environmental impacts of an action. Present actions are any other actions that are occurring in the same general time frame as the proposal. Reasonably foreseeable future actions are those that may affect projected impacts of a proposal and are not remote or speculative. **Table 6-1** identifies recent past, present, and reasonably foreseeable future actions within the vicinity of DFW.

Table 6-1. Past, Present, and Reasonably Foreseeable Future Actions

Project	Description	Status	Agency
Cotton Belt Line	New transit rail line	Under Construction	Dallas Area Rapid Transit (DART)
American Airlines (AA) Campus Master Plan	Demolition and construction of several AA owned buildings located on DFW property	Under Construction	DFW
ARFF Station Consolidation East and West Locations	Consolidation of four existing ARFF stations into two new stations and associated roadway improvements	In Planning	DFW
Southwest (SW) Consolidated Campus	Design:Build strategic, world- class operations and infrastructure development consolidated campus. The Southwest Consolidated Campus will be designed to enhance operational readiness through use of the latest technology enterprises (hardware and software)	Underway	DFW
Department of Public Safety (DPS) Firing Range	Construction of modular building at DPS 4 for indoor shooting	Complete	DFW
DPS K9 Outdoor Dogs Runs	Extension of K9 outdoor dog runs and construction of canopies and sidewalks	Complete	DFW
SW End-Around Taxiway (EAT)	Programming and Design services for the SW EAT	Finalizing for Construction	DFW
19th Street Cargo Redevelopment	Development of two cargo facilities and associated taxiway infrastructure and aircraft parking spaces.	In planning	DFW

Project	Description	Status	Agency
International Parkway	The project includes the reconstruction of the International Parkway roadway, north and south airfield drive bridges, and upgrades and modifications to the High Mast Lighting System.	Finalizing for Construction	DFW
Electric Central Utility Plan (eCUP) and Associated Utility Delivery Systems	The proposed project would include construction and operation of an Electric CUP along with rehabilitation, expansion, and upgrade of the main utility services distribution network.	In planning	DFW
Weber Gruene	The proposed project will consist of three industrial logistics buildings for the use of warehouse, distribution, office, logistics, and other uses	Underway	DFW
Project Integration Office (PIO)	The project is a part of the holistic design-build contract and includes the design, construction, and delivery of a PIO building.	Underway	DFW
Bear Creek Business Park	The proposed project is located on the southwest corner of the Airport and is proposed to be a business park with industrial and mixed. use/retail buildings	In planning	DFW
Walnut Hill	The project consists of an industrial building and associated loading docks and utilities	In Planning	DFW
Passport 125	The project would include the construction of a concrete tilt wall industrial building, loading docks, and requisite utilities	Finalizing for Construction	DFW
Commerce Center	The project will include the construction of one warehouse/distribution building. The building will have loading docks with cross-dock configuration (loading on both sides) and trailer parking	Complete	DFW
Commerce Center 2 and 3	The Project consists of concrete tilt wall industrial buildings developed in two main phases	Under Construction	DFW
Commerce Center 4	The proposed project consists of one concrete tilt-wall industrial distribution building	In Planning	DFW
Soil Slope Remediation	This project is to remediate each of the soil slope failures and bridge wing wall wash outs	Underway	DFW

Project	Description	Status	Agency
Northeast (NE) EAT	The NE EAT project site is in the NE quadrant, north of the thresholds of Runways 17R and 17C. The NE EAT will enable arriving aircraft on Runway 35C to exit the runway and taxi around Runways 17R and 17C using the EAT and enter the CTA on Taxiway J, without crossing an active runway. The NE EAT would also enable aircraft arriving on Runway 35R and 31R to use the same taxiing movements once exiting Taxiway Q.	Complete	DFW
Runway 17L/35R Storm Drainpipe	The project is comprised of rehabilitation and replacement of storm drainpipes on Runway 17L/35R and all associated connecting taxiways within the runway environment	Underway	DFW
Pavement Remediation	This project will conduct needed pavement repairs across the AOA. These repairs include joint seal, crack repair, spall repair, and select panel replacement.	Finalizing for Construction	DFW
Taxiway F Rehabilitation	The Taxiway F Rehabilitation includes demolition and reconstruction of asphalt shoulders along the full length of Taxiway F, removal and replacement of concrete panels on Taxiway F, concrete widening at the intersections of Taxiway F, and upgrades to taxiway lighting system.	Complete	DFW
East-West Connector from SH 360 to Rental Car Drive	Construction of east-west connector with up to 4 lanes, divided	Finalizing for Construction	DFW
Northbound Access Road	Access road to bypass revenue plaza	Complete	DFW
Northwest (NW) Logistics	Car dealerships north of Mustang Drive and the addition of three warehouses and canopies to Group One Audi	Complete	DFW
Passport Park East	Passport Park is a proposed mixed-use development capable of accommodating multiple big box retail anchors, junior anchors, and supporting specialty retail shops and restaurants. It will be located within the southeast (SE) quadrant of DFW Airport	Underway	DFW

Project	Description	Status	Agency
Passport Park West	Passport Park West will be developed as a single phase modern industrial park. The proposed project will include 7 buildings totaling over 2.7 million square feet which consist of 4 cross-dock distribution centers and 3 rear-load warehouses	Upcoming	DFW
Project Blue Sky – AA Headquarters	Demolition of old Sabre facility and construction of new AA headquarters	Complete	DFW
Runway 17R/35L Rehabilitation	Rehabilitation of runway 17R-35L and associated infrastructure	In Planning	DFW
Runway 18R/36L Rehabilitation	Rehabilitation of Runway 18R/36L and associated infrastructure	Complete	DFW
Employee Lot 5E	This proposed project is for reconstruction of Employee Parking Lot 5E due to significantly deteriorating pavement conditions	In Planning	DFW
Terminal C – High C Gates Demolition and Rebuild	Demolition and Rebuild of Terminal C Gates 33, 35-37, and 39	Complete	DFW
Terminal F Ramp	Expand Terminal F Ramp for Hardstand; install infrastructure for hydrants/deicing	Complete	DFW
Taxiway Y Bridge	Upgrading for Type VI aircraft	Complete	DFW
Other Transportation Related Projects			
Texas State Highway (SH) 121	Reconstruct Interstate Highway (IH) Loop 635 and Farm-to-Market Road (FM) 2499 interchanges	Complete	TxDOT
SH 161	Widen and reconstruct 4 to 8 general purpose lanes	Under Development	TxDOT
SH 183	Reconstruct 6 general purpose lanes; construct 0 to 2 concurrent High-Occupancy Vehicle (HOV)/managed lanes	Construction Scheduled	TxDOT
SH 114	Construction of up to 2 lane frontage road and ramp modifications, long term reconstruction of the remaining components of DFW Connector	Construction Scheduled	TxDOT
IH 635	Construction of up to 2 lane frontage road and ramp	Complete	TxDOT
Texrail Corridor Rail Line	Construction of new commuter rail line	Under Construction	North Central Texas Council of Governments (NCTCOG)

Project	Description	Status	Agency
Trinity Rail Express DFW Airport Services	New transit rail connection, DFW intermodal connection to Cotton Belt	Complete	Federal Transit Administration (FTA)
Office/Warehouse Projects Near DFW			
Irving IT Park Phase II	Multi-tenant office development south of SH 161	Under Construction	Private Development
Avion Business Park	Multi-tenant office development located northeast of SH 114	Under Construction	Private Development
Logistics Center 12	Multi-tenant flex warehouse office space located south of SH 161	Under Construction	Private Development
Hotel Project Near DFW			
Hyatt Hotel Extended Stay at DFW	Extended stay hotel north of South Airfield Drive and east of the North Service Road. Will have 125 rooms.	Announced	DFW Hyatt Complex
Lifestyle Hotel Campus	Hotel campus located northeast of SH 114 with 325 rooms	Under Construction	Private Development
Residential Housing Project Near DFW			
Elan Grapevine	Multi-family development west of Bear Creek, east of U.S. Highway (US) 360, with 324 units	Under Construction	Private Development
The Reserve at Bear Creek	Townhome development west of Bear Creek and east of US 360 with 71 units	Under Construction	Private Development
Sahyog Lifestyle Living	Single family residential development with 31 units north of SH 161	Under Construction	Private Development

6.2 Impact Areas

6.2.1 Air Quality

Other proposed airport development actions at DFW may produce air emissions from increased operations and/or construction activities. The timing of each project is dependent on several factors including, customer and airline demands, industry trends, and availability of funding. Definitive schedules of projects that would occur during the Proposed Action project-related construction schedule were not available at the time of this environmental review. The uncertainty related to the implementation schedules of future airport development projects, in conjunction with the Proposed Action, precludes meaningful quantification of potential cumulative impacts to air quality. However, for past projects within the boundaries of DFW, an air quality construction emissions inventory was completed under the NEPA process. Each project where construction emissions have been inventoried, emissions have been below *de minimis* levels. In addition, when future airport projects are ripe for construction, an air quality construction emissions inventory will be completed. The direct and cumulative impacts of these projects will be quantified and evaluated in the NEPA documentation submitted for FAA review.

6.2.2 Climate

Since aviation activity at DFW represents such a small number of United States and global emissions, and due to the related uncertainties involving the assessment of such emissions regionally and globally, the incremental contribution of the Proposed Action cannot be adequately assessed given the current state of the science and assessment methodology.

6.2.3 Hazardous Materials

Through a preliminary review, several of the proposed DFW development actions could involve work in or near areas having known soil contamination or facilities and infrastructure with ACM. This would be subject to Texas Voluntary Clean-up Program (TXVCP) involving buildings or locations at which potentially hazardous materials are used or stored. Other proposed area development actions may also involve sites with soil contamination and locations at which potentially hazardous materials are used or stored. The project sponsors would comply with federal, state, and local regulations governing hazardous materials and wastes.

The other proposed DFW, outside transportation, and private development would generate additional MSW and construction wastes. Growth in the DFW Metroplex has resulted in increased demand for services including solid waste collection and disposal services. Implementation of the other projects, particularly the land development projects, would result in further increased demand for solid waste handling/disposal facilities. Solid waste disposal services would be the responsibility of the local municipalities. There are several active, permitted landfills in the DFW area and there is no substantial collective capacity issues indicating that cumulative solid waste disposal would be of concern. The projects are not expected to have substantial impacts to any active, permitted landfill in the DFW area.

In summary, the limited hazardous material, pollution, and solid waste impacts of the Proposed Action, when considered in addition to similar impacts of other on- or off-airport projects would not be expected to lead to additional substantial impact in these areas.

6.2.4 Solid Waste

Since the Proposed Action is not expected to induce activity, the generation of MSW attributable to the Proposed Action is not expected to be materially different from the NAA. Given no expected increase in the MSW generation, no substantial cumulative impacts are expected. Other proposed future airport projects and nearby developments would generate additional MSW. Growth of the DFW Metroplex has resulted in the increased demand for various services including solid waste collection and disposal services. The implementation of other land development projects would result in further demand for solid waste handling and disposal services. Solid waste and disposal services and facilities would be the responsibility of local municipalities. There are several active, permitted landfills near DFW, and there is no substantive capacity issues indicating that solid waste handling and disposal would be of concern. The Proposed Action, and other area development projects would not be expected to have any cumulative impacts on active, permitted landfills within the DFW area.

6.2.5 Historical, Architectural, Archeological, and Cultural Resources

There are no recorded historic sites or NRHP eligible historical resources within the areas associated with the proposed other airport development actions. Several recorded archeological sites area located on or near the airport. However, the sites are not considered eligible for inclusion on the NRHP and the proposed airport development projects appear to have little potential to affect recorded or unrecorded sites.

It is possible that the other area development actions could directly or indirectly impact historical or archeological resources. Federal and state funded projects with potential for substantial

impacts to archeological or historic resources would coordinate the potential impacts with the SHPO, document the project's impacts in the environmental documentation, and include mitigation measures if warranted.

The Proposed Action would not be expected to generate impacts to historic, architectural, archeological or cultural resources. Therefore, the Proposed Action, when considered in addition to potential impacts of other on- or off-airport projects would not be expected to lead to additional substantial historic, architectural, archeological, or cultural resources impacted.

6.2.6 Water Resources - Surface Waters and Stormwater Treatment

Other proposed airport development actions could have the potential to exceed applicable water quality standards. Similar to the Proposed Action, the development actions would have construction-related impacts and several projects would result in additional stormwater run-off. It is assumed that similar design, controls, and BMPs would be implemented on projects at DFW to minimize water quality impacts. Implementation of other area development actions could also result in temporary and permanent impacts from land clearing, construction, and operations of the facilities. It is expected that major development actions would also include measures and practices to minimize impacts and not exceed water quality standards.

The limited water quality impacts of the Proposed Action, when considered in addition to similar impacts of other on- and off-airport projects would not be expected to lead to additional substantial water quality impacts.

6.3 Secondary and Induced Impacts

The Proposed Action and Connected Actions would not result in any substantial secondary (induced) impacts in terms of shifts in population movement and growth or changes in public service demands. Direct, indirect, and induced changes in business and economic activity from the proposed project would include a temporary increase in employment, output, and income associated with construction. The temporary increase in construction jobs would be expected to be filled by local workers. If needed, temporary non-local workers would be easily accommodated in the DFW Metroplex area. These impacts would support the anticipated long-term economic growth of the regional economy. The ability of DFW to continue to accommodate the efficient movement of passengers and cargo supports local economic development goals. Overall, the Proposed Action and Connected Actions would not result in significant secondary (induced) impacts.

No specific thresholds for significance for secondary (induced) impacts have been established in FAA Order 1050.1F, Exhibit 4-1, Significance Determination for FAA Actions. However, the proposed project would not include shifts in patterns of population movement or growth; public service demands; or changes in business and economic activity. Since the proposed project would not involve substantial induced or secondary impacts on surrounding communities, as described above, a significant impact threshold would not be exceeded.

The limited secondary (induced) impacts of the Proposed Action, when considered in addition to similar impacts of other on- or off-airport projects, are not expected to lead to substantial cumulative secondary impacts.

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7.0 AGENCY COORDINATION

The development of this EA included coordination with affected Federal and State agencies. This coordination process informs the public and agencies and allows an opportunity to identify any possible environmental concerns during the EA process.

7.1 Agency Coordination

DFW consulted with FAA, TCEQ, USEPA, and the THC during the development of the EA.

Agency coordination with TCEQ and USEPA, consisted of scoping letters submitted to various divisions within the USEPA and TCEQ on 14 February 2022 (**Appendix E**). TCEQ provided comments on 01 March 2022, indicating that there would be no significant long-term effects so long as BMP were in place for construction and waste disposal activities. TCEQ requested an analysis of potential air quality effects, which were performed for this EA and found to be below the *de minimis* thresholds. No comments were received from USEPA.

The THC was provided information through a cultural resources assessment associated with the Ramp Efficiency Improvements project site in late March 2022. THC provided concurrence on 20 April 2022 that no adverse effects to historic resources would result from the proposed project activities.

7.2 Public Involvement

Because the Proposed Action is not controversial, no significant adverse impacts were identified, and no special purpose laws were triggered that require public participation it was determined that public participation was not necessary.

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8.0 PREPARERS

As required by FAA Order 5050.4A, paragraph 77, the names and qualifications of the principal persons contributing information to this PEA are identified. It should be noted, in accordance with Section 1502.6 of the CEQ regulations, the efforts of an interdisciplinary team, consisting of technicians and experts in various fields were required to accomplish this study. Specialists involved in this EA included those in such fields as airport planning; noise assessment and abatement; land use planning; air quality; biology; historic, architectural, and archaeological resources; and other disciplines. It should also be noted, while an interdisciplinary approach has been used, all decisions made regarding the content and scope of this EA are those of DFW Airport.

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9.0 REFERENCES

Federal Aviation Administration (FAA). 2020. 1050.1F Desk Reference. February 2020. Retrieved 19 October 2021, from https://www.faa.gov/about/office_org/headquarters_offices/apl/environ_policy_guidance/policy/faa_nepa_order/desk_ref/media/desk-ref.pdf

FAA. 2018. Aviation Climate Change Research Initiative (ACCRI). March 2018. Retrieved 19 October 2021, from https://www.faa.gov/about/office_org/headquarters_offices/apl/research/science_integrated_modeling/accri/

FAA. 2015. Aviation Emissions and Air Quality Handbook Version 3 Update 1. January 2015. Retrieved 19 October 2021 from https://www.faa.gov/regulations_policies/policy_guidance/envir_policy/airquality_handbook/media/Air_Quality_Handbook_Appendices.pdf

Texas Commission on Environmental Quality (TCEQ). 2021a. 2021 Regional Haze SIP Revision. August 2021. Retrieved 19 October 2021, from https://www.tceq.texas.gov/airquality/sip/bart/haze_sip.html

TCEQ. 2021b. 2021 Regional Haze State Implementation Plan Revision for the Second Planning Period. June 2021. Retrieved 19 October 2021, from https://www.tceq.texas.gov/assets/public/implementation/air/sip/haze/2021RHSIP_ado.pdf

United States Environmental Protection Agency (USEPA). 2021a. Air Quality Design Values. 2020 Design Value Reports. July 2021.Retrieved 19 October 2021, from https://www.epa.gov/air-trends/air-quality-design-values#report

USEPA. 2021b. Air Quality Design Values. July 2021. Retrieved 08 November 2021, from https://www.epa.gov/air-trends/air-quality-design-values

USEPA. 2021c. EPA NAAQS Table. February 2021. Retrieved 19 October 2021, from https://www.epa.gov/criteria-air-pollutants/naaqs-table.

USEPA. 2021d. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019. Retrieved 10 November 2021, from https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2019

USEPA. 2015a. Green Book. 8-Hour Ozone (2015) Designated Area Design Values. September 2021. Retrieved 19 October 2021, from https://www3.epa.gov/airquality/greenbook/jdtc.html

USEPA. 2015b. US EPA Nonattainment Areas and Designations. July 2015. Retrieved 08 November 2021, from https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7B6D412E16-523A-4466-AE04-09EAEF7C16F3%7D

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APPENDICES

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APPENDIX A – PROTECTED SPECIES HABITAT ASSESSMENTS

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30 September 2021

Ms. Sandy Lancaster
Dallas Fort Worth International Airport
3003 South Service Road, Annex Building A
DFW Airport, Texas 75261-9428

Re: CTA Development Project Dallas County - Protected Species Habitat Assessment
Sites 7 through 10 of the 13 total locations for the CTA Terminals A and C Development Project located within the Dallas Fort Worth International Airport, Dallas County

Dear Ms. Lancaster,

Integrated Environmental Solutions, LLC (IES) performed a protected species habitat assessment on the CTA Terminals A and C Development Project associated with Sites 7 through 10 of the 13 total locations within the Dallas Fort Worth International Airport, Dallas County (**Attachment A, Figure 1**). This habitat assessment was performed to satisfy the requirements regarding the Endangered Species Act (ESA). The following report is a list of the federal and state-listed protected species for Dallas County and their preferred vegetation assemblages, a summary of the vegetation communities identified on the site, an evaluation of whether the communities present on the site could support a protected species, and whether or not future proposed actions would affect listed species.

INTRODUCTION

Protected Species

Federal

The ESA of 1973 (Public Law [P.L.] 93-205) and the amendments of 1988 (P.L. 100-578) were enacted to provide a program of preservation for endangered and threatened species and to provide protection for ecosystems upon which these species depend for their survival. The ESA requires all federal agencies to implement protection programs for designated species and to use their authorities to further the purposes of the Act. Responsibility for the listing of an endangered or threatened species and for the development of recovery plans lies with the Secretary of Interior and Secretary of Commerce. The U.S. Fish and Wildlife Service (USFWS) is responsible for implementing the ESA within the United States.

An endangered species is a species, which is in danger of extinction throughout all or a significant portion of its range. A threatened species is a species likely to become endangered within the near future throughout all or a significant portion of its range. Proposed species are those, which have been formally submitted to Congress for official listing as endangered or threatened.

In addition, the USFWS has identified species, which are candidates for possible addition to the list of Endangered and Threatened Wildlife and Plants (50 Code of Federal Regulations [CFR] 17.11 and 17.12) under the ESA. The USFWS maintains a candidate list to: (1) provide advance knowledge of potential listings that could affect land planning decisions, (2) solicit input to identify candidates not requiring protection or additional species that may require protection under the ESA, and (3) solicit information needed to prioritize the order in which species will be proposed for listing. Candidate species have no legal protection under the ESA.

The Migratory Bird Treaty Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit issued in accordance with the Act's policies and regulations. However, in a recent decision the U.S. Court of Appeals for the Fifth Circuit found that for an unlawful "taking" to occur, a "deliberate act done directly and intentionally to migratory birds" would need to occur. (United States v. CITGO Petroleum Corp., No. 14-40128 [5th Cir. Sept. 4, 2015]).

State

The Texas Parks and Wildlife Department (TPWD) Wildlife Diversity Program (WDP) maintains computerized records of state-listed threatened and endangered species by county. The State of Texas does not list threatened and endangered species using the same criteria as the federal government. When the USFWS lists a plant species, the State of Texas then lists that plant. Thus, the list of threatened and endangered plants in Texas is the same as the Federal list. The state has separate laws governing the listing of animal species as threatened or endangered. Threatened and endangered animal species in Texas are those species so designated according to Chapters 67 and 68 of the Texas Parks and Wildlife Code and Section 65.171 - 65.184 of Title 31 of the Texas Administrative Code. Species that are not currently listed by the Federal government may be listed as threatened or endangered by the TPWD.

METHODOLOGY

Prior to conducting fieldwork, the list of Endangered and Threatened Wildlife and Plants under the ESA was obtained through the USFWS Information, Planning, and Conservation System (IPaC) and from the TPWD WDP and the Texas Natural Diversity Database (TXNDD). The vegetation communities used by each species was obtained and is detailed below. During the field survey, vegetation composition within and adjacent to the project site were noted to determine whether there was any potential for protected species habitat. This survey was not designed to identify the presence of protected species; however, if any species were observed, they were recorded. Photographs were taken at representative points, illustrating common vegetation communities within the survey area (**Attachment B**).

RESULTS

Literature Review

According to the USFWS, four species, Golden-cheeked Warbler (*Dendroica chrysoparia*), Piping Plover (*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), and Whooping Crane (*Grus americana*) are listed as federally protected (i.e., threatened or endangered) with the potential to occur within Dallas County. Two of these species are conditionally listed as threatened within Dallas County on the basis that the proposed project is for wind energy production, Red Knot and Piping Plover. No federally listed critical habitat for these species is located within the vicinity of the survey area. The TPWD lists 14 state protected species that could occur within Dallas County. Five are also federally listed avian species; however, the Black Rail (*Laterallus jamaicensis*) is only listed by TPWD for Dallas County. The review of the TXNDD files did not indicate any unique vegetation communities, parks or natural/managed areas within the survey area.

Attachment C identifies the state and federally protected species that could potentially occur within Dallas County from the IPAC and Rare and Threatened Endangered Species of Texas (RTEST) lists.

Site Survey

Ms. Karisa Fenton and Ms. Clair Unruh of IES evaluated the survey area on 22 September 2021. This survey was designed to provide a habitat evaluation of the overall survey area with the primary focus on the plant community.

The four sites within the survey area consisted of two distinct vegetation communities, **frequently maintained grassland** and **urban matrix**. The entirety of Site 7 and the western portion of Site 8 contained the **frequently maintained grassland** vegetation community, dominated by mowed Bermudagrass (*Cynodon dactylon*). The **urban matrix** was found in the southeastern region of Site 8, and the entirety of Sites 9 and 10, and was comprised of gravel lots, buildings, and active construction areas. A small emergent wetland and associated pond were located on the

western boundary of Site 10. The wetland was dominated by saltmarsh aster (*Symphyotrichum subulatum*) and sumpweed (*Iva annua*), both common, early successional disturbance species that occupy mesic areas.

CONCLUSIONS

Preferred Habitat for Federally Protected Species

Table 1 provides a summary of the federally and state-listed species that could potentially occur within Dallas County, as well as a brief description of their habitat, whether this habitat is present within the survey area, and whether the proposed project would potentially affect the listed species.

Regarding federally listed threatened and endangered species, Golden-cheeked Warbler, Red Knot, Piping Plover, and Whooping Crane were listed for Dallas County. As these projects will not be related to wind energy, the Red Knot and Piping Plover will not be affected.

- The Golden-cheeked Warbler requires a habitat that includes forested areas dominated by Ashe juniper (*Juniperus ashei*) in mixed stands with various oaks (*Quercus* spp.). This unique vegetation community is not present within the survey area.
- Whooping Cranes utilize estuaries, prairie marshes, moist grasslands, croplands, and will use large shallow wetland areas associated with lakes for roosting and feeding. The survey area did not contain these types of vegetation communities.

As such, the habitats present within the survey area were not suitable for any of the federally listed threatened or endangered species. Nor were the habitats suitable for nesting, feeding, or stopover migration habitat for these species.

Preferred Habitat for State Protected Species

There were 14 state-listed threatened and endangered species for Dallas County, which includes all the federally listed avian species. Any occurrence of the Least Tern (*Sternula antillarum athalassos)*, Piping Plover, and White-faced Ibis (*Plegadis chihi*) would be in relation to stopover during migration; however, no suitable stopover or nesting habitat was observed within the survey area. Whooping Crane, Black Rail, and Wood Stork (*Mycteria americana*) would be unlikely to utilize the survey area, as their preferred habitat type were not present.

Black Rails utilize freshwater marshes and grassy swamps with dense emergent vegetation. While emergent vegetation was observed within the wetland, the size and location would indicate the survey area would not be suitable habitat. While this site contained a freshwater wetland, this community did not meet the parameters of the Wood Stork for roosting with no tall snags, red mangrove (*Rhizophora mangle*) dominated areas, or bald cypress (*Taxodium distichum*) dominated areas. Wood Storks utilize flooded fields and marsh habitats with shallow standing water for feeding areas, but none were observed. As such, foraging habitat potentially suitable for the Wood Stork was not present within the survey area.

Vegetation Communities

None of the vegetation observed within the survey areas would be considered unique or compose a unique vegetation type for the region. The vegetation communities described were composed of species that are not only common to grassland and forested areas, but to the Cross-Timbers and Blackland Prairie eco-regions of North Central Texas. It is IES' professional opinion that the proposed project will not have any effect on any unique vegetation, vegetation communities, or habitat types.

Table 1. Federally- and State- listed Threatened and Endangered Species Occurring or Potentially Occurring in Dallas County, Texas

Species	State Status	Federal Status	Description of Habitat	Habitat Present[1]	Species Effect[2]
BIRDS					
Black Rail (*Laterallus jamaicensis*)	T	LT	Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia.	No	No
Golden-cheeked Warbler (*Setophaga chrysoparia)*	E	LE	Ashe juniper in mixed stands with various oaks (*Quercus* spp.). Edges of cedar brakes. Dependent on Ashe juniper (also known as cedar) for long fine bark strips, only available from mature trees, used in nest construction; nests are placed in various trees other than Ashe juniper; only a few mature junipers or nearby cedar brakes can provide the necessary nest material; forage for insects in broad-leaved trees and shrubs; nesting late March-early summer.	No	No
Least Tern (*Sterna antillarum athalassos*)	E	DL	Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony.	No	No
Piping Plover (*Charadrius melodus*)	T	LT	Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e., north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.	No	No
Rufa Red Knot (*Calidris canutus rufa*)	T	LT	The Red Knot prefers the shoreline of coast and bays and also uses mudflats during rare inland encounters. Primary prey items include coquina clam (*Donax* spp.) on beaches and dwarf surf clam (*Mulinia lateralis*) in bays, at least in the Laguna Madre. Wintering Range includes- Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Jefferson, Kennedy, Kleberg, Matagorda, Nueces, San Patricio, and Willacy. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore.	No	No
White-faced ibis (*Plegadis chihi*)	T	---	Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.	No	No
Whooping Crane (*Grus americana*)	E	LE	Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.	No	No
Wood stork (*Mycteria americana)*	T	---	Prefers to nest in large tracts of baldcypress (*Taxodium distichum*) or red mangrove (*Rhizophora mangle*); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e., active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.	No	No

Species	State Status	Federal Status	Description of Habitat	Habitat Present[1]	Species Effect[2]
MOLLUSK					
Louisiana pigtoe (*Pleurobema riddellii*)	T	---	Occurs in small streams to large rivers in slow to moderate currents in substrates of clay, mud, sand, and gravel. Not known from impoundments (Howells 2010f; Randklev et al. 2013b; Troia et al. 2015). [Mussels of Texas 2019].	No	No
Sandbank pocketbook (*Lamsilis satura*)	T	---	Occurs in small streams to large rivers in slow to moderate current in sandy mud to sand and gravel substrate. Can occur in a variety of habitats but most common in littoral habitats such as banks or backwaters or in protected areas along point bars (Randklev et al. 2013b; Randklev et al. 2014a; Troia et al. 2015). [Mussels of Texas 2019].	No	No
Texas heelsplitter (*Potamilus amphichaenus*)	T	---	Occurs in small streams to large rivers in standing to slow-flowing water; most common in banks, backwaters and quiet pools; adapts to some reservoirs. Often found in soft substrates such as mud, silt or sand (Howells et al. 1996; Randklev et al. 2017a). [Mussels of Texas 2019].	No	No
Trinity pigtoe (*Fusconaia chunii)*	T	---	Found in a variety of habitats but most common in riffles. Inhabits various substrates though most often sand, gravel, and cobble (species was recently split from Texas Pigtoe and occurs in similar habitats; Howells 2010a; Randklev et al. 2013b; Randklev et al. 2014a; Troia et al 2015). [Mussels of Texas 2019].	No	No
INSECTS					
Monarch Butterfly (*Danaus plexippus*)	---	C	Adult monarch butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. During the breeding season, monarchs lay their eggs on their obligate milkweed host plant (primarily *Asclepias* spp.), and larvae emerge after 2 to 5 days. Larvae develop through five larval instars (intervals between molts) over a period of 9 to 18 days, feeding on milkweed and sequestering toxic chemicals (cardenolides) as a defense against predators. The larva then pupates into a chrysalis before emerging 6 to 14 days later as an adult butterfly. There are multiple generations of monarchs produced during the breeding season, with most adult butterflies living approximately 2 to 5 weeks; overwintering adults enter into reproductive diapause (suspended reproduction) and live 6 to 9 months. Individual monarchs in temperate climates, such as eastern and western North America, undergo long-distance migration, and live for an extended period of time. In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites.	No	No
REPTILES					
Alligator snapping turtle (*Macrochelys temminckii*)	T	---	Aquatic: Perennial water bodies; rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near running water; sometimes enters brackish coastal waters. Females emerge to lay eggs close to the water's edge.	No	No
Texas horned lizard (*Phrynosoma cornutum*)	T	---	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.	No	No

LE – Federally Listed Endangered, LT – Federally Listed Threatened, DL – Federally Delisted, PT – Federally Proposed Threatened, E – State Listed Endangered, T - State Listed Threatened

[1]*Habitat Present? – Do the vegetation communities located within the survey area match the requirements for that particular protected species?*

[2]*Species Effect? – Will the proposed project potentially affect a protected species?*

Data Sources: USFWS IPaC (Published and accessed 28 September 2021), TPWD (Published 22 June 2021, accessed 28 September 2021), and field survey of the survey area

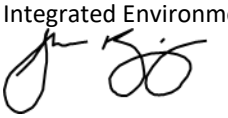
Potential to Affect Protected Species

As previously noted, habitat for any of the federally listed species and state listed species was not present within the survey area. As such, the proposed project is not expected to have any impacts on the federally or state-listed threatened or endangered species.

IES appreciates the opportunity to work with you and the Dallas Fort Worth International Airport Environmental Affairs Department on this project and hope we may be of assistance to you in the future. If you have any comments, questions, or concerns, please do not hesitate to contact me at 972-562-7672 or by email at skipp@intenvsol.com or rreinecke@intenvsol.com.

Sincerely,

Integrated Environmental Solutions, LLC.



Mr. Shae Kipp
Ecologist

Attachments

File ref: 03.006.094

ATTACHMENT A

Figures

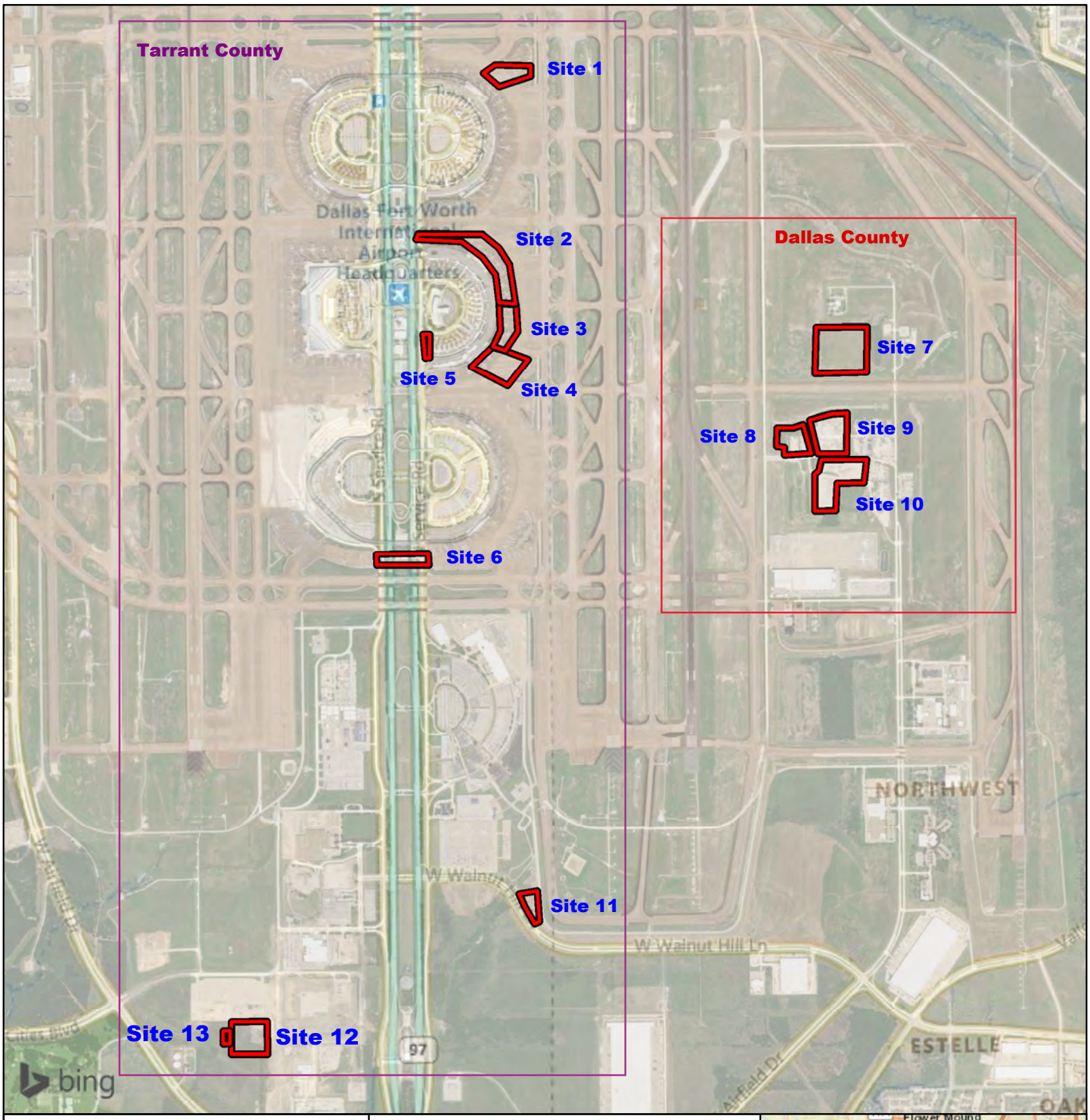


Figure 1.
General Location Map

CTA Development Project
Dallas Fort Worth International Airport
Dallas and Tarrant Counties, Texas

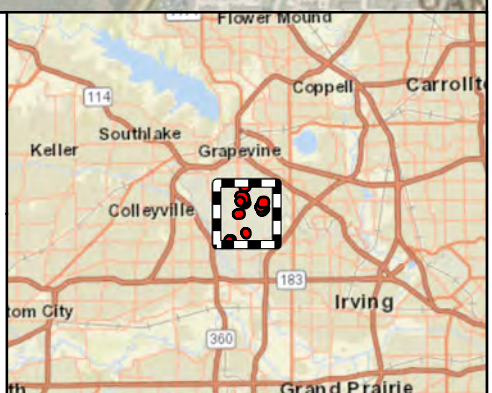
1 in = 2,000 feet

Feet
0 2,000

N
W E
S

File Ref. 03.006.094
Date: 9/28/2021

Survey Area



Area of Detail

Scale: 1 inch equals 10 miles

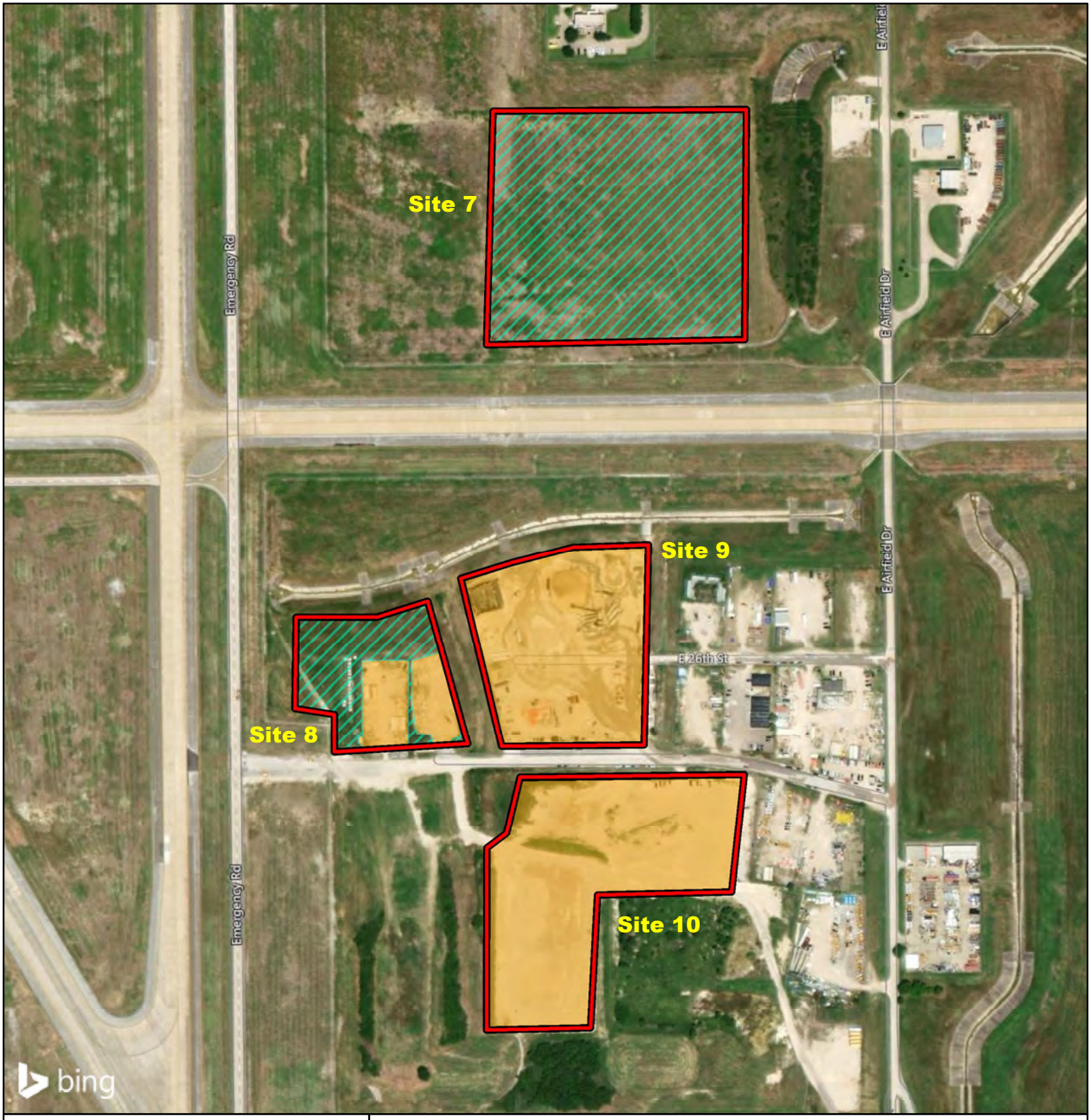


Figure 2.
Vegetation Communities Identified within the Survey Areas

CTA Development Project
Dallas Fort Worth International Airport
Dallas County, Texas

1 in = 400 feet

Feet
0 400

N
W E
S

File Ref. 03.006.094
Date: 9/29/2021

Survey Area

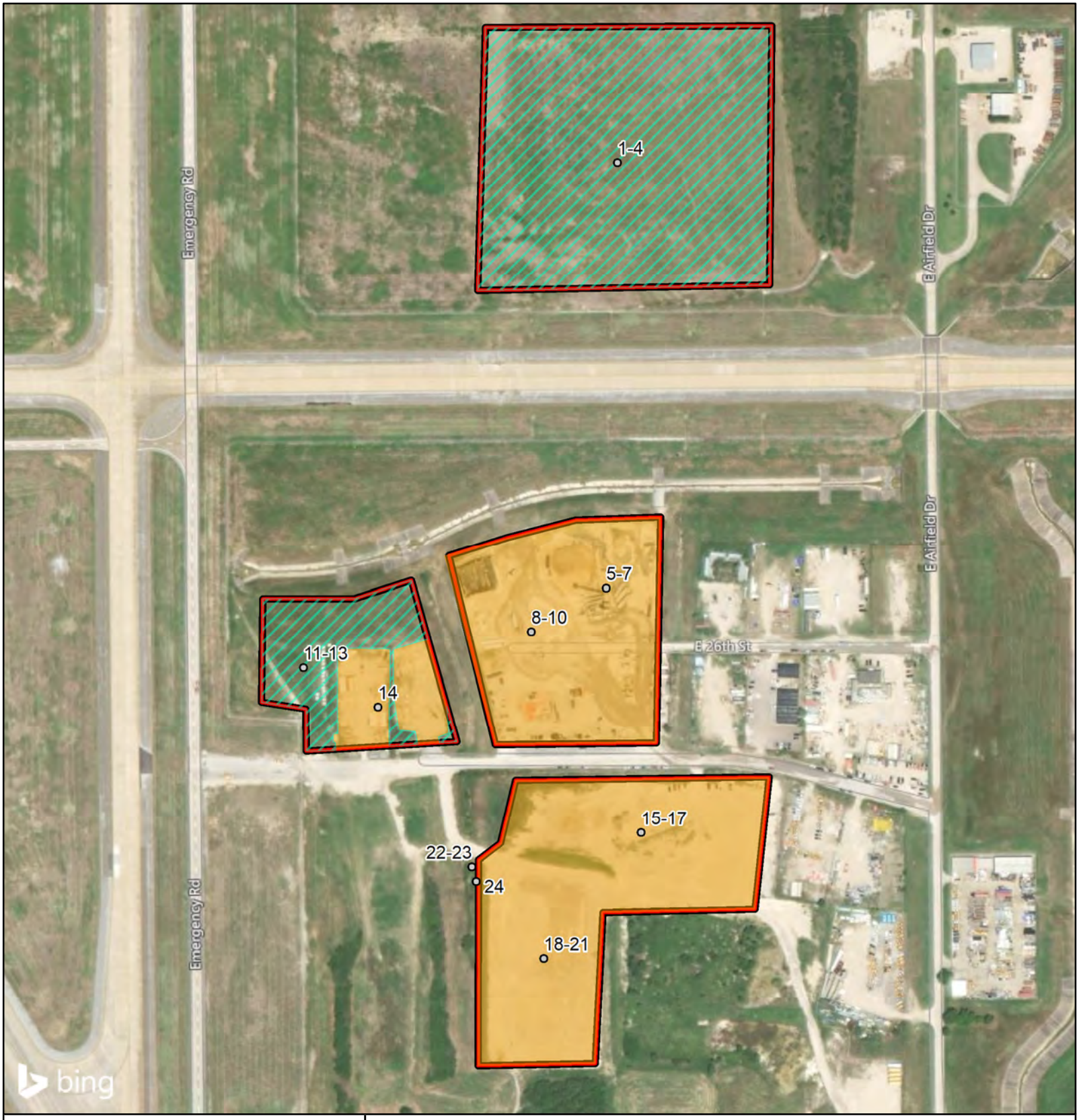
Vegetation Communities

Frequently Maintained Grassland

Urban Matrix

ATTACHMENT B

Site Photographs



Photograph Location Map

CTA Development Project
Dallas Fort Worth International Airport
Dallas County, Texas

1 in = 350 feet

Feet
0 350

N
W E
S

File Ref. 03.006.094
Date: 9/29/2021

Survey Area
Photograph Location

Vegetation Communities

Frequently Maintained Grassland
Urban Matrix

Photograph 1

Photograph 2

Photograph 3

Photograph 4

Photograph 5

Photograph 6

Photograph 7

Photograph 8

Photograph 9

Photograph 10

Photograph 11

Photograph 12

Photograph 13

Photograph 14

Photograph 15

Photograph 16

Photograph 17

Photograph 18

Photograph 19

Photograph 20

Photograph 21

Photograph 22

Photograph 23

Photograph 24

ATTACHMENT C

Protected Species Lists

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arlington Ecological Services Field Office
2005 Ne Green Oaks Blvd
Suite 140
Arlington, TX 76006-6247
Phone: (817) 277-1100 Fax: (817) 277-1129
http://www.fws.gov/southwest/es/arlingtontexas/
http://www.fws.gov/southwest/es/EndangeredSpecies/lists/

In Reply Refer To: September 28, 2021
Consultation Code: 02ETAR00-2021-SLI-3183
Event Code: 02ETAR00-2021-E-07138
Project Name: CTA Development Dallas

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, which may occur within the boundary of your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under section 7(a)(1) of the Act, Federal agencies are directed to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Under and 7(a)(2) and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether their actions may affect threatened and endangered species and/or designated critical habitat. A Federal action is an activity or program authorized, funded, or carried out, in whole or in part, by a Federal agency (50 CFR 402.02).

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For Federal actions other than major construction activities, the Service suggests that a biological evaluation (similar to a Biological Assessment) be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

After evaluating the potential effects of a proposed action on federally listed species, one of the following determinations should be made by the Federal agency:

1. *No effect* - the appropriate determination when a project, as proposed, is anticipated to have no effects to listed species or critical habitat. A "no effect" determination does not require section 7 consultation and no coordination or contact with the Service is necessary. However, the action agency should maintain a complete record of their evaluation, including the steps leading to the determination of affect, the qualified personnel conducting the evaluation, habitat conditions, site photographs, and any other related information.
2. *May affect, but is not likely to adversely affect* - the appropriate determination when a proposed action's anticipated effects to listed species or critical habitat are insignificant, discountable, or completely beneficial. Insignificant effects relate to the size of the impact and should never reach the scale where "take" of a listed species occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not be able to meaningfully measure, detect, or evaluate insignificant effects, or expect discountable effects to occur. This determination requires written concurrence from the Service. A biological evaluation or other supporting information justifying this determination should be submitted with a request for written concurrence.
3. *May affect, is likely to adversely affect* - the appropriate determination if any adverse effect to listed species or critical habitat may occur as a consequence of the proposed action, and the effect is not discountable or insignificant. This determination requires formal section 7 consultation.

The Service has performed up-front analysis for certain project types and species in your project area. These analyses have been compiled into *determination keys*, which allows an action agency, or its designated non-federal representative, to initiate a streamlined process for determining a proposed project's potential effects on federally listed species. The determination keys can be accessed through IPaC.

The Service recommends that candidate species, proposed species, and proposed critical habitat be addressed should consultation be necessary. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (https://www.fws.gov/birds/management/managed-species/eagle-management.php). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds/collisions/communication-towers.php.

For additional information concerning migratory birds and eagle conservation plans, please contact the Service's Migratory Bird Office at 505-248-7882.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Arlington Ecological Services Field Office
2005 Ne Green Oaks Blvd
Suite 140
Arlington, TX 76006-6247
(817) 277-1100

Project Summary

Consultation Code: 02ETAR00-2021-SLI-3183
Event Code: Some(02ETAR00-2021-E-07138)
Project Name: CTA Development Dallas
Project Type: DEVELOPMENT
Project Description: 03.006.094
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@32.8955043,-97.01841020541451,14z

Counties: Dallas County, Texas

Endangered Species Act Species

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
Golden-cheeked Warbler (=wood) *Dendroica chrysoparia* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/33	Endangered
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. The location of the critical habitat is not available. This species only needs to be considered under the following conditions: ▪ Wind Energy Projects Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. This species only needs to be considered under the following conditions: ▪ Wind Energy Projects Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane *Grus americana* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus*	Candidate

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/9743

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Last Update: 6/22/2021

DALLAS COUNTY

BIRDS

black rail *Laterallus jamaicensis*

Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia

Federal Status: LT	State Status: T	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S2

golden-cheeked warbler *Setophaga chrysoparia*

Ashe juniper in mixed stands with various oaks (Quercus spp.). Edges of cedar brakes. Dependent on Ashe juniper (also known as cedar) for long fine bark strips, only available from mature trees, used in nest construction; nests are placed in various trees other than Ashe juniper; only a few mature junipers or nearby cedar brakes can provide the necessary nest material; forage for insects in broad-leaved trees and shrubs; nesting late March-early summer.

Federal Status: LE	State Status: E	SGCN: Y
Endemic: N	Global Rank: G2	State Rank: S2S3B

interior least tern *Sternula antillarum athalassos*

Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony

Federal Status: DL: Delisted	State Status: E	SGCN: N
Endemic: N	Global Rank: G4T3Q	State Rank: S1B

piping plover *Charadrius melodus*

Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.

Federal Status: LT	State Status: T	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S2N

rufa red knot *Calidris canutus rufa*

Red knots migrate long distances in flocks northward through the contiguous United States mainly April-June, southward July-October. A small plump-bodied, short-necked shorebird that in breeding plumage, typically held from May through August, is a distinctive and unique pottery orange color. Its bill is dark, straight and, relative to other shorebirds, short-to-medium in length. After molting in late summer, this species is in a drab gray-and-white non-breeding plumage, typically held from September through April. In the non-breeding plumage, the knot might be confused with the omnipresent Sanderling. During this plumage, look for the knot's prominent pale eyebrow and whitish flanks with dark barring. The Red Knot prefers the shoreline of coast and bays and also uses mudflats during rare inland encounters. Primary prey items include coquina clam (Donax spp.) on beaches and dwarf surf clam (Mulinia lateralis) in bays, at least in the Laguna Madre. Wintering Range includes- Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Jefferson, Kennedy, Kleberg, Matagorda, Nueces, San Patricio, and Willacy. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore.

Federal Status: LT	State Status: T	SGCN: Y
Endemic: N	Global Rank: G4T2	State Rank: S2N

white-faced ibis *Plegadis chihi*

Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S4B

whooping crane *Grus americana*

Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.

Federal Status: LE	State Status: E	SGCN: Y
Endemic: N	Global Rank: G1	State Rank: S1N

wood stork *Mycteria americana*

Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G4	State Rank: SHB,S2N

MOLLUSKS

Louisiana Pigtoe *Pleurobema riddellii*

Occurs in small streams to large rivers in slow to moderate currents in substrates of clay, mud, sand, and gravel. Not known from impoundments (Howells 2010f; Randklev et al. 2013b; Troia et al. 2015). [Mussels of Texas 2019]

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G1G2	State Rank: S1

Sandbank Pocketbook *Lampsilis satura*

Occurs in small streams to large rivers in slow to moderate current in sandy mud to sand and gravel substrate. Can occur in a variety of habitats but most common in littoral habitats such as banks or backwaters or in protected areas along point bars (Randklev et al. 2013b; Randklev et al. 2014a; Troia et al. 2015). [Mussels of Texas 2019]

Federal Status:	State Status: T	SGCN: Y
Endemic:	Global Rank: G2?	State Rank: S1

Texas Heelsplitter *Potamilus amphichaenus*

Occurs in small streams to large rivers in standing to slow-flowing water; most common in banks, backwaters and quiet pools; adapts to some reservoirs. Often found in soft substrates such as mud, silt or sand (Howells et al. 1996; Randklev et al. 2017a). [Mussels of Texas 2019]

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G1G3	State Rank: S1

Trinity Pigtoe *Fusconaia chunii*

Found in a variety of habitats but most common in riffles. Inhabits various substrates though most often sand, gravel, and cobble (species was recently split from Texas Pigtoe and occurs in similar habitats; Howells 2010a; Randklev et al. 2013b; Randklev et al. 2014a; Troia et al 2015). [Mussels of Texas 2020]

Federal Status:	State Status: T	SGCN: Y
Endemic: Y	Global Rank: GNR	State Rank: S1

REPTILES

alligator snapping turtle *Macrochelys temminckii*

Aquatic: Perennial water bodies; rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near running water; sometimes enters brackish coastal waters. Females emerge to lay eggs close to the waters edge.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S2

Texas horned lizard *Phrynosoma cornutum*

Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G4G5	State Rank: S3

integrated environmental solutions

30 September 2021

Ms. Sandy Lancaster
Dallas Fort Worth International Airport
3003 South Service Road, Annex Building A
DFW Airport, Texas 75261-9428

Re: CTA Development Project Tarrant County - Protected Species Habitat Assessment
Sites 1 through 6 and 11 through 13 of the 13 total locations for the CTA Terminals A and C Development Project located within the Dallas Fort Worth International Airport, Tarrant County

Dear Ms. Lancaster,

Integrated Environmental Solutions, LLC (IES) performed a protected species habitat assessment on the CTA Terminals A and C Development Project associated with Sites 1 through 6 and 11 through 13 of the 13 total locations within the Dallas Fort Worth International Airport, Tarrant County (**Attachment A, Figure 1**). This habitat assessment was performed to satisfy the requirements regarding the Endangered Species Act (ESA). The following report is a list of the federal and state-listed protected species for Tarrant County and their preferred vegetation assemblages, a summary of the vegetation communities identified on the site, an evaluation of whether the communities present on the site could support a protected species, and whether or not future proposed actions would affect listed species.

INTRODUCTION

Protected Species

Federal

The ESA of 1973 (Public Law [P.L.] 93-205) and the amendments of 1988 (P.L. 100-578) were enacted to provide a program of preservation for endangered and threatened species and to provide protection for ecosystems upon which these species depend for their survival. The ESA requires all federal agencies to implement protection programs for designated species and to use their authorities to further the purposes of the Act. Responsibility for the listing of an endangered or threatened species and for the development of recovery plans lies with the Secretary of Interior and Secretary of Commerce. The U.S. Fish and Wildlife Service (USFWS) is responsible for implementing the ESA within the United States.

An endangered species is a species, which is in danger of extinction throughout all or a significant portion of its range. A threatened species is a species likely to become endangered within the near future throughout all or a significant portion of its range. Proposed species are those, which have been formally submitted to Congress for official listing as endangered or threatened.

In addition, the USFWS has identified species, which are candidates for possible addition to the list of Endangered and Threatened Wildlife and Plants (50 Code of Federal Regulations [CFR] 17.11 and 17.12) under the ESA. The USFWS maintains a candidate list to: (1) provide advance knowledge of potential listings that could affect land planning decisions, (2) solicit input to identify candidates not requiring protection or additional species that may require protection under the ESA, and (3) solicit information needed to prioritize the order in which species will be proposed for listing. Candidate species have no legal protection under the ESA.

The Migratory Bird Treaty Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit issued in accordance with the Act's policies and regulations. However, in a recent decision the U.S. Court of Appeals for the Fifth Circuit found that for an unlawful "taking" to occur, a "deliberate act done directly and intentionally to migratory birds" would need to occur. (United States v. CITGO Petroleum Corp., No. 14-40128 [5th Cir. Sept. 4, 2015]).

State

The Texas Parks and Wildlife Department (TPWD) Wildlife Diversity Program (WDP) maintains computerized records of state-listed threatened and endangered species by county. The State of Texas does not list threatened and endangered species using the same criteria as the federal government. When the USFWS lists a plant species, the State of Texas then lists that plant. Thus, the list of threatened and endangered plants in Texas is the same as the Federal list. The state has separate laws governing the listing of animal species as threatened or endangered. Threatened and endangered animal species in Texas are those species so designated according to Chapters 67 and 68 of the Texas Parks and Wildlife Code and Section 65.171 - 65.184 of Title 31 of the Texas Administrative Code. Species that are not currently listed by the Federal government may be listed as threatened or endangered by the TPWD.

METHODOLOGY

Prior to conducting fieldwork, the list of Endangered and Threatened Wildlife and Plants under the ESA was obtained through the USFWS Information, Planning, and Conservation System (IPaC) and from the TPWD WDP and the Texas Natural Diversity Database (TXNDD). The vegetation communities used by each species was obtained and is detailed below. During the field survey, vegetation composition within and adjacent to the project site were noted to determine whether there was any potential for protected species habitat. This survey was not designed to identify the presence of protected species; however, if any species were observed, they were recorded. Photographs were taken at representative points, illustrating common vegetation communities within the survey area (**Attachment B**).

RESULTS

Literature Review

According to the USFWS, three species, Piping Plover (*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), and Whooping Crane (*Grus americana*) are listed as federally protected (i.e., threatened or endangered) with the potential to occur within Tarrant County. Two of these species are conditionally listed as threatened within Tarrant County on the basis that the proposed project is for wind energy production, Red Knot, and Piping Plover. No federally listed critical habitat for these species is located within the vicinity of the survey area. The TPWD lists 12 state protected species that could occur within Tarrant County. Four are also federally listed avian species; however, the Black Rail (*Laterallus jamaicensis*) is only listed by TPWD for Tarrant County. The review of the TXNDD files did not indicate any unique vegetation communities, parks or natural/managed areas within the survey area.

Attachment C identifies the state and federally protected species that could potentially occur within Tarrant County from the IPAC and Rare and Threatened Endangered Species of Texas (RTEST) lists.

Site Survey

Ms. Karisa Fenton and Ms. Clair Unruh of IES evaluated the survey area on 22 September 2021. This survey was designed to provide a habitat evaluation of the overall survey area with the primary focus on the plant community.

Sites 1 through 6 and 11 through 13 consisted of four distinct vegetation communities, **urban matrix, frequently maintained grassland**, **infrequently maintained grassland**, and **shrub-scrub upland**. The **urban matrix** was found throughout a majority of Sites 1 through 6, and on the eastern side of Site 12. The urban matrix was comprised of concrete lots, roads, buildings, and active construction areas. The entirety of Site 11, and the western portion of Site 5 contained the **frequently maintained grassland** vegetation community, dominated by mowed Bermudagrass (*Cynodon dactylon*). The **infrequently maintained grassland** was observed in the central region of Site 12 and was comprised of Maximilian sunflower (*Helianthus maximiliani*), meadow dropseed (*Sporobolus compositus*),

Johnsongrass (*Sorghum halepense*), white heath aster (*Symphyotrichum ericoides*), King Ranch bluestem (*Bothriochloa ischaemum*), sumpweed (*Iva annua*), Canada goldenrod (*Solidago canadensis*), prairie broomweed (*Amphiachyris dracunculoides*), Bermudagrass, and annual sunflower (*Helianthus annuus*). The **shrub-scrub upland** vegetation community was observed on the western side of Site 12 and throughout Site 13, dominated by honey mesquite (*Prosopis glandulosa*), sugarberry (*Celtis laevigata*), giant ragweed (*Ambrosia trifida*), Johnsongrass, Bermudagrass, and annual sunflower.

CONCLUSIONS

Preferred Habitat for Federally Protected Species

Table 1 provides a summary of the federally and state-listed species that could potentially occur within Tarrant County, as well as a brief description of their habitat, whether this habitat is present within the survey area, and whether the proposed project would potentially affect the listed species.

Regarding federally listed threatened and endangered species, Red Knot, Piping Plover, and Whooping Crane were listed for Tarrant County. As these projects will not be related to wind energy, the Red Knot and Piping Plover will not be affected.

- Whooping Cranes utilize estuaries, prairie marshes, moist grasslands, croplands, and will use large shallow wetland areas associated with lakes for roosting and feeding. The survey area did not contain this type of vegetation communities within.

As such, the habitats present within the survey area were not suitable for any of the federally listed threatened or endangered species. Nor were the habitats suitable for nesting, feeding, or stopover migration habitat for these species.

Preferred Habitat for State Protected Species

There were 12 state-listed threatened and endangered species for Tarrant County, which includes all the federally listed avian species. Any occurrence of the Least Tern (*Sterna antillarum athalassos*), Piping Plover, and White-faced Ibis (*Plegadis chihi*) would be in relation to stopover during migration; however, no suitable stopover or nesting habitat was observed within the survey area. Whooping Crane and Black Rail would be unlikely to utilize the survey area, as their preferred habitat type were not present.

Vegetation Communities

None of the vegetation observed within the survey areas would be considered unique or compose a unique vegetation type for the region. The vegetation communities described were composed of species that are not only common to grassland and forested areas, but to the Cross-Timbers and Blackland Prairie eco-regions of North Central Texas. It is IES' professional opinion that the proposed project will not have any effect on any unique vegetation, vegetation communities, or habitat types.

Table 1. Federally- and State- listed Threatened and Endangered Species Occurring or Potentially Occurring in Tarrant County, Texas

Species	State Status	Federal Status	Description of Habitat	Habitat Present[1]	Species Effect[2]
BIRDS					
Black Rail (*Laterallus jamaicensis*)	T	LT	Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia.	No	No
Least Tern (*Sterna antillarum athalassos*)	E	DL	Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony.	No	No
Piping Plover (*Charadrius melodus*)	T	LT	Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e., north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.	No	No
Rufa Red Knot (*Calidris canutus rufa*)	T	LT	The Red Knot prefers the shoreline of coast and bays and also uses mudflats during rare inland encounters. Primary prey items include coquina clam (*Donax* spp.) on beaches and dwarf surf clam (*Mulinia lateralis*) in bays, at least in the Laguna Madre. Wintering Range includes- Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Jefferson, Kennedy, Kleberg, Matagorda, Nueces, San Patricio, and Willacy. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore.	No	No
White-faced ibis (*Plegadis chihi*)	T	---	Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.	No	No
Whooping Crane (*Grus americana*)	E	LE	Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.	No	No
MAMMALS					
Black Bear (*Ursus americanus*)	T	---	Historically prefers higher elevations where pinyon-oaks predominate; also occasionally sighted in desert scrub of Trans-Pecos (Black Gap Wildlife Management Area) and Edwards Plateau in juniper-oak habitat.	No	No
MOLLUSKS					
Louisiana pigtoe (*Pleurobema riddellii*)	T	---	Occurs in small streams to large rivers in slow to moderate currents in substrates of clay, mud, sand, and gravel. Not known from impoundments (Howells 2010f; Randklev et al. 2013b; Troia et al. 2015). [Mussels of Texas 2019].	No	No
Sandbank pocketbook (*Lamsilis satura*)	T	---	Occurs in small streams to large rivers in slow to moderate current in sandy mud to sand and gravel substrate. Can occur in a variety of habitats but most common in littoral habitats such as banks or backwaters or in protected areas along point bars (Randklev et al. 2013b; Randklev et al. 2014a; Troia et al. 2015). [Mussels of Texas 2019].	No	No
Texas heelsplitter (*Potamilus amphichaenus*)	T	---	Occurs in small streams to large rivers in standing to slow-flowing water; most common in banks, backwaters and quiet pools; adapts to some reservoirs. Often found in soft substrates such as mud, silt or sand (Howells et al. 1996; Randklev et al. 2017a). [Mussels of Texas 2019].	No	No

Species	State Status	Federal Status	Description of Habitat	Habitat Present[1]	Species Effect[2]
INSECTS					
Monarch Butterfly (Danaus plexippus)	---	C	Adult monarch butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. During the breeding season, monarchs lay their eggs on their obligate milkweed host plant (primarily Asclepias spp.), and larvae emerge after 2 to 5 days. Larvae develop through five larval instars (intervals between molts) over a period of 9 to 18 days, feeding on milkweed and sequestering toxic chemicals (cardenolides) as a defense against predators. The larva then pupates into a chrysalis before emerging 6 to 14 days later as an adult butterfly. There are multiple generations of monarchs produced during the breeding season, with most adult butterflies living approximately 2 to 5 weeks; overwintering adults enter into reproductive diapause (suspended reproduction) and live 6 to 9 months. Individual monarchs in temperate climates, such as eastern and western North America, undergo long-distance migration, and live for an extended period of time. In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites.	No	No
REPTILES					
Alligator snapping turtle (*Macrochelys temminckii*)	T	---	Aquatic: Perennial water bodies; rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near running water; sometimes enters brackish coastal waters. Females emerge to lay eggs close to the water's edge.	No	No
Texas horned lizard (*Phrynosoma cornutum*)	T	---	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.	No	No

LE – Federally Listed Endangered, LT – Federally Listed Threatened, DL – Federally Delisted, PT – Federally Proposed Threatened, E – State Listed Endangered, T - State Listed Threatened
C - Candidate

[1]*Habitat Present? – Do the vegetation communities located within the survey area match the requirements for that particular protected species?*

[2]*Species Effect? – Will the proposed project potentially affect a protected species?*

Data Sources: USFWS IPaC (Published and accessed 28 September 2021), TPWD (Published 22 June 2021, accessed 28 September 2021), and field survey of the survey area

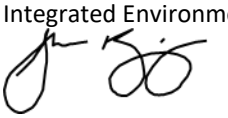
Potential to Affect Protected Species

As previously noted, habitat for any of the federally listed species and state listed species was not present within the survey area. As such, the proposed project is not expected to have any impacts on the federally or state-listed threatened or endangered species.

IES appreciates the opportunity to work with you and the Dallas Fort Worth International Airport Environmental Affairs Department on this project and hope we may be of assistance to you in the future. If you have any comments, questions, or concerns, please do not hesitate to contact me at 972-562-7672 or by email at skipp@intenvsol.com or rreinecke@intenvsol.com.

Sincerely,

Integrated Environmental Solutions, LLC.



Mr. Shae Kipp
Ecologist

Attachments

File ref: 03.006.094

ATTACHMENT A

Figures

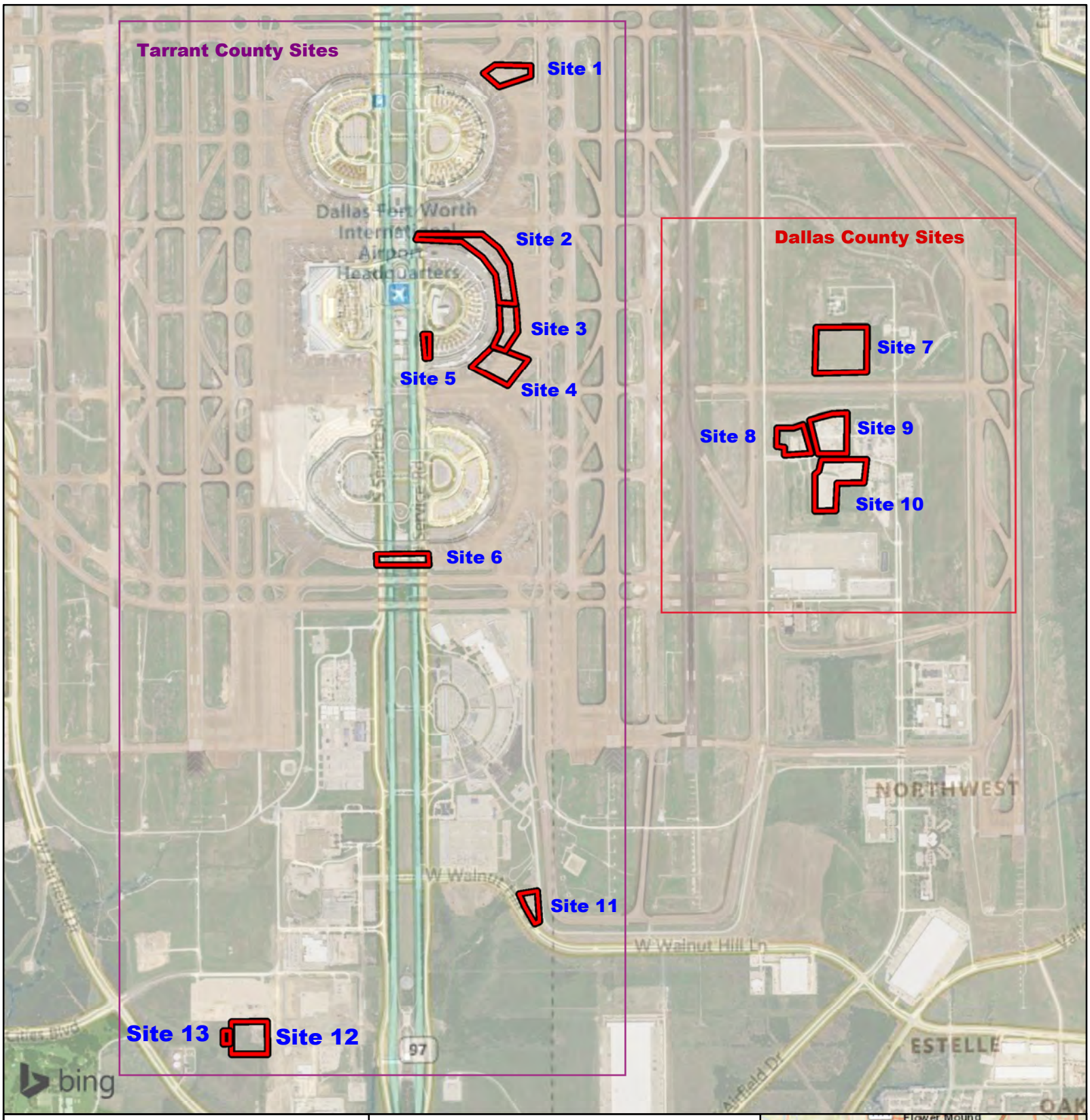


Figure 1.
General Location Map

CTA Development Project
Dallas Fort Worth International Airport
Dallas and Tarrant Counties, Texas

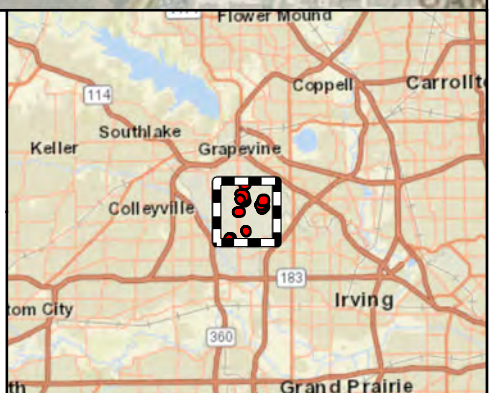
1 in = 2,000 feet

Feet
0 2,000

N
W E
S

File Ref. 03.006.094
Date: 9/28/2021

Survey Area



Area of Detail

Scale: 1 inch equals 10 miles

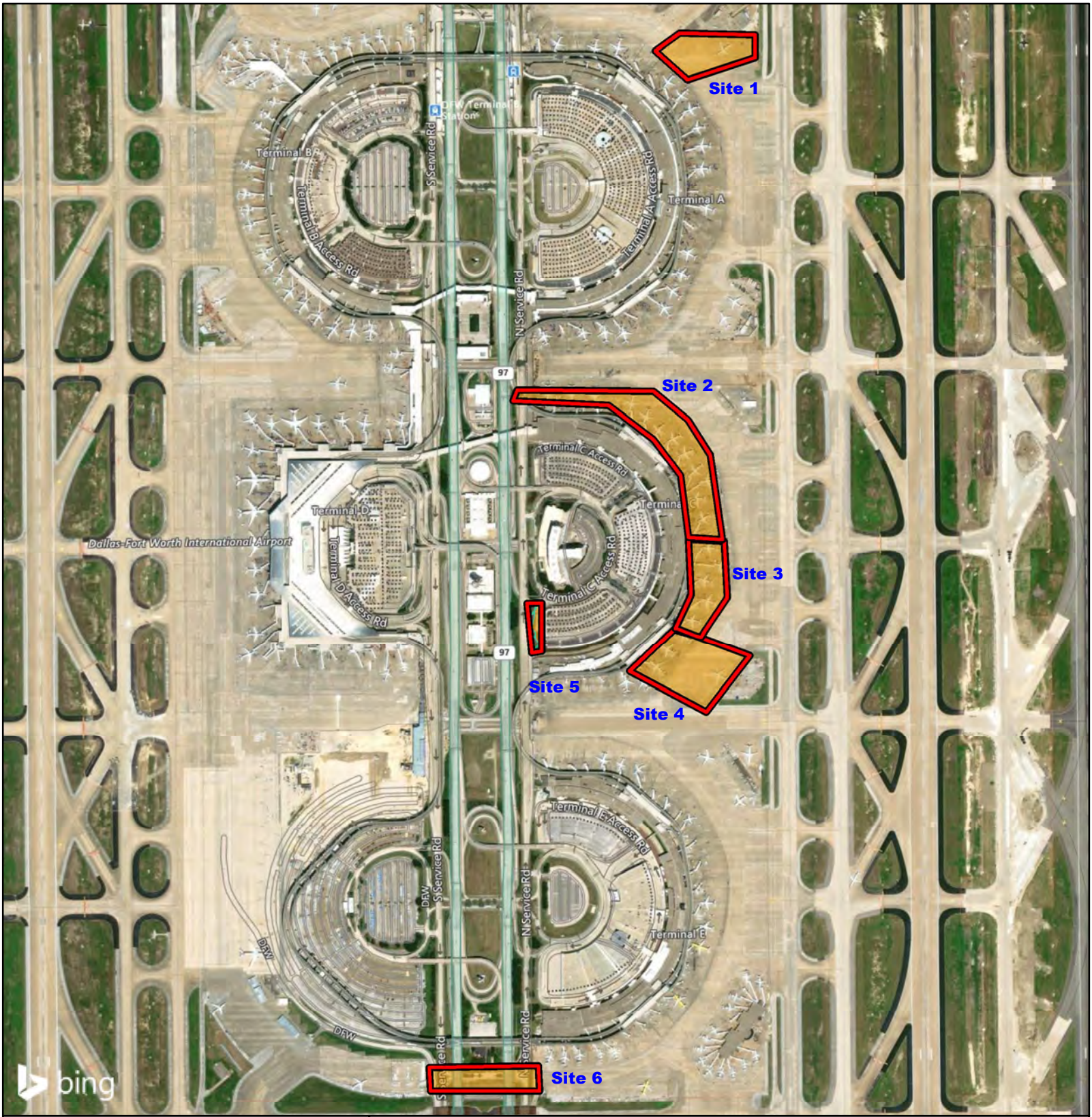


Figure 2A.
Vegetation Communities Identified within the Survey Area

CTA Development Project
Dallas Fort Worth International Airport
Tarrant County, Texas

1 in = 950 feet

Feet
0 950

N
W E
S

File Ref. 03.006.094
Date: 9/29/2021

Survey Area

Vegetation Communities

Frequently Maintained Grassland

Urban Matrix

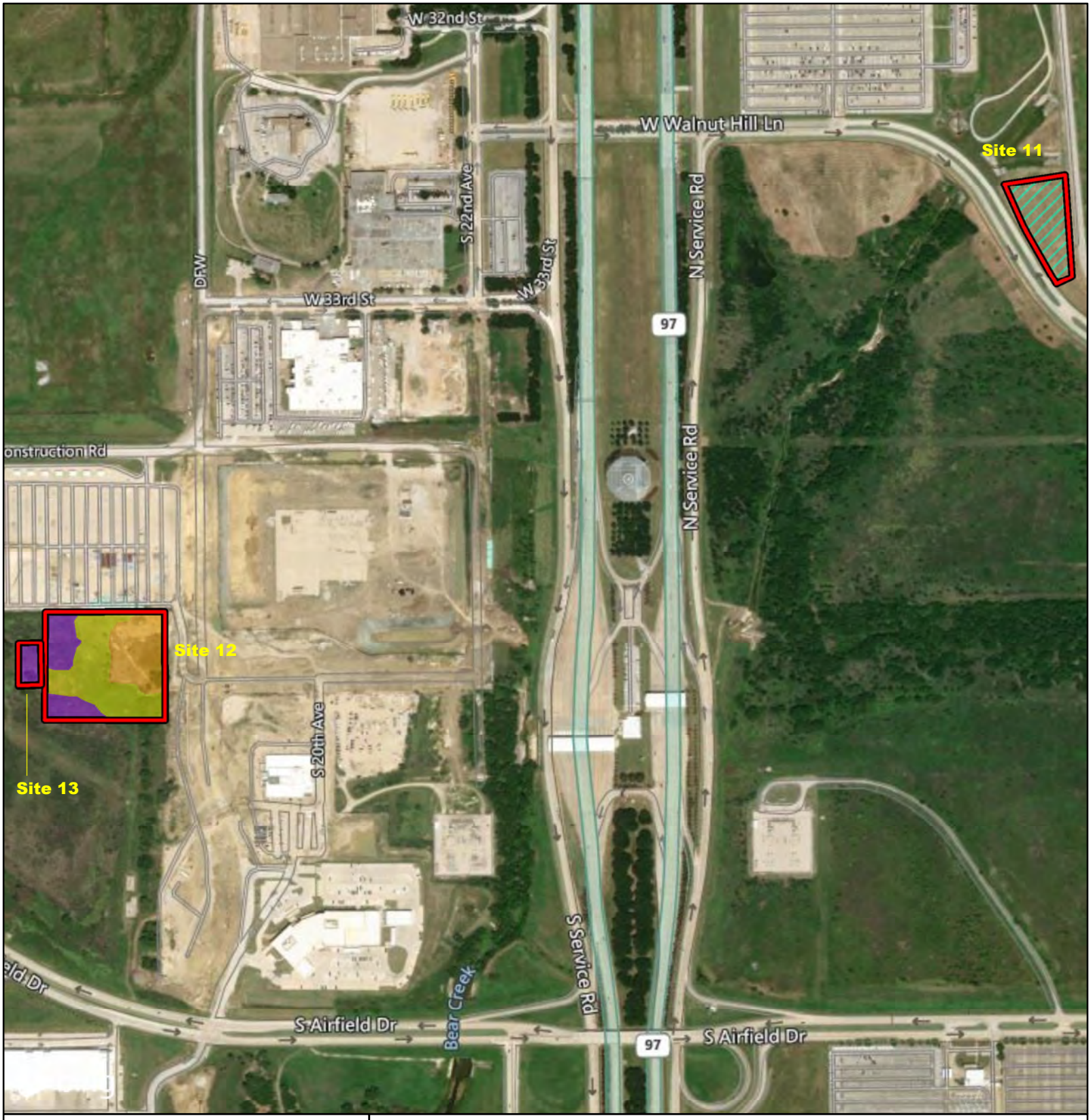


Figure 2B.
Vegetation Communities Identified within the Survey Area

CTA Development Project
Dallas Fort Worth International Airport
Tarrant County, Texas

1 in = 600 feet

Feet
0 600

N
W E
S

File Ref. 03.006.094
Date: 9/29/2021

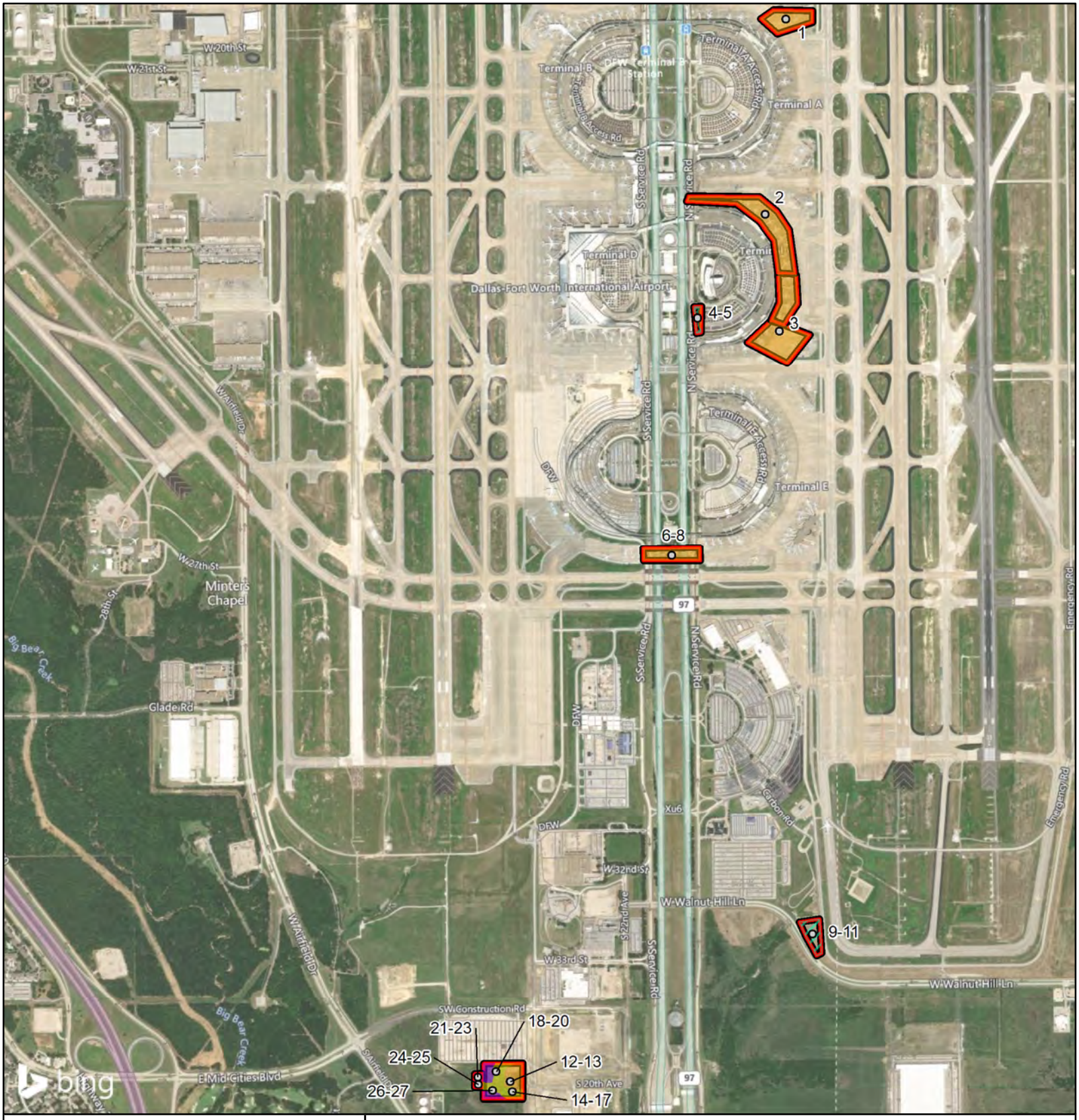
Survey Area

Vegetation Communities

- Frequently Maintained Grassland
- Infrequently Maintained Grassland
- Urban Matrix
- Scrub Shrub

ATTACHMENT B

Site Photographs



Photograph Location Map

CTA Development Project
Dallas Fort Worth International Airport
Tarrant County, Texas

1 in = 1,800 feet

Feet
0
1,800

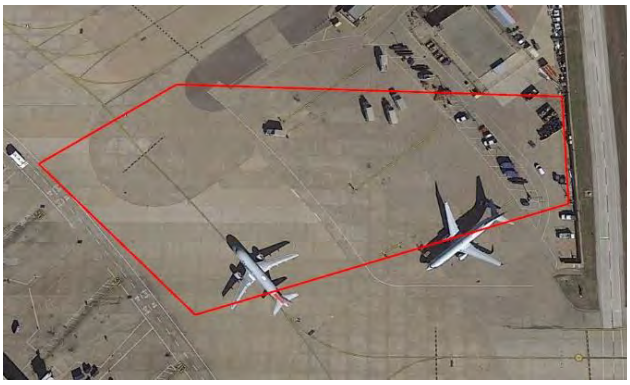
N
W
E
S

File Ref. 03.006.094
Date: 9/29/2021

Survey Area
Photograph Location

Vegetation Communities

Frequently Maintained Grassland
Infrequently Maintained Grassland
Urban Matrix
Scrub Shrub

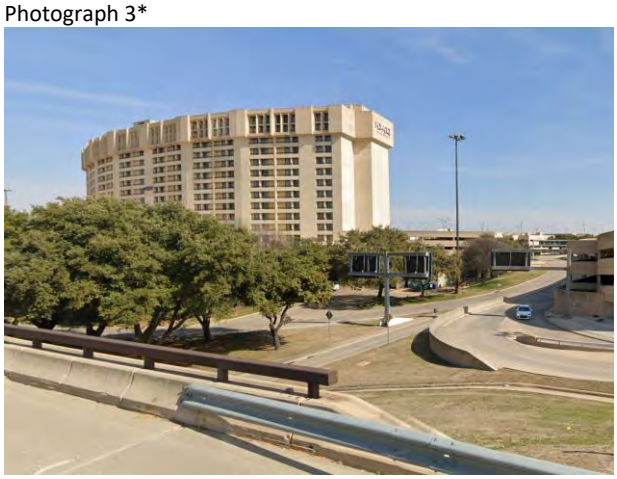


Photograph 1*

Photograph 2*

Photograph 3*

Photograph 4*



Photograph 5*

Photograph 6*

Photograph 7*

Photograph 8*

Photograph 9

Photograph 10

Photograph 11

Photograph 12

Photograph 13

Photograph 14

Photograph 15

Photograph 16

Photograph 17

Photograph 18

Photograph 19

Photograph 20

Photograph 21

Photograph 22

Photograph 23

Photograph 24

Photograph 25

Photograph 26

Photograph 27

*Aerial Images and Street View Images from Google Earth

ATTACHMENT C

Protected Species Lists

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arlington Ecological Services Field Office
2005 Ne Green Oaks Blvd
Suite 140
Arlington, TX 76006-6247
Phone: (817) 277-1100 Fax: (817) 277-1129
http://www.fws.gov/southwest/es/arlingtontexas/
http://www.fws.gov/southwest/es/EndangeredSpecies/lists/

In Reply Refer To: September 28, 2021
Consultation Code: 02ETAR00-2021-SLI-3184
Event Code: 02ETAR00-2021-E-07140
Project Name: CTA Development Tarrant

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, which may occur within the boundary of your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under section 7(a)(1) of the Act, Federal agencies are directed to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Under and 7(a)(2) and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether their actions may affect threatened and endangered species and/or designated critical habitat. A Federal action is an activity or program authorized, funded, or carried out, in whole or in part, by a Federal agency (50 CFR 402.02).

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For Federal actions other than major construction activities, the Service suggests that a biological evaluation (similar to a Biological Assessment) be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

After evaluating the potential effects of a proposed action on federally listed species, one of the following determinations should be made by the Federal agency:

1. *No effect* - the appropriate determination when a project, as proposed, is anticipated to have no effects to listed species or critical habitat. A "no effect" determination does not require section 7 consultation and no coordination or contact with the Service is necessary. However, the action agency should maintain a complete record of their evaluation, including the steps leading to the determination of affect, the qualified personnel conducting the evaluation, habitat conditions, site photographs, and any other related information.
2. *May affect, but is not likely to adversely affect* - the appropriate determination when a proposed action's anticipated effects to listed species or critical habitat are insignificant, discountable, or completely beneficial. Insignificant effects relate to the size of the impact and should never reach the scale where "take" of a listed species occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not be able to meaningfully measure, detect, or evaluate insignificant effects, or expect discountable effects to occur. This determination requires written concurrence from the Service. A biological evaluation or other supporting information justifying this determination should be submitted with a request for written concurrence.
3. *May affect, is likely to adversely affect* - the appropriate determination if any adverse effect to listed species or critical habitat may occur as a consequence of the proposed action, and the effect is not discountable or insignificant. This determination requires formal section 7 consultation.

The Service has performed up-front analysis for certain project types and species in your project area. These analyses have been compiled into *determination keys*, which allows an action agency, or its designated non-federal representative, to initiate a streamlined process for determining a proposed project's potential effects on federally listed species. The determination keys can be accessed through IPaC.

The Service recommends that candidate species, proposed species, and proposed critical habitat be addressed should consultation be necessary. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (https://www.fws.gov/birds/management/managed-species/eagle-management.php). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds/collisions/communication-towers.php.

For additional information concerning migratory birds and eagle conservation plans, please contact the Service's Migratory Bird Office at 505-248-7882.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Arlington Ecological Services Field Office
2005 Ne Green Oaks Blvd
Suite 140
Arlington, TX 76006-6247
(817) 277-1100

Project Summary

Consultation Code: 02ETAR00-2021-SLI-3184
Event Code: Some(02ETAR00-2021-E-07140)
Project Name: CTA Development Tarrant
Project Type: DEVELOPMENT
Project Description: 03.006.094
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@32.8869225,-97.04044863280589,14z

Counties: Tarrant County, Texas

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. The location of the critical habitat is not available. This species only needs to be considered under the following conditions: ▪ Wind Energy Projects Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. This species only needs to be considered under the following conditions: ▪ Wind Energy Projects Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane *Grus americana* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus*	Candidate

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/9743

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Last Update: 6/22/2021

TARRANT COUNTY

BIRDS

black rail *Laterallus jamaicensis*

Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia

Federal Status: LT	State Status: T	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S2

interior least tern *Sternula antillarum athalassos*

Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony

Federal Status: DL: Delisted	State Status: E	SGCN: N
Endemic: N	Global Rank: G4T3Q	State Rank: S1B

piping plover *Charadrius melodus*

Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.

Federal Status: LT	State Status: T	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S2N

rufa red knot *Calidris canutus rufa*

Red knots migrate long distances in flocks northward through the contiguous United States mainly April-June, southward July-October. A small plump-bodied, short-necked shorebird that in breeding plumage, typically held from May through August, is a distinctive and unique pottery orange color. Its bill is dark, straight and, relative to other shorebirds, short-to-medium in length. After molting in late summer, this species is in a drab gray-and-white non-breeding plumage, typically held from September through April. In the non-breeding plumage, the knot might be confused with the omnipresent Sanderling. During this plumage, look for the knot's prominent pale eyebrow and whitish flanks with dark barring. The Red Knot prefers the shoreline of coast and bays and also uses mudflats during rare inland encounters. Primary prey items include coquina clam (Donax spp.) on beaches and dwarf surf clam (Mulinia lateralis) in bays, at least in the Laguna Madre. Wintering Range includes- Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Jefferson, Kennedy, Kleberg, Matagorda, Nueces, San Patricio, and Willacy. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore.

Federal Status: LT	State Status: T	SGCN: Y
Endemic: N	Global Rank: G4T2	State Rank: S2N

white-faced ibis *Plegadis chihi*

Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S4B

whooping crane *Grus americana*

Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.

Federal Status: LE | State Status: E | SGCN: Y
Endemic: N | Global Rank: G1 | State Rank: S1N

MAMMALS

black bear *Ursus americanus*

Generalist. Historically found throughout Texas. In Chisos, prefers higher elevations where pinyon-oaks predominate; also occasionally sighted in desert scrub of Trans-Pecos (Black Gap Wildlife Management Area) and Edwards Plateau in juniper-oak habitat. For ssp. luteolus, bottomland hardwoods, floodplain forests, upland hardwoods with mixed pine; marsh. Bottomland hardwoods and large tracts of inaccessible forested areas.

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G5 | State Rank: S3

MOLLUSKS

Louisiana Pigtoe *Pleurobema riddellii*

Occurs in small streams to large rivers in slow to moderate currents in substrates of clay, mud, sand, and gravel. Not known from impoundments (Howells 2010f; Randklev et al. 2013b; Troia et al. 2015). [Mussels of Texas 2019]

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G1G2 | State Rank: S1

Sandbank Pocketbook *Lampsilis satura*

Occurs in small streams to large rivers in slow to moderate current in sandy mud to sand and gravel substrate. Can occur in a variety of habitats but most common in littoral habitats such as banks or backwaters or in protected areas along point bars (Randklev et al. 2013b; Randklev et al. 2014a; Troia et al. 2015). [Mussels of Texas 2019]

Federal Status: | State Status: T | SGCN: Y
Endemic: | Global Rank: G2? | State Rank: S1

Texas Heelsplitter *Potamilus amphichaenus*

Occurs in small streams to large rivers in standing to slow-flowing water; most common in banks, backwaters and quiet pools; adapts to some reservoirs. Often found in soft substrates such as mud, silt or sand (Howells et al. 1996; Randklev et al. 2017a). [Mussels of Texas 2019]

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G1G3 | State Rank: S1

REPTILES

alligator snapping turtle *Macrochelys temminckii*

Aquatic: Perennial water bodies; rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near running water; sometimes enters brackish coastal waters. Females emerge to lay eggs close to the waters edge.

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G3 | State Rank: S2

Texas horned lizard *Phrynosoma cornutum*

Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G4G5 | State Rank: S3

APPENDIX B – WATERS OF THE UNITED STATES DELINEATION REPORT

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integrated environmental solutions

30 September 2021

Ms. Sandy Lancaster
Dallas/Fort Worth International Airport
Environmental Affairs Department
3003 South Service Road, Annex Building A
DFW Airport, Texas 75261-9428

Re: CTA Development Project - Waters of the United States Delineation & Desktop Assessment
Approximately 69 acres across 13 different sites within the DFW International Airport CTA Terminals A and C Development Project located on the DFW International Airport complex, Dallas and Tarrant Counties, Texas

Dear Ms. Lancaster,

Integrated Environmental Solutions, LLC (IES) performed a site survey and desktop review to identify any aquatic features that meet a definition of a water of the United States on approximately 69 acres across 13 different sites within the DFW Airport CTA Terminals A and C Development Project located on the DFW International Airport complex, Dallas and Tarrant Counties, Texas. A desktop evaluation was conducted on Sites 1 through 7 as they were not able to be accessed due to airport regulations. A site survey was conducted on Sites 8 through 13 as they were able to be accessed via public roadways (**Attachment A, Figure 1**). This report will ultimately assess and delineate potentially jurisdictional aquatic features to ensure compliance with Sections 401 and 404 of the Clean Water Act (CWA).

INTRODUCTION

Waters of the United States are protected under guidelines outlined in Sections 401 and 404 of the CWA, in Executive Order (EO) 11990 (Protection of Wetlands), and by the review process of the Texas Commission on Environmental Quality (TCEQ). Agencies that regulate impacts to the nation's water resources within Texas include the U.S. Army Corps of Engineers (USACE), the U.S. Environmental Protection Agency (USEPA), the U.S. Fish and Wildlife Service (USFWS), and the TCEQ. The USACE has the primary regulatory authority for enforcing Section 404 requirements for waters of the United States.

The decision for whether a Section 404 of the CWA permit is required on a property is determined if there are waters of the United States present and the extent of losses of those features. The USACE and EPA have gone through rulemaking to define what is a water of the United States, independently and jointly, several times since the initial CWA. The longest standing definitions of waters of the United States were those published in 1986; however, these definitions were challenged in 2001 and 2007 U.S. Supreme Court decisions. Since then, both the Obama and Trump administration completed rulemaking to modify the definitions of waters of the United States in the Clean Water Rule in 2016 and the Navigable Water Protection Rule (NWPR) in 2020. A recent federal district court decision in Arizona struck down the NWPR but was silent on which definitions of waters of the United States would replace it. As of the date of this letter report, the USACE Fort Worth District has provided verbal guidance that the USACE will be utilizing the pre-2015 definitions (i.e., 1986 definitions combined with the *Rapanos* and *Carabell* U.S. Supreme Court decisions) to define waters of the United States. Please note, at this time there is no written guidance from USACE on this decision and whether the federal district court ruling actually applies nationwide. Furthermore, it is uncertain as to whether there will be any appeal to the federal appellate court. Therefore, this report will analyze all aquatic features within the project site to determine their applicability under both NWPR and the 1986 Rule.

Navigable Waters Protection Rule (Effective 22 June 2020)

The streamlined regulations have redefined waters of the United States as the following at 33 Code of Federal Regulations (CFR) 328.3 (a) as:

1. *The territorial seas, and waters which are currently used or were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters which are subject to the ebb and flow of the tide;*
2. *Tributaries;*
3. *Lakes and ponds, and impoundments of jurisdictional waters; and*
4. *Adjacent wetlands*

The following features are excluded from jurisdiction at 33 CFR 328.3 (b) as:

1. *Lake/pond/impoundment or wetland that does not contribute surface water flow directly or indirectly to an (a)(1) water and is not inundated by flooding from an (a)(1)-(a)(3) water in a typical year, surface water channel that does not contribute surface water flow directly or indirectly to an (a)(1) water in a typical year, or Water or water feature that is not identified in (a)(1)-(a)(4) and does not meet the other (b)(1) sub-categories;*
2. *Groundwater, including groundwater drained through subsurface drainage systems;*
3. *Ephemeral feature, including an ephemeral stream, swale, gully, rill, or pool;*
4. *Diffuse stormwater run-off over upland or directional sheet flow over upland;*
5. *Ditch that is not an (a)(1) or (a)(2) water;*
6. *Prior converted cropland;*
7. *Artificially irrigated area, including fields flooded for agricultural production, that would revert to upland should application of irrigation water to that area cease;*
8. *Artificial lake/pond constructed or excavated in upland or a non-jurisdictional water, so long as the artificial lake or pond is not an impoundment of a jurisdictional water;*
9. *Water-filled depression constructed/excavated in upland/non-jurisdictional water incidental to mining/construction or pit excavated in upland/non-jurisdictional water to obtain fill/sand/gravel;*
10. *Stormwater control feature constructed or excavated in upland or in a non-jurisdictional water to convey, treat, infiltrate, or store stormwater runoff;*
11. *Groundwater recharge, water reuse, or a wastewater recycling structure constructed or excavated in upland or in a non-jurisdictional water; and*
12. *Waste treatment system.*

Further definitions located at 33 CFR 328.3 (c) include:

(1) *Adjacent wetlands*. The term adjacent wetland means wetlands that:

i. Abut, meaning to touch at least one point or side of, a water identified in paragraph (a)(1), (2), or (3) of this section;

ii. Are inundated by flooding from a water identified in paragraph (a)(1), (2), or (3) of this section in a typical year;

iii. Are physically separated from a water identified in paragraph (a)(1), (2), or (3) of this section only by an artificial dike, barrier, or similar artificial structure so long as that structure allows for a direct hydrologic surface connection between the wetlands and the water identified in paragraph (a)(1), (2), or (3) of the section in atypical year, such as through a culvert, flood or tide gate, pump, or similar artificial feature. An adjacent wetland is jurisdictional in its entirety when a road or similar

artificial structure divides the wetland, as long as the structure allows for direct hydrologic connection through or over that structure in a typical year.

(6) *Lakes and ponds, and impoundments of jurisdictional waters*. The term lakes and ponds, and impoundments of jurisdictional waters means standing bodies of open water that contribute surface water flow to a water identified in paragraph (a)(1) of this section in a typical year either directly or through one or more waters identified in paragraph (a)(2), (3), or (4) of this section. A lake, pond, or impoundment of a jurisdictional water does not lose its jurisdictional status if it contributes surface water flow to a downstream jurisdictional water in a typical year through a channelized nonjurisdictional surface water feature, through a culvert, dike, spillway, or similar artificial feature, or through a debris pile, boulder field, or similar natural feature. A lake or pond, or impoundment of a jurisdictional water is also jurisdictional if it is inundated by flooding from a water identified in paragraph (a)(1), (2), or (3) of this section in a typical year.

(12) *Tributary*. The term tributary means a river, stream, or similar naturally occurring surface water channel that contributes surface water flow to a water identified in paragraph (a)(1) of this section in a typical year either directly or through one or more waters identified in paragraph (a)(2), (3), or (4) of this section. A tributary must be perennial or intermittent in a typical year. The alteration or relocation of a tributary does not modify its jurisdictional status as long as it continues to satisfy the flow conditions of this definition. A tributary does not lose its jurisdictional status if it contributes surface water flow to a downstream jurisdictional water in a typical year through a channelized nonjurisdictional surface water feature, through a subterranean river, through a culvert, dam, tunnel, or similar artificial feature, or through a debris pile, boulder field, or similar natural feature. The term tributary includes a ditch that either relocates a tributary, is constructed in a tributary, or is constructed in an adjacent wetland as long as the ditch satisfies the flow conditions of this definition.

1986 Waters of the United States Definitions and Rapanos Decision

The definition of waters of the United States, in 33 CFR 328.3, includes waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, wetlands, sloughs, wet meadows, or natural ponds and all impoundments of waters otherwise defined as waters of the United States. Also included are wetlands adjacent to waters (other than waters that are themselves wetlands). The term *adjacent* is defined as bordering, contiguous, or neighboring. Jurisdictional wetlands are a category of waters of the United States and have been defined by the USACE as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Waters of the United States are defined in 33 CFR 328.3 (a), 13 November 1986, as:

1. *All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;*
2. *All interstate waters including interstate wetlands;*
3. *All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters:*
    i. *Which are or could be used by interstate or foreign travelers for recreational or other purposes; or*
    ii. *From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or*
    iii. *Which are used or could be used for industrial purposes by industries in interstate commerce;*
4. *All impoundments of waters otherwise defined as waters of the United States under the definition;*
5. *Tributaries of waters identified in paragraphs (a)(1)-(4) of this section;*
6. *The territorial seas;*

7. *Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a)(1)-(6) of this section.*

On 05 June 2007, the USACE and the USEPA issued joint guidance on delineation of waters on the United States based on the U.S. Supreme Court decisions in *Rapanos* and *Carabell*. Under this guidance, potential waters of the United States have been classified as traditional navigable waters (TNW), relatively permanent waters (RPW) (i.e., having flow most of the year or at least seasonally), or non-RPWs. This guidance states that TNWs and RPWs and contiguous or adjacent wetlands to these aquatic features are waters of the United States. Wetlands that are bordering, contiguous, or neighboring another water of the United States is considered adjacent. Additionally, wetlands that are within the 100-year floodplain of another water of the United States are also considered adjacent. Non-RPWs, wetlands contiguous or adjacent to non-RPWs, and isolated wetlands must undergo a "significant nexus" test on a case-by-case basis to determine the jurisdictional nature of these aquatic features. Under the "significant nexus" test a water feature must have substantial connection to a TNW by direct flow, or by indirect biological, hydrologic, or chemical connection. Under the "significant nexus" test the USACE District Engineer must submit the jurisdictional determination (JD) to the regional USEPA office, which makes the decision whether to move the JD to Headquarters USACE to make the final determination.

This guidance does not void the January 2001 decision of the U.S. Supreme Court in Solid Waste Agency of Northern Cook County (SWANCC) v. USACE which disallowed regulation of isolated wetlands under the CWA through the "Migratory Bird Rule." Previously, the USACE assumed jurisdiction over isolated waters of the United States based on its 1986 preamble stating that migratory birds used these habitats. The "Migratory Bird Rule" provided the nexus to interstate commerce and thus protection under the CWA. However, the new guidance does require that the "significant nexus" test be performed in addition to an analysis of other potential interstate commerce uses for isolated waters.

METHODOLOGY

Prior to conducting the desktop evaluation and fieldwork, the U.S. Geological Survey (USGS) topographic map (**Attachment A, Figures 2A** and **2B**), the *Soil Survey of Dallas County* and *the Soil Survey of Tarrant County, Texas*, and the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) digital soil databases for Dallas and Tarrant Counties (**Attachment A, Figure 3**), the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) (**Attachment A, Figure 4**), and recent and historic aerial photographs of the proposed survey area were studied to identify possible aquatic features that could meet the definition of waters of the United States and areas prone to wetland development. Ms. Karisa Fenton and Ms. Claire Unruh of IES conducted the delineation in the field in accordance with the USACE procedures on 22 September 2021.

Wetland determinations and delineations were performed on location using the methodology outlined in the 1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineer Wetland Delineation Manual: Great Plains Region (Version 2.0). The presence of a wetland is determined by the positive indication of three criteria (i.e., hydrophytic vegetation, hydrology, and hydric soils). Potential jurisdictional boundaries for other water features (i.e., non-wetland) were delineated in the field at the ordinary high-water mark (OHWM). The 33 CFR 328.3 (c)(7) defines OHWM as the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Water feature boundaries were recorded on a Trimble GeoExplorer XT Global Positioning System (GPS) unit capable of sub-meter accuracy. Photographs were also taken at representative points within the survey area (**Attachment B**). Routine wetland determination data forms are provided in **Attachment C**. Historic aerial photographs, from Environmental Data Resources, Inc. (EDR), were used in the jurisdictional determination of some aquatic features, are included in **Attachment D.**

RESULTS

Background Review

Topographic Setting

The USGS topographic maps (Grapevine 7.5' Quadrangle 1959, revised 1982; Euless 7.5' Quadrangle 1959; revised 1992) illustrate one blue line feature within the survey area. The blue line feature is depicted meandering through the southern region of Site 8 and continuing into the northwestern region of Site 9, oriented southwest-to-northeast (*see* **Attachment A, Figure 2A**). The 2019 version of the Grapevine and Euless 7.5' Quadrangle maps illustrates the blue line feature in similar alignment (*see* **Attachment A, Figure 2B**). The overall topography was illustrated with slopes oriented west-to-east in Sites 1 through 11 and north-to-south in Sites 12 and 13. The maximum elevation of the property was approximately 580 feet above mean sea level (amsl) and a minimum elevation of approximately 520 feet amsl.

Soils

The *Soil Survey of Dallas County, Texas* identified four soil map units within the survey area, Ferris-Heiden complex, 5 to 12 percent slopes; Heiden clay, 1 to 3 percent slopes; Heiden clay, 2 to 5 percent slopes, eroded; and Houston Black-Urban land complex, 0 to 4 percent slopes. The *Soil Survey of Tarrant County, Texas* identified four soil map units within the survey area, Heiden clay, 1 to 3 percent slopes; Houston Black clay, 1 to 3 percent slopes; Houston Black-Urban land complex, 1 to 4 percent slopes; and Urban land. None of these soil map units were listed as a hydric soil on the Hydric Soils of Texas list prepared by the National Technical Committee for Hydric Soils (accessed 29 September 2021, Dallas and Tarrant Counties, Texas) (*see* **Attachment A, Figure 3**). Hydric soils are described as those soils that are sufficiently wet in the upper part to develop anaerobic conditions during the growing season.

FEMA FIRM

The FEMA FIRM (Dallas and Tarrant Counties; Map Panel 4439C0120K; effective 25 September 2009; 48113C0145K; effective 07 July 2014 and Map Panels 48439C0235L, and 48113C0285L; effective 03 March 2019) shows the entire survey area to be within Zone X (Areas determined to be outside the 0.2 percent annual chance floodplain) (*see* **Attachment A, Figure 4**).

Historic Aerial Photographs

Historic aerial photographs from an aerial photograph decade package from EDR were also reviewed to understand the sequence of events that have occurred in Site 10 of the survey area (*see* **Attachment D**). Site 10 was evaluated due to the presence of a pond and wetland. The following paragraphs provide a description of the aerial photographs based on site conditions:

> *1942-1968* – Site 10 is characterized as an active agricultural property comprised of pastureland. A drainage is depicted outside of the western boundary. The surrounding area is comprised of pastureland, drainages, and scattered homesteads.
>
> *1972* – Dirt roads are visible across Site 10. The drainage to the west has been channelized and an impoundment has been excavated to the north.
>
> *1979* – The roads are no longer visible and the impoundment to the north has been filled. A commercial complex has been constructed south of Site 10.
>
> *1984* – Site 10 has been entirely cleared.
>
> *1990* – Dark color signatures are visible in the channel to the west, indicating potential inundation.
>
> 1995 – Airport runways and buildings have been constructed surrounding Site 10 and a road has been cleared along the northern boundary. The drainage to the north that was previously impounded has been channelized and routed through a concrete channel.
>
> 2005-2012 – The eastern region of Site 10 has been cleared. Canopy cover has increased along the drainage to the west, and the area to the south.

2016 – A lot has been partially cleared in the southern region.

Weather History

The weather history for Wunderground.com Edwards weather station (KTXEULES47) recorded no rainfall in the 7-day period prior to and during the evaluation, and a total of 0.20 inch during the 30-day period prior to the site visit. The Antecedent Precipitation Tool (APT) indicated that the conditions on-site at the time of the evaluation were considered hydrologically "normal" based on the 30-year climactic average (32.885619 °N, -97.040544 °W).

Field Investigation

The 13 sites within the survey area consisted of four distinct vegetation communities: **urban matrix**, **frequently maintained grassland**, **infrequently maintained grassland**, and **shrub-scrub upland**. The **urban matrix** was found throughout a majority of Sites 1 through 6, 8 through 10, and the eastern side of Site 12. The urban matrix was comprised of concrete lots, roads, buildings, and active construction areas. The entirety of Sites 7 and 11, and the western portions of Sites 5 and 8 contained the **frequently maintained grassland** vegetation community, dominated by mowed Bermudagrass (*Cynodon dactylon*). The **infrequently maintained grassland** was observed in the central region of Site 12 and was comprised of Maximilian sunflower (*Helianthus maximiliani*), meadow dropseed (*Sporobolus compositus*), Johnsongrass (*Sorghum halepense*), white heath aster (Symphyotrichum ericoides), King Ranch bluestem (*Bothriochloa ischaemum*), sumpweed (*Iva annua*), Canada goldenrod (*Solidago canadensis*), prairie broomweed (*Amphiachyris dracunculoides*), Bermudagrass, and annual sunflower (*Helianthus annuus*). The **shrub-scrub** upland vegetation community was observed on the western side of Site 12 and throughout Site 13, dominated by honey mesquite (*Prosopis glandulosa*), sugarberry (*Celtis laevigata*), giant ragweed (*Ambrosia trifida*), Johnsongrass, Bermudagrass, and annual sunflower.

Water from Sites 1 through 10 flows east into Hackberry Creek, then into the Elm Fork Trinity River, and ultimately into the Trinity River, a TNW. Water from Sites 11 through 13 flows south into Big Bear Creek, then into the West Fork Trinity River, and ultimately into the Trinity River, a TNW.

Desktop Evaluation

Aquatic features within Sites 1 through 7 were identified and delineated using both the National Hydrography Dataset (NHD) and historic and recent aerial photography. Sites 8 through 13 were field verified after a review of the available secondary data. **Table 1** and the following paragraphs detail the aquatic features identified within the survey sites at the time of evaluation (**Attachment A, Figure 5** and **6**).

Table 1. Aquatic Features Identified within the Survey Area

Water Identification	Hydrology Characteristics	Area (Acre)	Length (Linear Feet)
Wetland 1	Seasonally Saturated	0.01	---
Ditch 1	Ephemeral	0.03	267
Pond 1	Seasonally Inundated	0.03	---

**Actual acreage less than 0.01 acre*

Wetland 1 was an emergent wetland observed along the western boundary of Site 10, adjacent to Pond 1. The wetland appeared to form when the construction site to the east was cleared, and construction activities resulted in the formation of a berm outside of the construction fenceline allowing water to pool in the space between the fence and berm after rainfall. Hydrologic vegetation was dominated by saltmarsh aster (*Symphyotrichum subulatum*), and sumpweed (*Iva annua*). Hydric soils were indicated by a Depleted Matrix with a matrix color of 10YR 4/2 with redoximorphic concentrations of 5YR 4/6 in the pore linings and matrix. Hydrologic indicators consisted of drainage patterns, surface soil cracks, and a positive FAC-Neutral test.

Ditch 1 was a shallow, concrete-lined, stormwater drainage ditch within Site 5. Based on historic and recent aerial photography, Ditch 1 appears to have been constructed prior to 1995 to convey excess stormwater from the surrounding roads, lots, and fields. The USGS topographic map does not illustrate a blue line feature in the location of Ditch 1 and the shallow nature of the concrete channel suggests that the man-made feature replaced a swale.

Ditch 1 appeared dry in all aerial photographs. As such, it is IES' professional opinion that Ditch 1 would be considered an ephemeral feature.

Pond 1 was a small, artificial pond located along the western boundary of Site 10 with no OHWMs entering or exiting the pond. A review of aerial photography indicates Pond 1 was excavated in 2020, along the edge of a construction site with a small berm constructed across the gradient to capture sheet flow. Pond 1 was inundated at the time of the evaluation. Given the relatively small size of the pond and its location high in the watershed, it is IES' professional opinion that Pond 1 be considered seasonally inundated.

POTENTIAL JURISDICTIONAL ASSESSMENT

Due to the uncertainty associated with the definitions of waters of the United States and thereby the jurisdiction of features, IES is providing an analysis of jurisdiction based on the current NWPR and the former definitions using the *Rapanos* and *Carabell* decisions.

Navigable Waters Protection Rule (Effective 22 June 2020)

Table 2 provides an overview of the jurisdictional assessment of the aquatic features located within the survey area under the NWPR. Under this rule, none of the aquatic features located within the survey area would be considered a water of the United States (*see* **Attachment A, Figure 5**). **Wetland 1** was adjacent to an isolated pond and **Ditch 1** was a man-made ephemeral ditch; therefore, these features do not meet the definition of an adjacent wetland, or a replacement of a jurisdictional water and would not be subject to regulation. **Pond 1** does not contribute water flow through a surface connection to any intermittent or perennial water; therefore, it would not meet a definition of a jurisdictional pond or impoundment under the NWPR.

Table 2. Jurisdictional Assessment of Aquatic Features under the NWPR

Water Identification	Hydrology Characteristics	NWPR Classification
Wetland (b)(1)		
Wetland 1	Seasonally Saturated	Wetland
Ditch (b)(5)		
Ditch 1	Ephemeral	Ditch
Artificial Pond (b)(8)		
Pond 1	Seasonally Inundated	Artificial Pond

[1](a)(1-4) definitions are regulated under Section 404 of the CWA, while (b)(1-12) are excluded from regulation

1986 Waters of the United States Definitions and Rapanos Decision

The 05 June 2007 USACE and USEPA jointly published instructional guidebook is intended to provide the USACE field staff a national standard operating procedure for conducting jurisdictional determinations. The guidebook was prepared by combining all prior applicable provisions, regulations, statutes, and case laws pertaining to the CWA. All terms, definitions, and conclusions regarding the jurisdictional nature of the aquatic features used within this report are derived directly, as they are practiced, from the guidance. The following outlines the applicable interpretations of the guidance appropriate for this situation. **Table 3** provides an overview of the jurisdictional assessment of the aquatic features under the 1986 Waters of the United States definitions and the *Rapanos* decision (**Attachment A, Figure 6**).

Table 3. Jurisdictional Assessment of Aquatic Features Under the 1986 Definitions

Water Identification	Post-*Rapanos* Water Classification	33 CFR 328.3 Definition
Non-Jurisdictional Features		
Wetland 1	Seasonally Saturated	---
Ditch 1	Ephemeral	---
Pond 1	Artificial Pond	---

Non-Jurisdictional Features

Wetland 1

Wetland 1 was identified along a short swale, upstream of a pond that ran along a construction fence. Wetland 1 was neither adjacent to or abutting any non-RPWs or RPWs and lacked a significant nexus to a TNW. As such, Wetland 1 does not meet a definition of a water of the United States and would not be regulated under Section 404 of the CWA.

Ditch 1

Based on the historic aerial photography, Ditch 1 was excavated in an upland area prior to 1995 to convey surface hydrology off the surrounding roads, concrete lots, and fields. The entire ditch was dry in all aerial photographs. The USGS topographic map does not illustrate a blue line feature in the location of Ditch 1 and the shallow, concrete-lined channel suggests that the stormwater ditch replaced a swale. Current site conditions indicate that the ditch is ephemeral and does not carry relatively permanent flow. Under the 2007 guidance:

Drainage ditches would not be subject to jurisdiction under Section 404 of the CWA by definition, as such features;

- are not tributaries of waters, impoundment of waters, or are waters as defined in paragraphs (a)(1) through (7) of the CWA 33 CFR 328.3;
- are not TNW's or wetlands adjacent to a TNW, nor are they non-navigable tributaries of a TNW with relatively permanent flow or wetlands that abut such tributaries; and
- in accordance with the Rapanos guidance, ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water, are generally not considered to be waters of the United States.

Generally, under the guidance, features that do not have the physical characteristics of a tributary or a wetland and only convey sporadic flow with a speculative connection to a TNW are not considered waters of the United States.

Pond 1

Based on evidence provided by recent aerial photographs, Pond 1 was an artificial pond constructed in 2020. Pond 1 was constructed along a fence line on the edge of a construction site by excavating and placing earthen fill across the natural gradient of the landscape in such a manner to collect and redirect upslope sheet flow. Under the 2007 guidance:

Pond 1 would not be subject to jurisdiction under Section 404 of the CWA, by definition, as it;

- is not a natural pond, impoundment of waters, or a water as defined in paragraphs (a)(1)-(7) of the CWA 33 CFR 328.3;
- is not a TNW or wetland adjacent to a TNW, nor is it a non-navigable tributary of a TNW with relatively permanent flow or wetlands that abut such tributaries; and
- as clarified under 33 CFR 323.2 (b), The term *lake* … As used in this regulation, the term does not include artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water for such purposes as stock watering, irrigation, settling basins, cooling, and rice growing.

CONCLUSIONS

To summarize the delineation, a wetland, a ditch, and a pond were identified and delineated within the survey area. A summary of these features' characteristics is presented in **Table 1** and a summary of the jurisdictional assessment is presented in **Table 2** under the NWPR and in **Table 3** for the 1986 waters of the United States definitions and the *Rapanos* decision.

Under the ***NWPR,*** and the ***1986 waters of the United States definitions*** and the *Rapanos* decision, none of the identified aquatic features would be waters of the United States.

This delineation is based on professional experience in the approved methodology, photograph interpretation and assessing the desktop resources, and from experience with the USACE Fort Worth District regulators; however, this delineation does not constitute a jurisdictional determination of waters of the United States. This delineation has been based on the professional experience of IES staff and our interpretation of USACE regulations at 33 CFR 328.3, the joint USACE/USEPA guidance regarding the *Rapanos* and *Carabell* decisions, IES' interpretation of the NWPR, current judicial reviews, and the Regulatory Guidance Letter (RGL) 08-02. While, IES believes our delineation to be accurate, final authority to interpret the regulations lies solely with the USACE and USEPA. The USACE Headquarters in association with the USEPA often issue guidance that changes the interpretation of published regulations. USACE/USEPA guidance issued after the date of this report has the potential to invalidate the report conclusions and/or recommendations, which may create the need to reevaluate the report conclusions. IES has no regulatory authority, as such, proceeding based solely upon this report does not protect the Client from potential sanction or fines from the USACE/USEPA. The Client acknowledges that they have the opportunity to submit this report to the USACE for a preliminary jurisdictional determination for concurrence prior to proceeding with any work within aquatic features located on the survey area. If the Client elects not to do so, then the Client proceeds at their sole risk.

IES appreciates the opportunity to work with you and the Dallas Fort Worth International Airport Environmental Affairs Department on this project, and we hope we may be of assistance to you in the future. If you have any comments, questions, or concerns, please do not hesitate to contact us. We can be reached at 972-562-7672 or by email at skipp@intenvsol.com or rreinecke@intenvsol.com.

Sincerely,

Integrated Environmental Solutions, LLC.

Mr. Shae Kipp
Ecologist

Attachments

File ref: 03.006.094

ATTACHMENT A
Figures

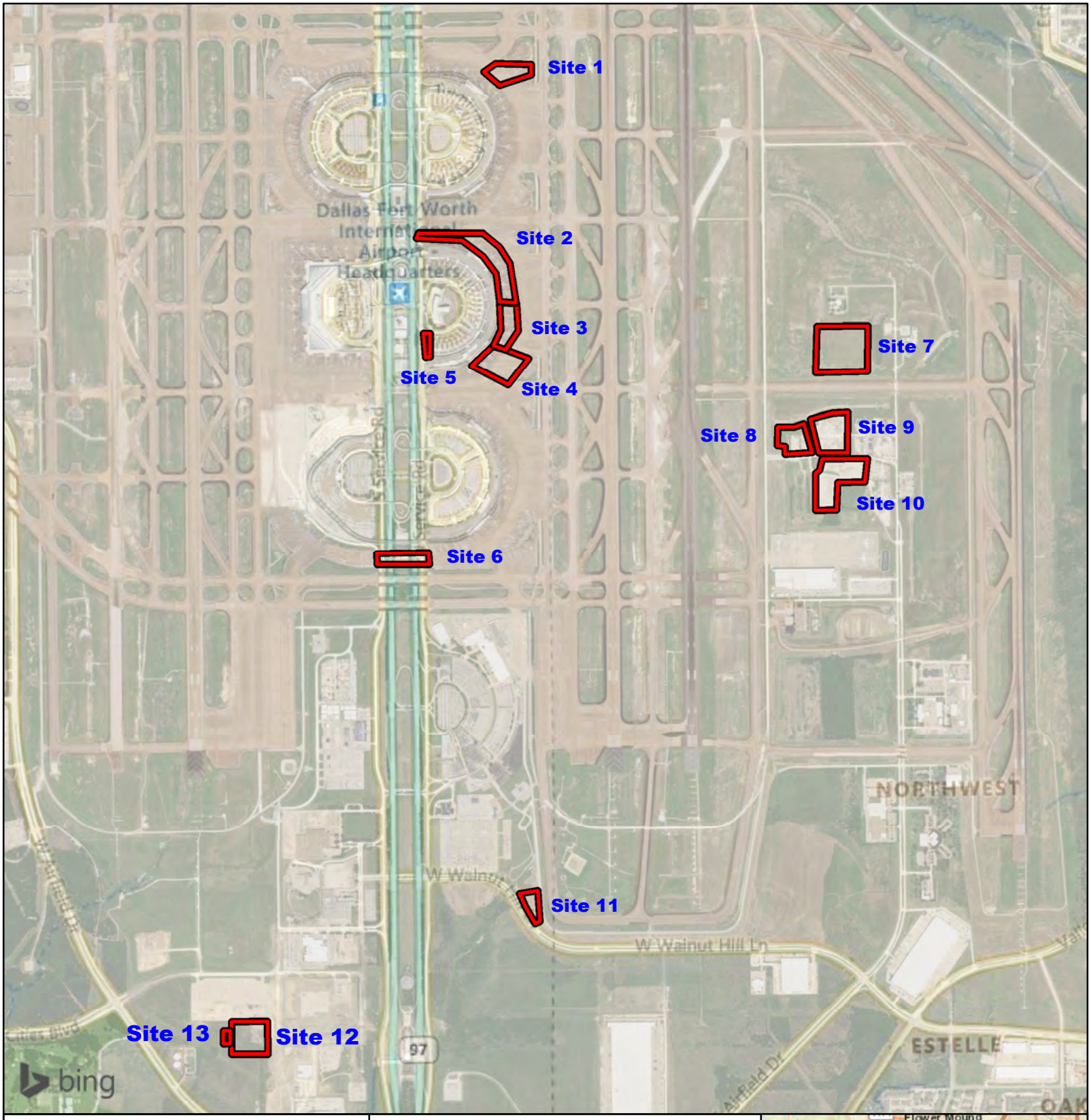


Figure 1.
General Location Map

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

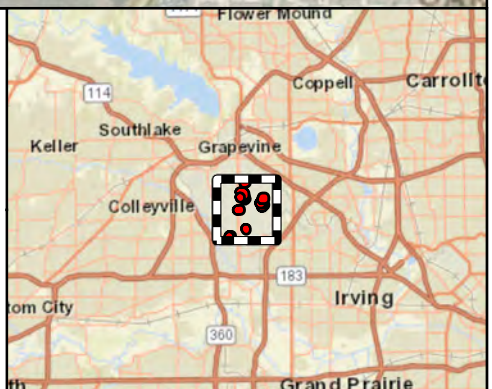
1 in = 2,000 feet

Feet
0 2,000

N
W E
S

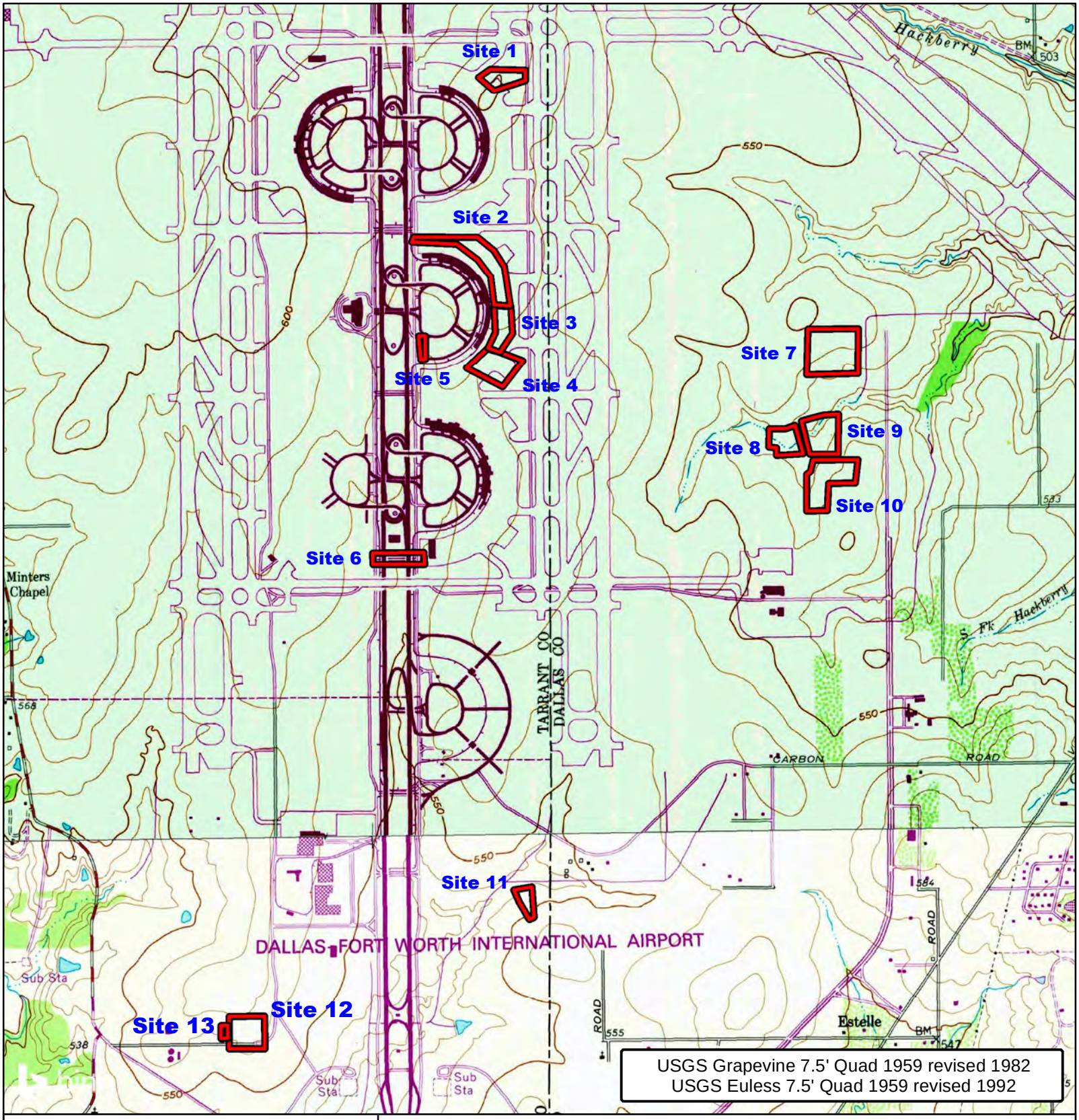
File Ref. 03.006.094
Date: 9/28/2021

Survey Area



Area of Detail

Scale: 1 inch equals 10 miles



Survey Area

Figure 2A.
Topographic Setting

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
0 2,000

N
W E
S

File Ref. 03.006.094
Date: 9/28/2021

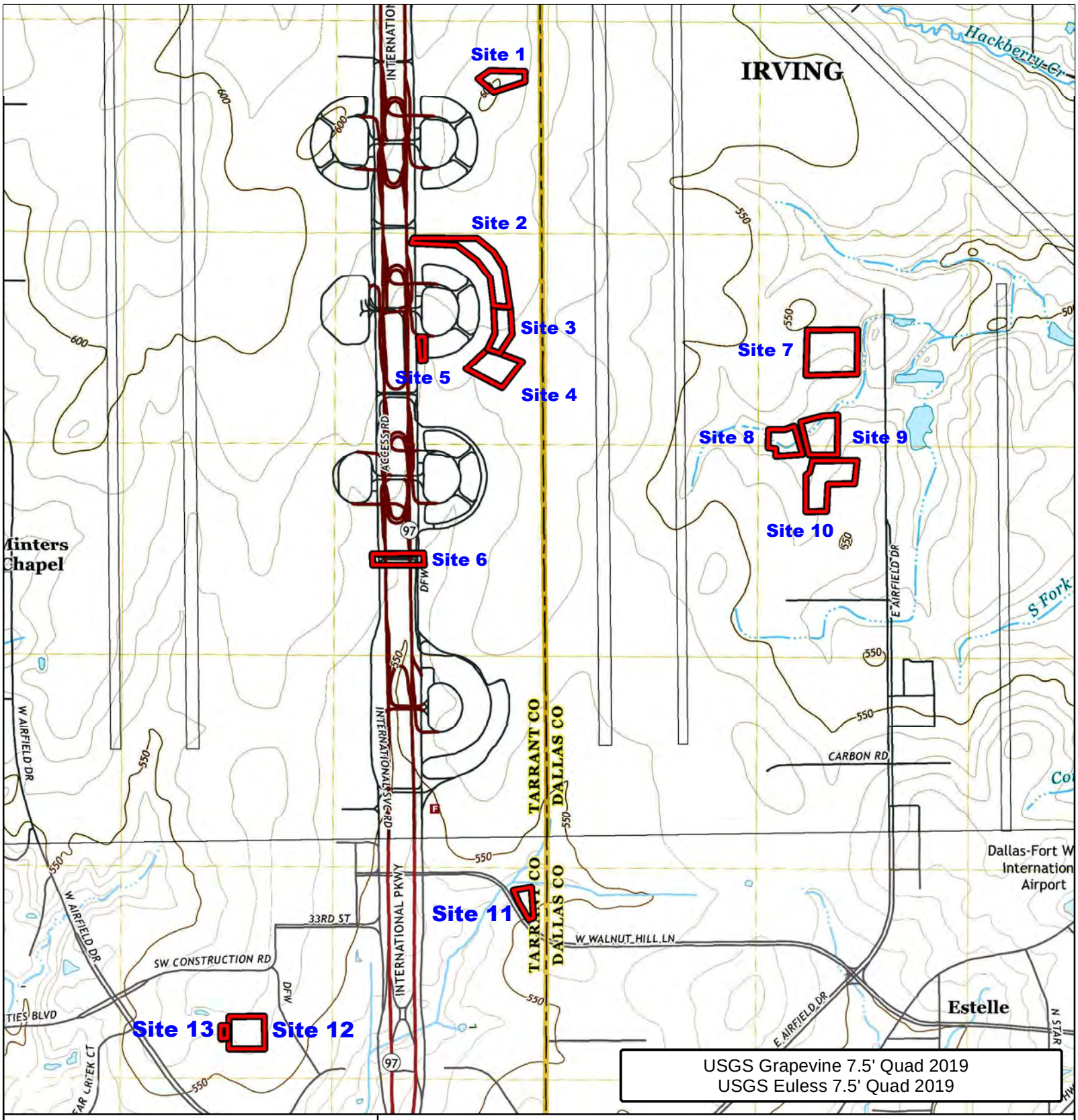


Figure 2B.
Topographic Setting

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
0 2,000

N
W E
S

File Ref. 03.006.094
Date: 9/28/2021

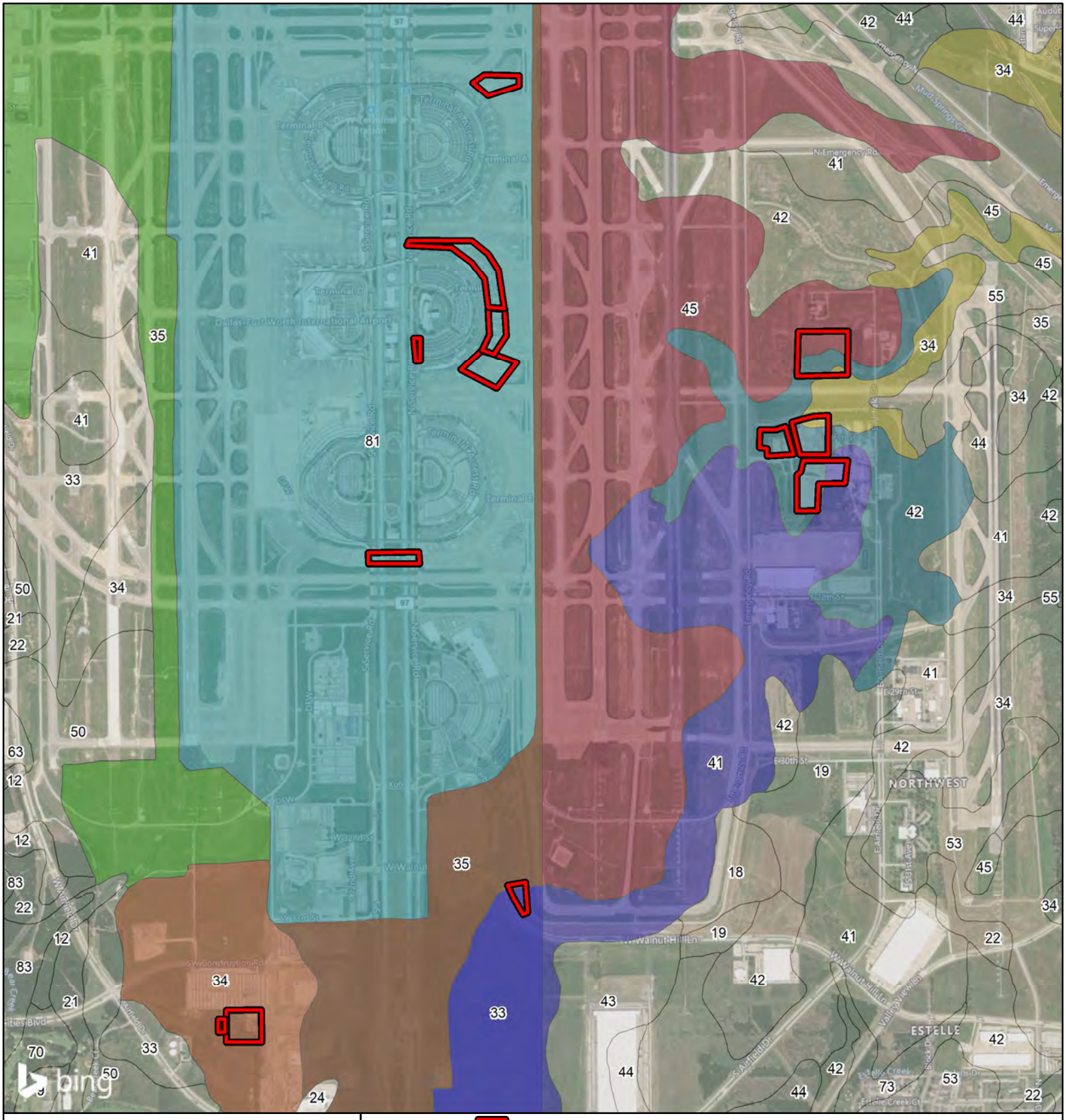


Figure 3.
Soils Map

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
0 2,000

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W E
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File Ref. 03.006.094
Date: 9/29/2021

Survey Area
Soil map units outside survey area

Soil Map Units - Dallas County

- 34- Ferris-Heiden complex, 5 to 12 percent slopes
- 41- Heiden clay, 1 to 3 percent slopes
- 42- Heiden clay, 2 to 5 percent slopes, eroded
- 45- Houston Black-Urban land complex, 0 to 4 percent slopes

Soil Map Units - Tarrant County

- 33 - Heiden clay, 1 to 3 percent slopes
- 34 - Houston Black clay, 1 to 3 percent slopes
- 35 - Houston Black-Urban land complex, 1 to 4 percent slopes
- 81 - Urban land

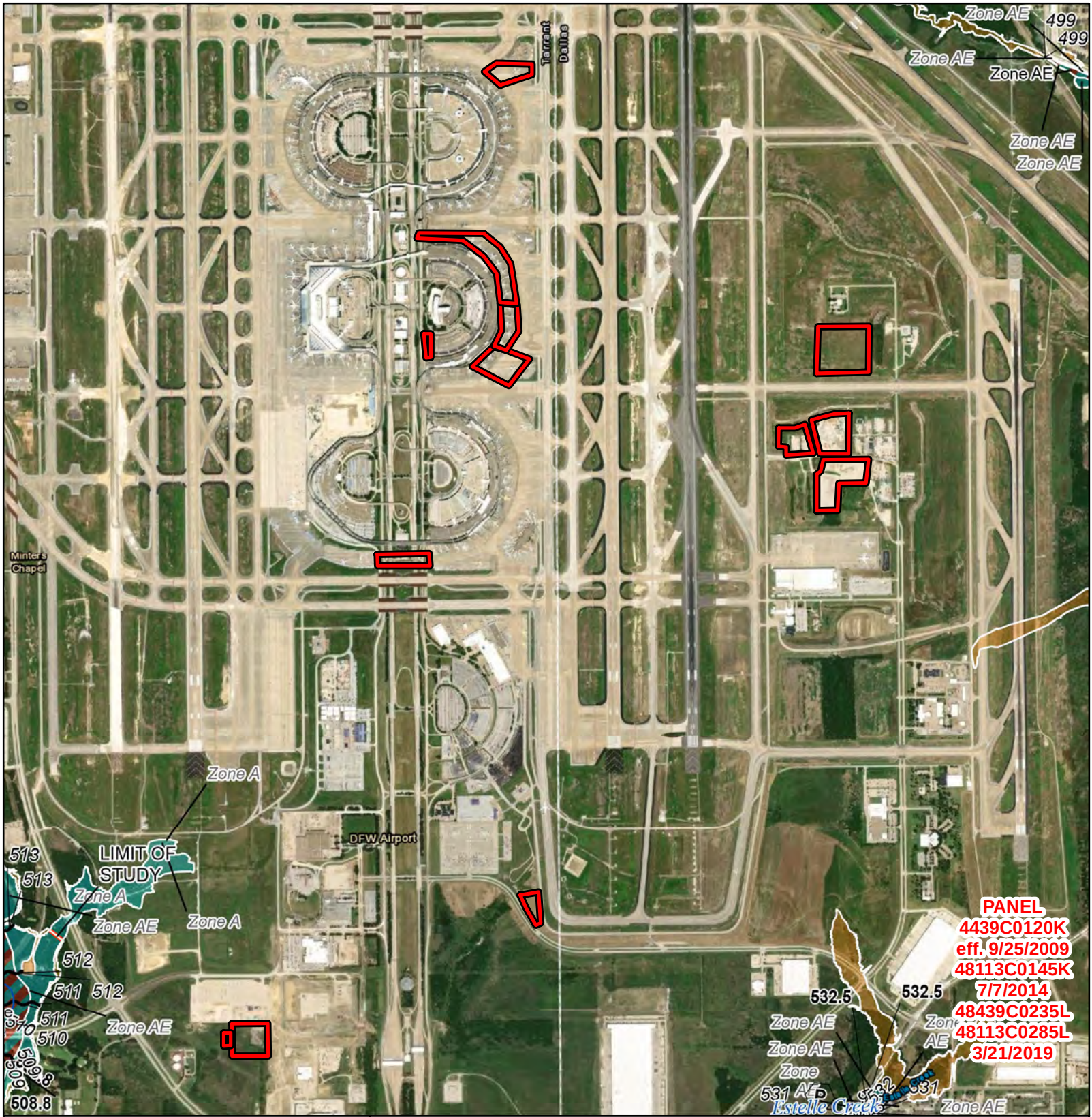


Figure 4.
Federal Emergency Management Agency
Flood Insurance Rate Map

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
0 2,000

N
W E
S

File Ref. 03.006.094
Date: 9/29/2021

Survey Area

FEMA FIRM Zone Descriptions

- Zone X - Areas determined to be outside the 0.2% annual chance floodplain
- Zone X - Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood
- Zone A - Special Flood Hazard Areas subject to inundation by the 1% annual chance flood; No base flood elevations determined
- Zone AE - Special Flood Hazard Areas subject to inundation by the 1% annual chance flood; Base flood elevations determined
- Zone AE - Floodway areas in Zone AE

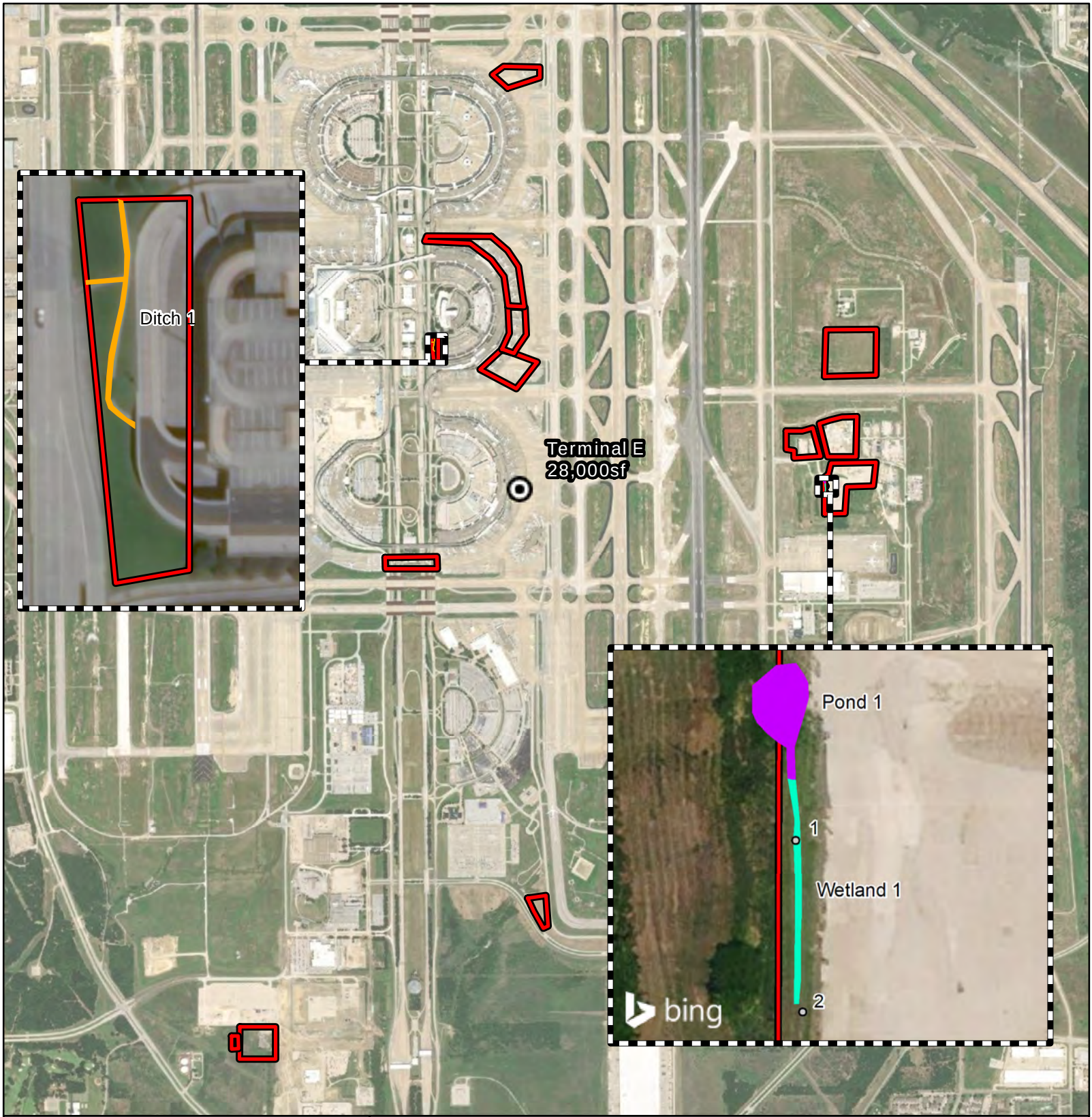


Figure 5.
NWPR Aquatic Features Identified within the Survey Area

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
0 2,000

N
W E
S

File Ref. 03.006.094
Date: 9/29/2021

Survey Area
Wetland Determination Data Form

Aquatic Features Excluded From Jurisdiction

Wetland (b)(1)
Ditch (b)(5)
Artificial Pond (b)(8)

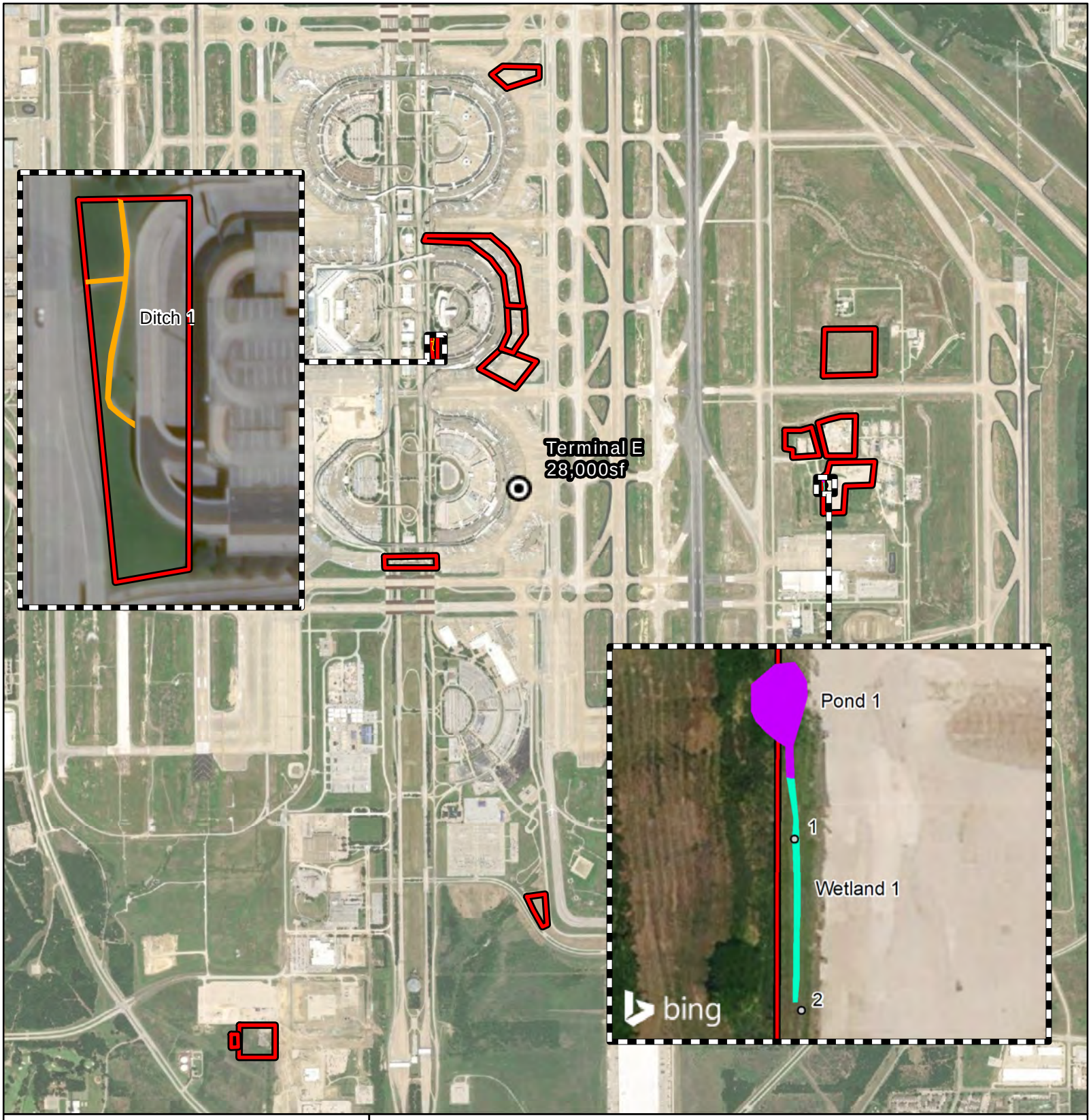


Figure 6.
Pre-2015 Aquatic Features Identified within the Survey Area

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
0 2,000

N
W E
S

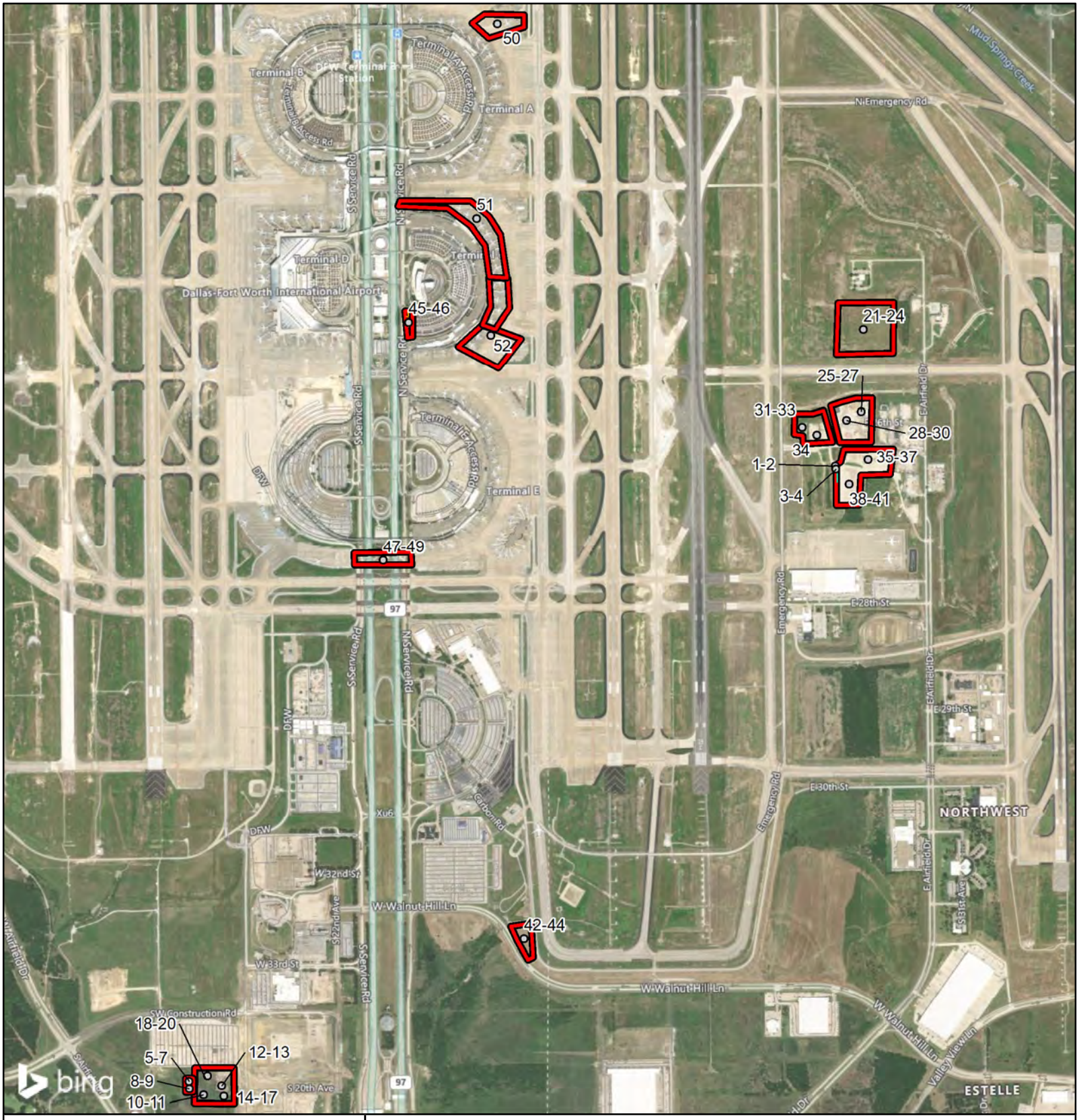
File Ref. 03.006.094
Date: 9/29/2021

Survey Area
Wetland Determination Data Form

Aquatic Features Excluded From Jurisdiction

Wetland, Isolated
Ditch, Ephemeral
Artificial Pond

ATTACHMENT B
Site Photographs



Photograph Location Map

CTA Development
DFW International Airport
Dallas and Tarrant Counties, Texas

1 in = 1,800 feet

Feet
0 1,800

N
W E
S

File Ref. 03.006.094
Date: 9/29/2021

Survey Area
Photograph Location

Aquatic Features Excluded From Jurisdiction

Wetland, Isolated
Ditch, Ephemeral
Artificial Pond

Photograph 1

Photograph 2

Photograph 3

Photograph 4

Photograph 5

Photograph 6

Photograph 7

Photograph 8

Photograph 9

Photograph 10

Photograph 11

Photograph 12

Photograph 13

Photograph 14

Photograph 15

Photograph 16

Photograph 17

Photograph 18

Photograph 19

Photograph 20

Photograph 21

Photograph 22

Photograph 23

Photograph 24

Photograph 25

Photograph 26

Photograph 27

Photograph 28

Photograph 29

Photograph 30

Photograph 31

Photograph 32

Photograph 33

Photograph 34

Photograph 35

Photograph 36

Photograph 37

Photograph 38

Photograph 39

Photograph 40

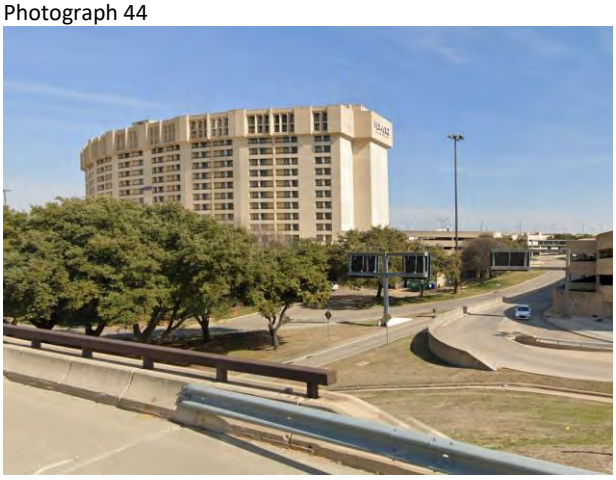
Photograph 41

Photograph 42

Photograph 43

Photograph 44

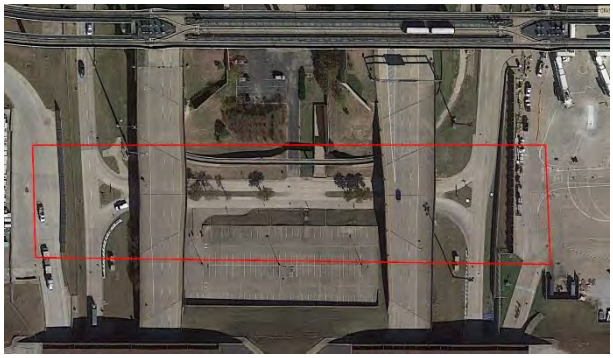
Photograph 45*



Photograph 46*

Photograph 47*

Photograph 48*



Photograph 49*

Photograph 50*

Photograph 51*

Photograph 52*

*Aerial Images and Street View Images from Google Earth

ATTACHMENT C
Routine Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CTA Development Project | City/County: DFW Airport/Tarrant | Sampling Date: 9/22/2021

Applicant/Owner: Dallas/Fort Worth International Airport, Environmental Affairs Department | State: TX | Sampling Point: 1

Investigator(s): Karisa Fenton; Claire Unruh | Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Swale | Local relief (concave, convex, none): Concave | Slope %: 0-1

Subregion (LRR): J | Lat: 32.889606 N | Long: -97.019763 W | Datum: NAD 1983

Soil Map Unit Name: Heiden clay, 2 to 5 percent slopes, eroded | NWI Classification: N/A

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

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ☒	No ☐	Is the Sampled Area within a wetland?	**Yes** ☒ **No** ☐
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐		

Remarks: Swale adjacent to pond along construction fenceline.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot Size: 30' Radius)	Absolute % Coverage	Dominant Species?	Indicator Status
1. *N/A*			
2.			
3.			
4.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot Size: 15' Radius)			
1. *N/A*			
2.			
3.			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot Size: 5' Radius)			
1. *Iva annua*	40	Yes	FAC
2. *Symphyotrichum subulatum*	35	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	75 = Total Cover		

Woody Vine Stratum (Plot Size: 15' Radius)			
1. *N/A*			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 25

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index Worksheet:

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

Prevalence Index = B/A=

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- Yes 2 - Dominance Test is > 50%
- 3 - Prevalence Index is ≤ 3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

SOILS

Sampling Point: 1

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Loc[2]	Texture	Remarks
0-16	10 YR 4/2	97	5 YR 4/6	3	C	PL/M	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) **(LRR F)**
- ☐ 1 cm Muck (A9) (**LRR F, G, H)**
- ☐ Depleted below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ☐ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16 **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 CM Muck (A9) **(LRR I, J)**
- ☐ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ☐ Dark Surface (S7) **(LRR G)**
- ☐ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ☒ **No** ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☒ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☒ Drainage patterns (B10)
- ☐ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present? Yes? ☐ No? ☒ Depth (inches): N/A

Water Table Present? Yes? ☐ No? ☒ Depth (inches): N/A

Saturation Present? (includes capillary fringe) Yes? ☐ No? ☒ Depth (inches): N/A

Wetland Hydrology Present? **Yes** ☒ **No** ☐

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

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CTA Development Project | City/County: DFW Airport/Tarrant | Sampling Date: 9/22/2021

Applicant/Owner: Dallas/Fort Worth International Airport, Environmental Affairs Department | State: TX | Sampling Point: 2

Investigator(s): Karisa Fenton; Claire Unruh | Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): None | Slope %: 0-1

Subregion (LRR): J | Lat: 32.889606 N | Long: -97.019763 W | Datum: NAD 1983

Soil Map Unit Name: Heiden clay, 2 to 5 percent slopes, eroded | NWI Classification: N/A

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

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ☐	No ☒	Is the Sampled Area within a wetland?	Yes ☐ No ☒
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒		

Remarks: Hillslope upslope of wetland swale, along construction fenceline. Upland berm evident between wetland and downslope area.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot Size: 30' Radius)	Absolute % Coverage	Dominant Species?	Indicator Status
1. *N/A*			
2.			
3.			
4.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot Size: 15' Radius)			
1. *N/A*			
2.			
3.			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot Size: 5' Radius)			
1. *Helianthus annuus*	40	Yes	FACU
2. *Sorghum halepense*	40	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	80 = Total Cover		

Woody Vine Stratum (Plot Size: 15' Radius)			
1. *N/A*			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 20

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index Worksheet:

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

Prevalence Index = B/A=

Hydrophytic Vegetation Indicators:

_____ 1 - Rapid Test for Hydrophytic Vegetation

_____ 2 - Dominance Test is > 50%

_____ 3 - Prevalence Index is ≤ 3.0[1]

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

_____ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOILS

Sampling Point: 2

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	10 YR 4/2	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) **(LRR F)**
- ☐ 1 cm Muck (A9) (**LRR F, G, H)**
- ☐ Depleted below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ☐ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16 **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 CM Muck (A9) **(LRR I, J)**
- ☐ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ☐ Dark Surface (S7) **(LRR G)**
- ☐ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ☐ **No** ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage patterns (B10)
- ☐ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present? Yes? ☐ No? ☒ Depth (inches): N/A

Water Table Present? Yes? ☐ No? ☒ Depth (inches): N/A

Saturation Present? (includes capillary fringe) Yes? ☐ No? ☒ Depth (inches): N/A

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:

ATTACHMENT D
Historic Aerial Photographs

CTA Development Project

2682 E Airfield Dr

Dallas, TX 75261

Inquiry Number: 6681807.1

September 28, 2021

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

09/28/21

Site Name:

CTA Development Project
2682 E Airfield Dr
Dallas, TX 75261
EDR Inquiry # 6681807.1

Client Name:

Integrated Env. Solutions, Inc.
610 Elm St Suite 300
McKinney, TX 75069
Contact: Claire Unruh

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	Scale	Details	Source
2016	1"=500'	Flight Year: 2016	USDA/NAIP
2012	1"=500'	Flight Year: 2012	USDA/NAIP
2008	1"=500'	Flight Year: 2008	USDA/NAIP
2005	1"=500'	Flight Year: 2005	USDA/NAIP
1995	1"=500'	Acquisition Date: January 31, 1995	USGS/DOQQ
1990	1"=500'	Flight Date: January 29, 1990	NAPP
1984	1"=500'	Flight Date: May 10, 1984	TXDOT
1979	1"=500'	Flight Date: November 11, 1979	USDA
1972	1"=500'	Flight Date: February 13, 1972	USDA
1968	1"=500'	Flight Date: September 18, 1968	USGS
1958	1"=500'	Flight Date: January 07, 1958	ASCS
1950	1"=500'	Flight Date: December 17, 1950	USDA
1942	1"=500'	Flight Date: January 27, 1942	USDA

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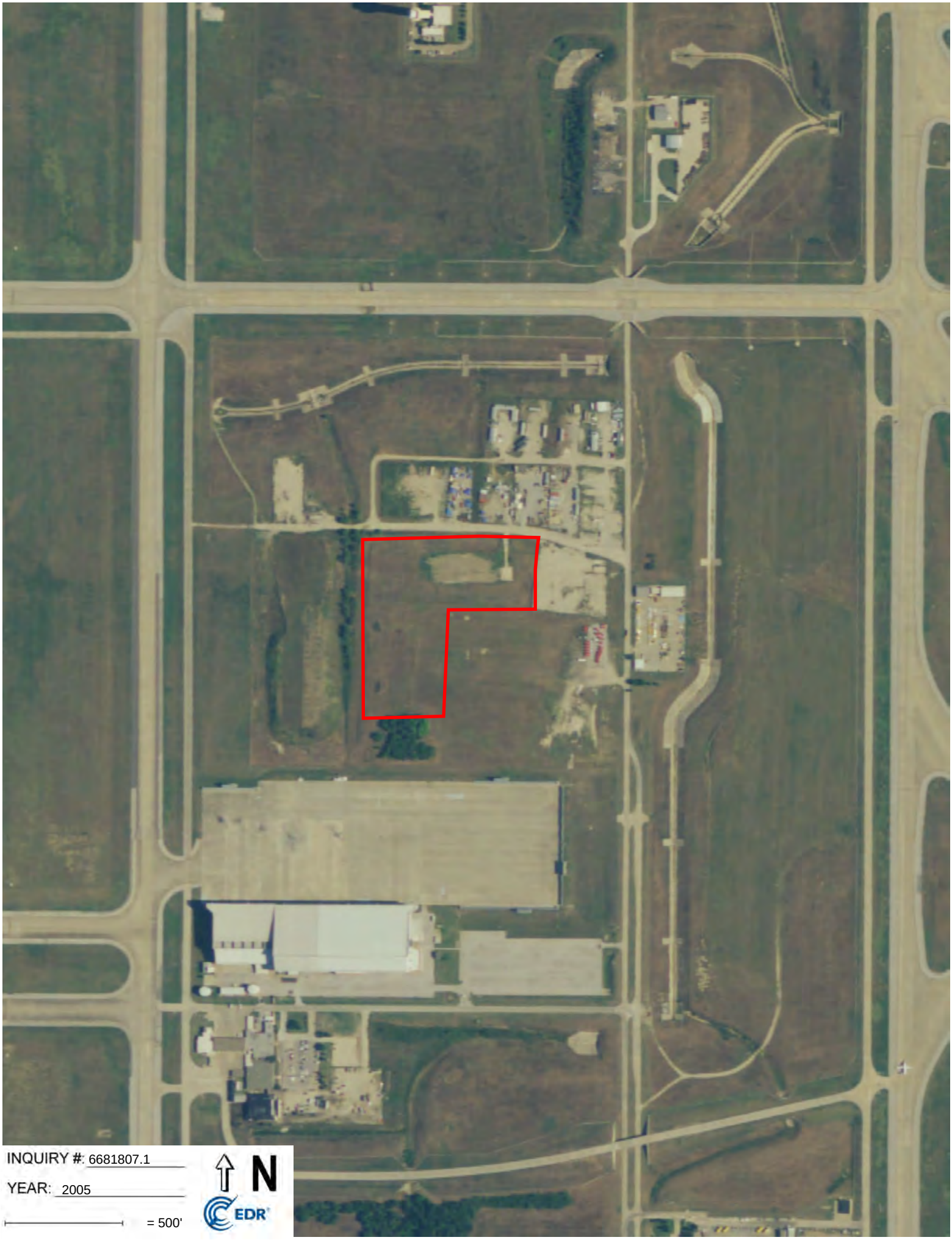
INQUIRY #: 6681807.1
YEAR: 2016
= 500'
N
EDR


INQUIRY #: 6681807.1
YEAR: 2012
= 500'
N
EDR


INQUIRY #: 6681807.1
YEAR: 2008
= 500'
N
EDR



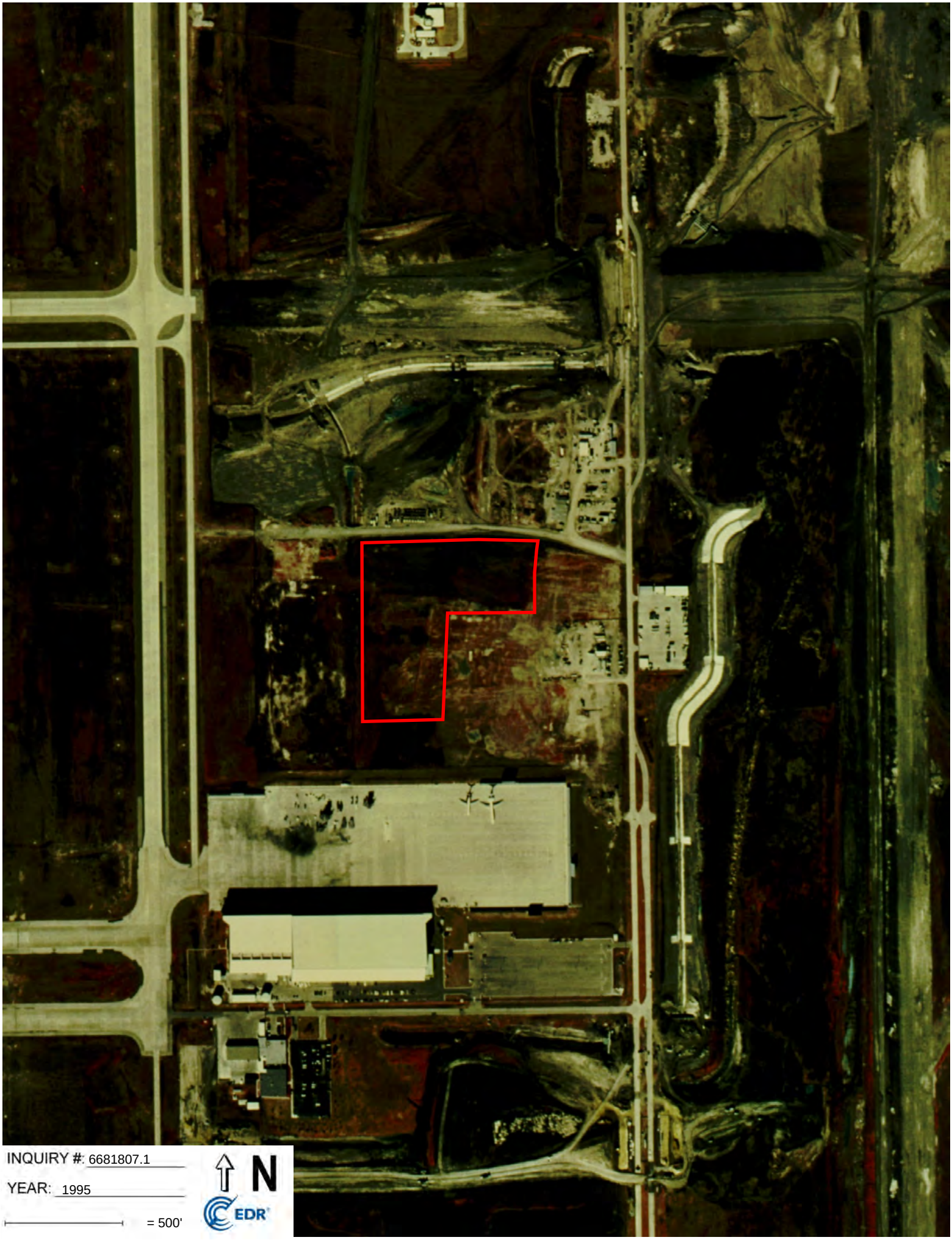
INQUIRY #: 6681807.1

YEAR: 2005

= 500'

N

EDR



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YEAR: 1995

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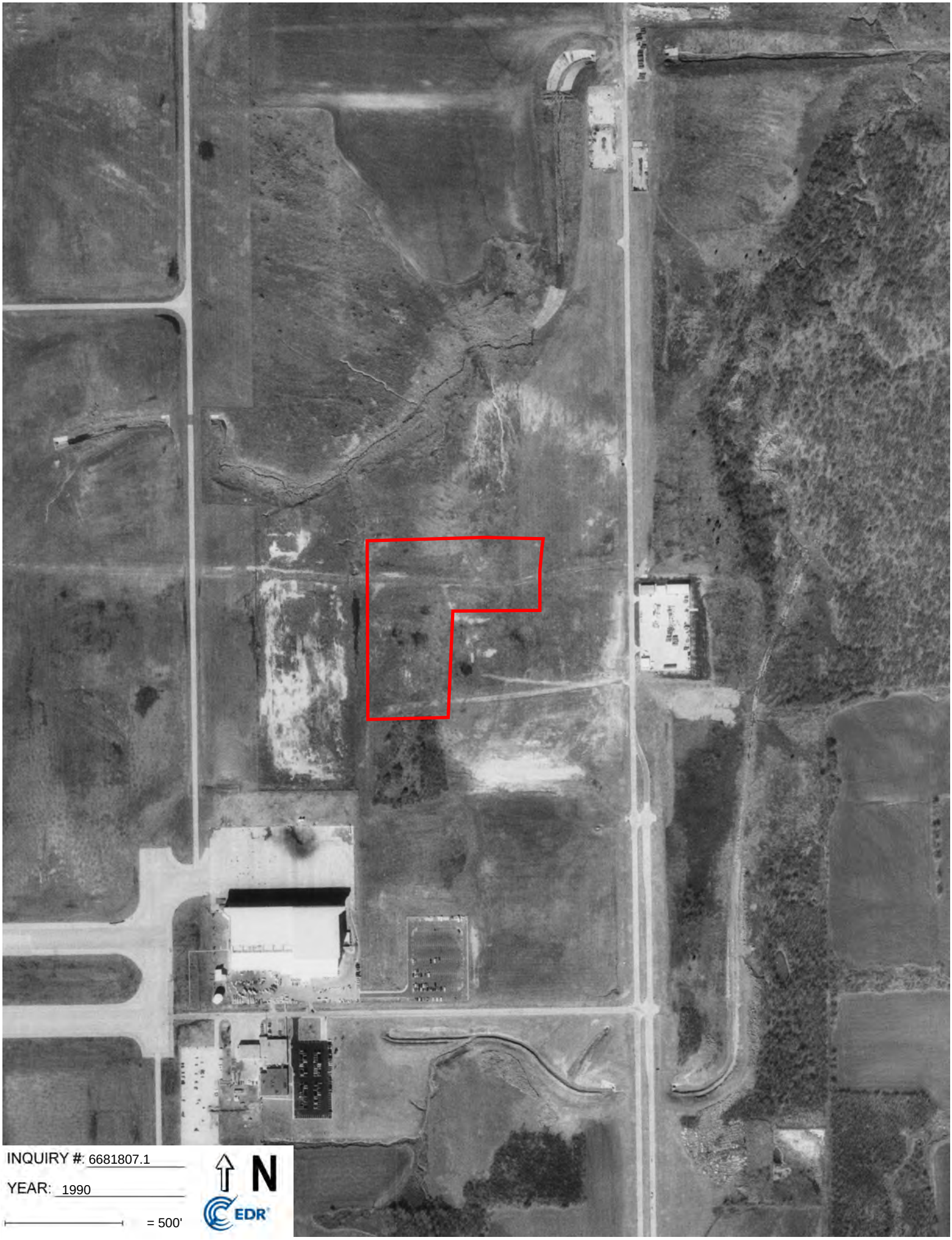
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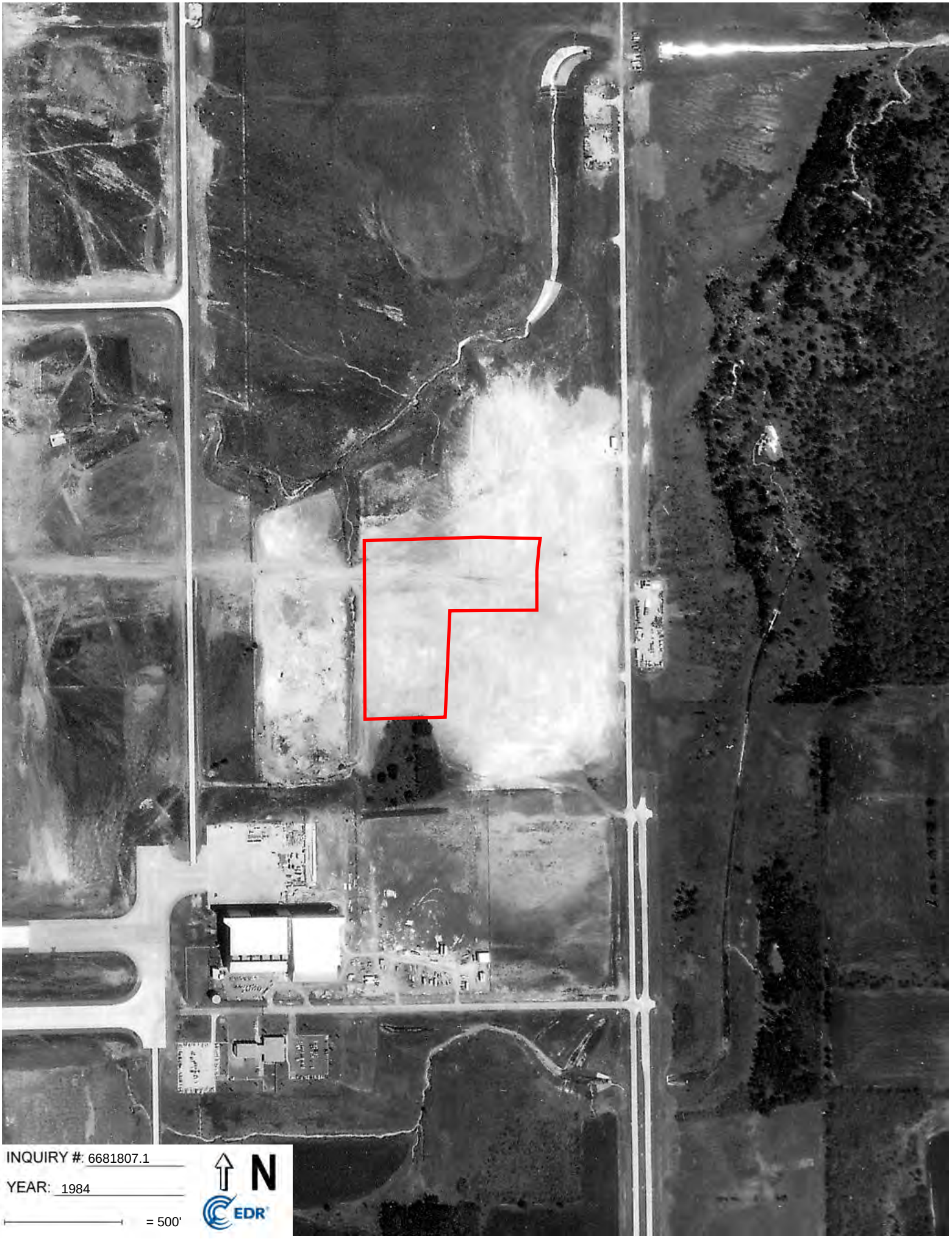
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EDR

INQUIRY #: 6681807.1

YEAR: 1979

= 500'

N

EDR

INQUIRY #: 6681807.1

YEAR: 1972

= 500'

N

EDR


INQUIRY #: 6681807.1
YEAR: 1968
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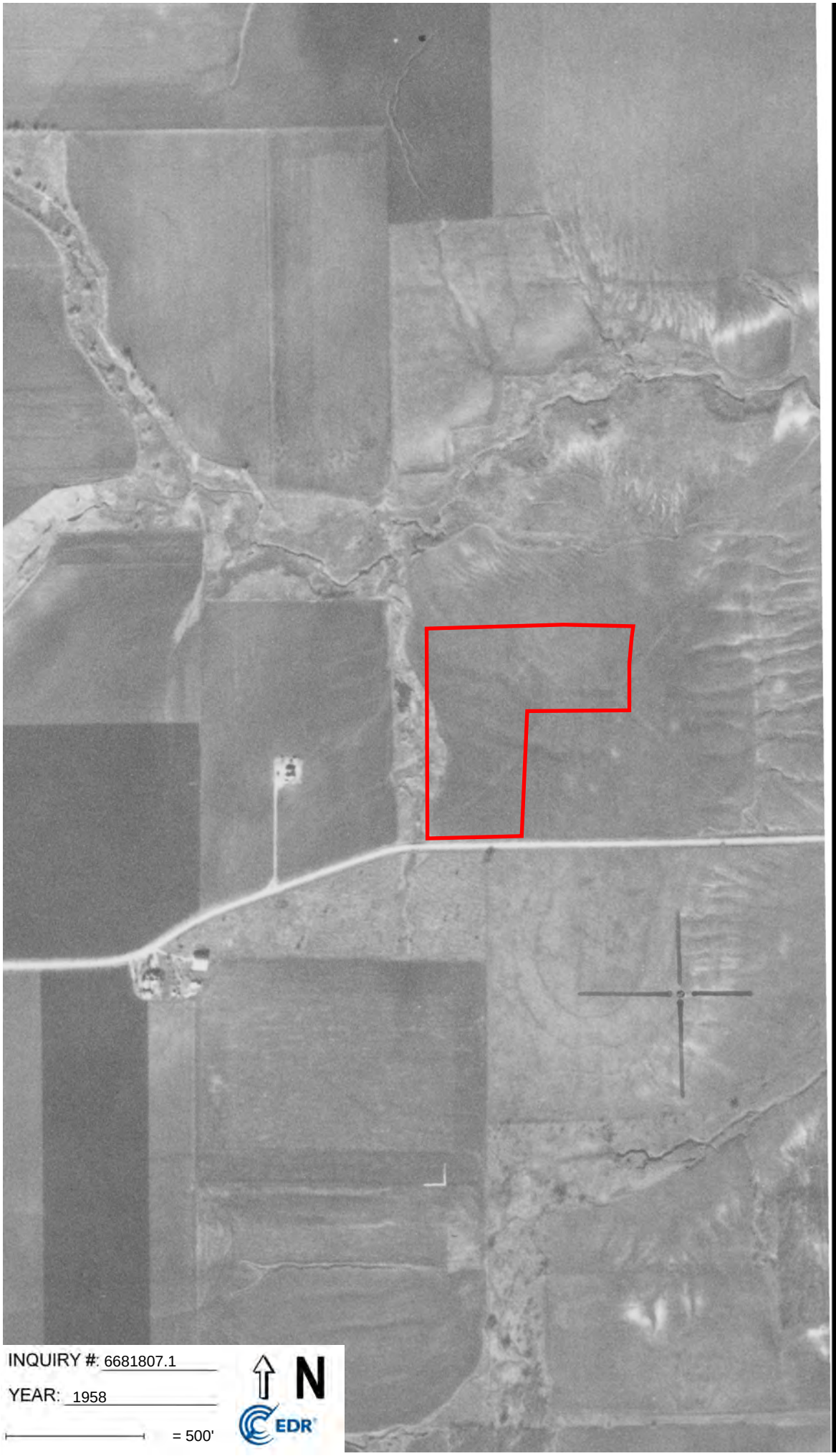
EDR



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YEAR: 1958

= 500'

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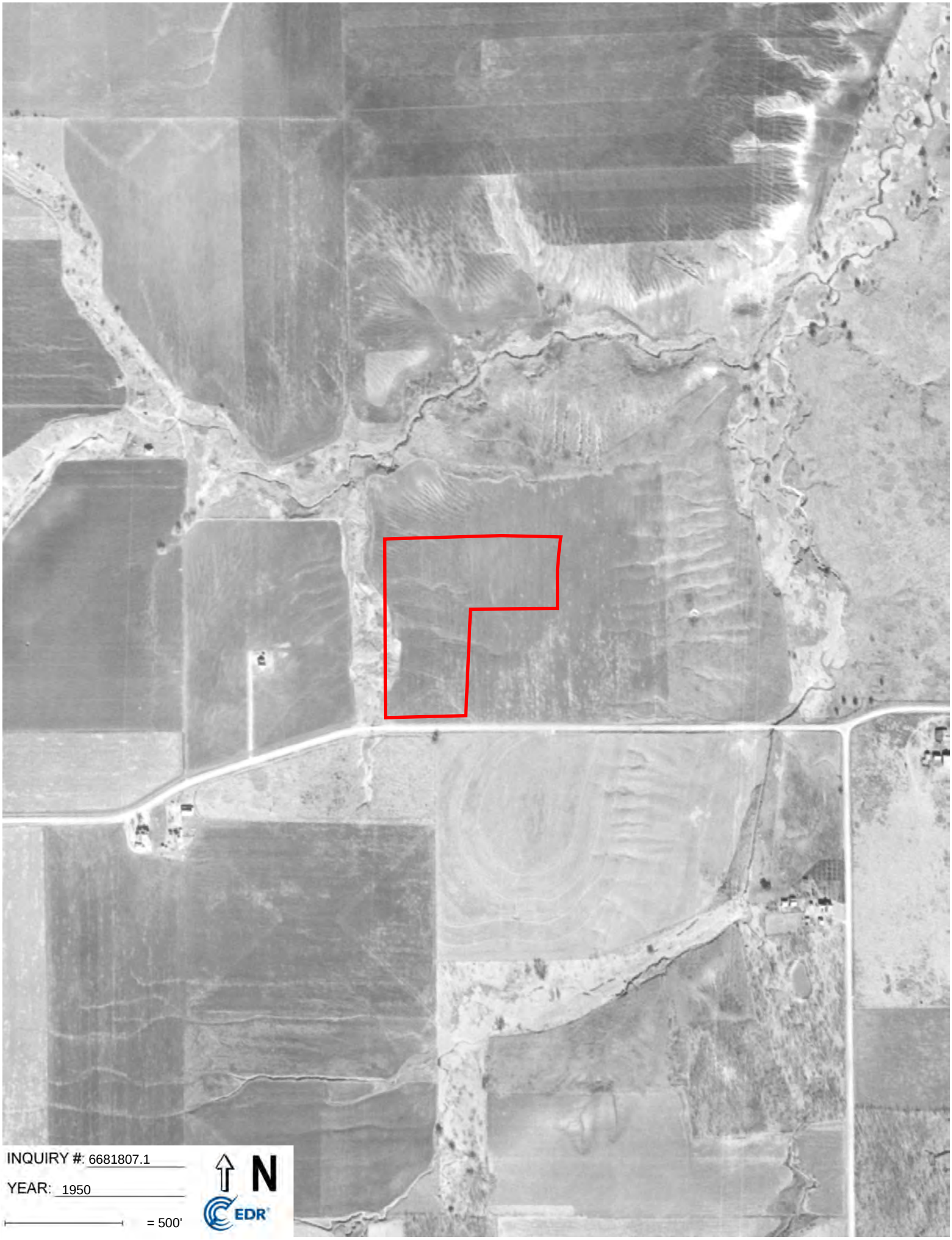
INQUIRY #: 6681807.1
YEAR: 1950
= 500'
N
EDR

INQUIRY #: 6681807.1

YEAR: 1942

= 500'

N

EDR

APPENDIX C – CULTURAL RESOURCES REPORT AND THC/SHPO CONCURRENCE

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AIRFIELD RAMP EFFICIENCY IMPROVEMENTS PROJECT

Section 106 Assessment

Komatsu Architecture
Contract Delivery Order 27 – Revision 4
3.23.2022

March 23, 2022

Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711-2276

RE: Initiation of Section 106 Consultation for Airfield Ramp Efficiency Improvement Project

Dear Mr. Wolfe:

On behalf of the Dallas Fort Worth International Airport and the Federal Aviation Administration (FAA), Komatsu Architecture is initiating consultation with the State Historic Preservation Office (SHPO) for the proposed Airfield Ramp Efficiency Improvement Project at DFW International Airport property. The DFW International Airport is seeking approval from the FAA to modify their Airport Layout Plan (ALP) to reflect the permanent alterations. Since the ALP modification is considered a federal action, the FAA will review the undertaking in accordance with the National Environmental Policy Act of 1969 (NEPA). In addition, coordination with the SHPO, represented by the Texas Historical Commission (THC) is necessary in accordance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 and its implementing regulations, 36 CFR Part 800, which requires that federal agencies consider the effects of their undertakings on historic properties. In addition, to direct action of the federal government, federal undertakings are project involving permits, funding, or other assistance. Therefore, we are requesting a review of the project to determine THC/SHPO recommendation to proceed.

The Airfield Ramp Efficiency Improvements Project is located primarily in the Infield areas surrounding Terminals A and C, with additional Infield modifications around Terminal B, as illustrated in Image 1. The purpose of the project is to enhance airfield efficiency by improving the Airfields, terminal ramps, and runway apron areas surrounding the east side of Terminal A and C, and northwest side of Terminal B.

The Airfield Ramp Efficiency project also includes the relocation and replacement of the Northeast Airfield Lighting Vault building currently located on the northeast corner of the Terminal A ramp, as illustrated in Image 1 (Infield Area #4). The purpose of this project is to relocate the vault to the southeast side of the Airport, adjacent to the Southeast End Around Taxiway (as shown in Image 1). The project will also upgrade the electrical supply and associated building that powers the east airfield lighting systems.

The Airfield Ramp Efficiency Improvements Project and Vault Relocation will be constructed during the same general timeframe as the other Airport projects namely, the Central Terminal Area (CTA) Expansion, and the Service Delivery System (SDS) and Electric Central Utility Plant. The CTA Expansion includes improvements and modifications to Terminal A and C in order to improve airport efficiency and capacity. DFW and FAA recently coordinated with THC on the projects listed below:

- Services Delivery System (SDS) – includes Central Utility Plant, Boiler House, Pump House, and Utility Corridor – Section 106 report submitted to THC on Feb. 25, 2022; THC Concurrence received on March 10, 2022.
- Project Integration Office (PIO) – New development on a vacant parcel within the southwest quadrant of DFW Airport. Section 106 review, particularly for archeological resources, was completed, and THC concurrence was received in 2018.
- High C Gates Replacement – Demolition and rebuild of High C Gates; these were constructed in 1987. Section 106 review is completed, and THC concurrence was received on September 30, 2020.

DFW and FAA will continue to coordinate and collaborate with THC to ensure Section 106 review of future projects such as the Terminal A Modifications and North Pier, Terminal C South Processor and Pier, Terminal C Interior Renovations, and Terminal C Garages and Roadways upgrades.

Image 1. CTA Development Program Overview

DFW Airport Cultural Resources Evaluation Overview

For the last two years, DFW Airport has proactively reviewed the Airport Operational Area (AOA) for potential historic resources as the Airport's age nears fifty years. The resulting Cultural Resources Evaluation report is included in Attachment D. The investigation process for the Evaluation report was organized in the following order:

- Terminal C Cultural Resources Evaluation (Task 1)
- High C Gates Section 106 (Task 1B) – Review complete and concurrence received from THC.
- DFW Airport Cultural Resources Evaluation: Terminals A, B, & E (Task 3A)

Detailed reviews of the Terminals' history, design, and existing integrity are included in this report along with historic contexts for the Airport as a whole. Detail analysis of the Terminals' eligibility for the National Register is also included in the report.

These "Task" assignments were authorized by DFW EAD and provide the basis for this "Task 4A" report, which outlines the Section 106 consultation process for the Airfield Ramp Efficiency Improvements Project. The Task sequence was driven in part by the schedule for the Ramp Efficiency Project and an effort to complete the project in advance of the other comprehensive Central Terminal package of elements occurring within five years prior to DFW's original 1974 resources reaching the fifty-year National Register threshold. This was necessitated by the airline tenant needs, as well as replacement of aging infrastructure to meet current and future capacity demands based on industry

and DFW specific traffic projections. The Evaluations have followed standard protocols, recognized research, and information for cultural resource data to support National Historic Preservation Act (NHPA) Section 106 requirements to date at this stage of the process.

Undertaking

The Airfield Ramp Efficiency Improvements project scope addresses aircraft movement efficiency, airfield congestion, and taxiing relief around Terminals A, B, and C by increasing the amount of Apron Entry Point (AEP) locations available for use. By adding aircraft pavement in strategic locations near the Terminal buildings, the number of AEP locations will be increased and available for passenger aircraft traveling to and from the Terminals, which reduces choke points and increases operational flexibility, efficiency, and capacity. The project locations illustrated in Image 2 are currently being used for a variety of purposed to include airfield lighting infrastructure, airline support facilities, aircraft hardstands, and other functions. Five discrete infield areas on the aircraft ramp adjacent to the existing Terminal complex have been identified:

- Infield #1 is located southeast of Terminal C
- Infield #2 is located northeast of Terminal C
- Infield #3 is located southeast of Terminal A
- Infield #4 is located northeast of Terminal A, current location of Northeast Airfield Lighting Vault
- Infield #5 is located northwest of Terminal B

The Infield sites include mostly ground level paving with concrete walls to section off storage and equipment containment. Some of the Infields include small above grade buildings that are not of historic age or original to the Airport design. Existing conditions can be reviewed in Attachment B. This project will remove all existing infrastructure in the defined Infield locations and modify the locations for future aircraft taxing and parking. Parking for Ground Service Equipment (GSE) will be moved as indicated on Image 2. These projects are set page from the primary Airport structures and will not modify the Terminal Buildings.

The main enhancement for the Airfield Ramp Efficiency Project is the approximately 15.5 acres of concrete pavement construction. Demolition is necessary to construct this new heavy-duty concrete aircraft pavement. Some of the areas to be paved are grass infields today, but a significant portion of the subject areas are paved with light-duty pavement that must be removed because it was only

designed for lightweight Ground Service Equipment. A portion of the existing deicing infrastructure located in Infield #4 will be demolished/replaced due to age, deterioration, or due to changing ramp geometry. The existing Deicing Pad will be expanded and optimized for Aircraft Design Group III aircraft. The existing stormwater collection and conveyance system must be modified to ensure adequate drainage on the proposed pavement. In addition, several underground utilities and underground storage tanks (fuel and SADF) must be adjusted or relocated.

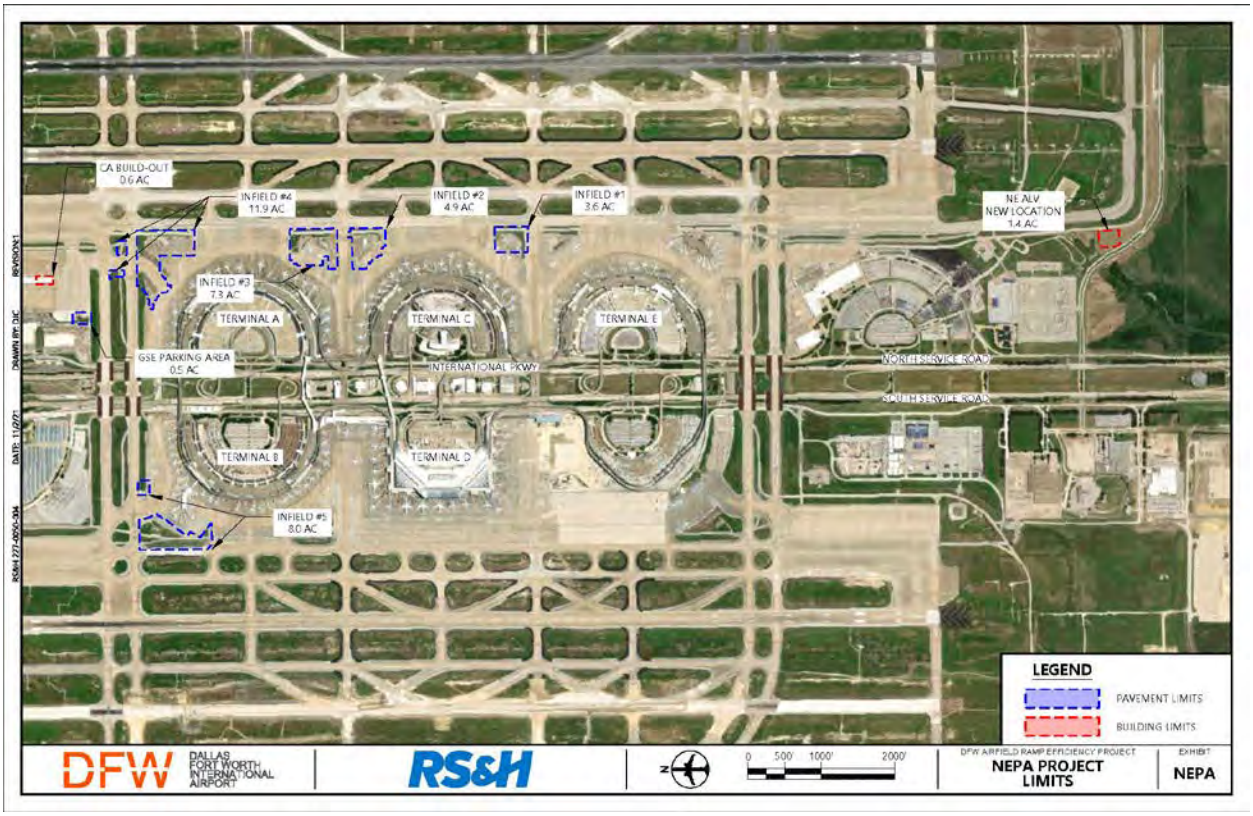


Image 2. Airfield Ramp Efficiency Project Area

Additionally, relocation of the Aircraft Entry/Exit positions along Taxiway K and Z is accomplished in part by relocation of the Northeast Airfield Lighting Vault (NE ALV). The existing Vault building is underground, near the northeast corner of the terminal complex near the intersection of Taxiway K and Taxiway Z and within the Infield #4 project limits. It will be replaced by a new facility that will be located at the southeast end of the Airfield. The new site is currently located outside the secure Airport

Operations Area (AOA), but after the facility is constructed, the fence will be relocated, thereby recategorizing the area from landside to airside, and redefining the airport perimeter.

The Northeast Airfield Vault Relocation / Replacement project, designated as Vault #5, is a replacement of one of four sister facilities that house specialized electrical equipment used to power runway and taxiway lighting. This vault in particular powers all airfield lighting, signage, and associated controls. The NE ALV is a critical component of the East Airfield electrical system and airfield operations at DFW. While the existing Vault has served its functional life, it has been upgraded multiple times during its lifespan to meet the demand for the East Airfield. Review and analysis conducted by the DFW Design, Code, and Construction and Energy, Transportation, and Asset Management teams have confirmed that rebuilding the facility to meet latest code requirements and add redundancy in the overall system.

The new facility is an above ground structure that avoids the issues with the existing underground vault conditions. The new Vault #5 is an 8,050 square feet footprint. There is ground disturbance for the site prep including 600 linear feet of retaining wall required (general area requirements reflected in the IES ground survey summary for archeological potential). The existing Duct Bank runs from the former Northeast Vault are being abandoned in place so very little demolition ground disturbance is designated in the project scope. New duct bank runs will enhance the overall infrastructure that supports the East Airfield, including the East Air Traffic Control Tower, that will serve and add flexibility to the new location. The building is one-story and constructed from concrete block. It has a simple roof designed to tolerate high winds. The building does not have windows, but it has numerous doors to provide direct access to individual interior spaces. HVAC equipment, transformers, and a fuel tank for the generator are placed outside. A significant feature of the vault complex is the cast-in-place concrete retaining wall around the perimeter of the site. The purpose of the retaining wall is to elevate the site to the same level of the adjacent airfield perimeter road outer loop, permitting convenient and direct access for the electricians working in the new facility.

Finally, the Corporate Aviation Build Out project includes the partial remodel and finish out of an existing building north of the Central Terminal Area in preparation for a lessee, Allied Aviation. The existing building was constructed in 1997 and remodeled in 2005. The remodel will include all

interior work of approximately 5,300 square feet, which will include updates to a breakroom, training office, manager office, locker room, uniform storage, IT/Communications room, and general circulation.

Image 3. Diagram of Northeast Airfield Vault Relocation from northeast (left) to southeast (right).

Image 4. Illustrations are from the Design Narrative: Northeast Airfield Vault Replacement, and NE ALV Drawings Vol. 1, as described by the Design Team under RS&H.

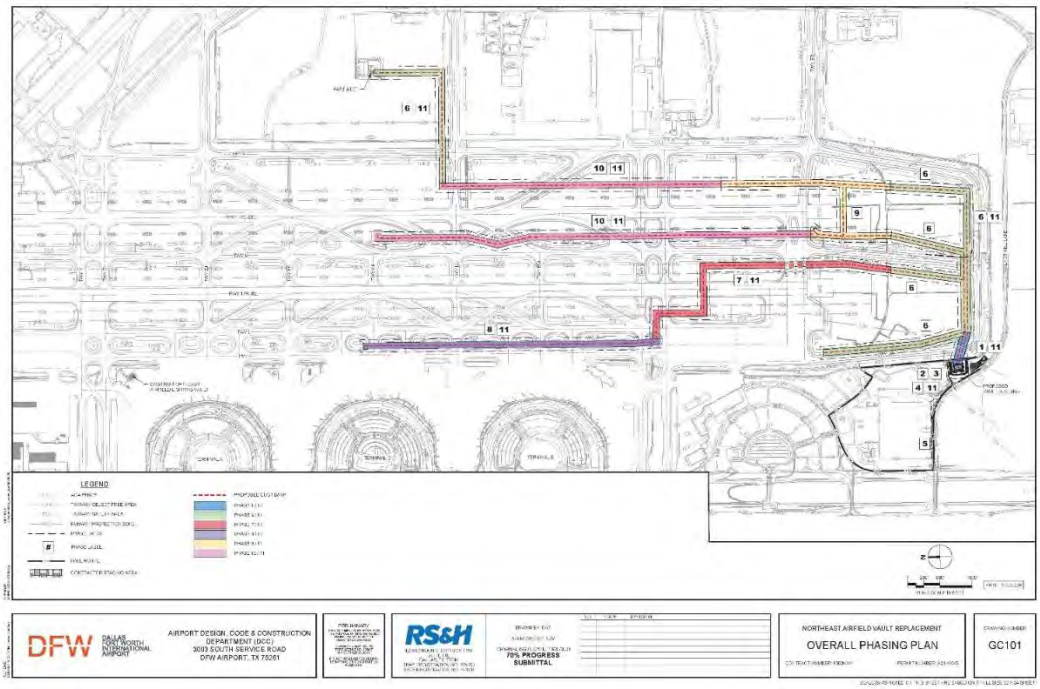


Image 5. Illustrations are from the Design Narrative: Northeast Airfield Vault Replacement, and NE ALV Drawings Vol. 1, as described by the Design Team under RS&H

Area of Potential Effect

The Area of Potential Effect (APE) has been defined by Komatsu Architecture in the map provided in Attachment A. The Direct APE is applied to the direct interface of the proposed Airfield Ramp Efficiency and Vault Relocation project areas and approximately 150 feet outside of the immediate footprint. The Indirect APE is applied to approximately 500 feet surrounding the project areas to include all visual and physical elements within the proximity of the project.

Identification of Historic Properties

GROUND AND ARCHEOLOGICAL CULTURAL RESOURCE INVESTIGATION

IES, sub consultant to Komatsu Architecture, reviewed the project area for potential archeological cultural resources. Per the September 14, 2021 report found in Appendix D, their conclusions and recommendations were as follows:

> "Komatsu and IES do not consider viable potential archeological cultural resources within the 62-acre APE of the Central Terminal Expansion project scope likely, and thus no known sites are eligible for the NRHP under Criteria Consideration D or G. With this report, DFW is requesting concurrence with the findings of this desktop analysis and the recommendation that no properties impacted by project's ground disturbances will be affected under 36 CFR Part 800.4(d)(1) within the current APE. It is the recommendation that the SHPO concur with these findings and has been prepared in accordance with FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures,* and FAA Order 5050.4B, *NEPA Implementing Instructions for Airport Actions*."

HISTORIC RESOURCES ANALYSIS

The Airfield Ramp areas, including the Infields and associated infrastructure, are not eligible for the National Register of Historic Places in their own right, as they do not meet any of the required Criterion. The patterns of the airfield taxiways, staging areas, and equipment flatwork, unpaved leave-out patterns, and other infrastructure, are not consequential to the broader overall planning concepts that are DFW Airport's defining features as discussed in the Cultural Resource Evaluations provided in

Attachment D. The new Vault location is a green field site that does not touch any existing buildings or potential historic resources. The Corporate Aviation is not of historic age and all work is internal, therefore it will not affect surrounding buildings.

Determination of Findings

Komatsu Architecture finds that the proposed Airfield Ramp Efficiency projects ***do not have potential to cause adverse effects on historic properties*** within the APE. This finding is proposed for both the Direct and Indirect Area of Potential Effect considerations.

The Airfield Ramp Efficiency Improvements are primarily sub-grade and grade / pavement level improvements. The current archeological and cultural surveys status is No Adverse Effect. The Improvements do not touch any existing buildings and have no visual, physical, or causality effects on the Central Terminal Area as a whole. Furthermore, the single above-grade structure, the Northeast Vault Replacement Building, is secluded by itself on the far southeast side of the Airport, which also does not have visual, physical, or causality effects on obscuring the overall planning identity and any near-historic age (between 45 years and 49 years old) structures that may acquire future significance.

Therefore, pursuant to 36 CFR 800.4(d)(1), Komatsu Architecture as DFW Airport's consultant and representative, and on behalf of the FAA, has determined that there are No Adverse Effects on historic properties within the APE, and requests the SHPO's concurrence on the consultant and agency's finding per 36 CFR Part 800.

Table 1: Summary of CTA Expansion Findings In Progress

Project Site/Area	Individual Eligibility Opinion	Effect on NRHP Resources	Status of SHPO Coordination	Date of SHPO Concurrence
1. Program Integration Office (PIO)	No Eligible Resources	No Adverse Effects to any Eligible Resource	Complete	3/22/2018
2. Service Delivery System - Central Utility Plant, Utilidor, Boiler & Pump House	Not Eligible	No Adverse Effects to any Eligible Resource	Complete	3/10/22
3a. Airfield Ramp Efficiency	**Not Eligible**	**No Adverse Effects to any Eligible Resource**	**Underway**	**TBD**
3b. NE Airfield Lighting Vault	**Not Eligible**	**No Adverse Effects to any Eligible Resource**	**Underway**	**TBD**

Thank you in advance for your consideration.

Sincerely,

Karl A. Komatsu

Karl Komatsu, President
Komatsu Architecture

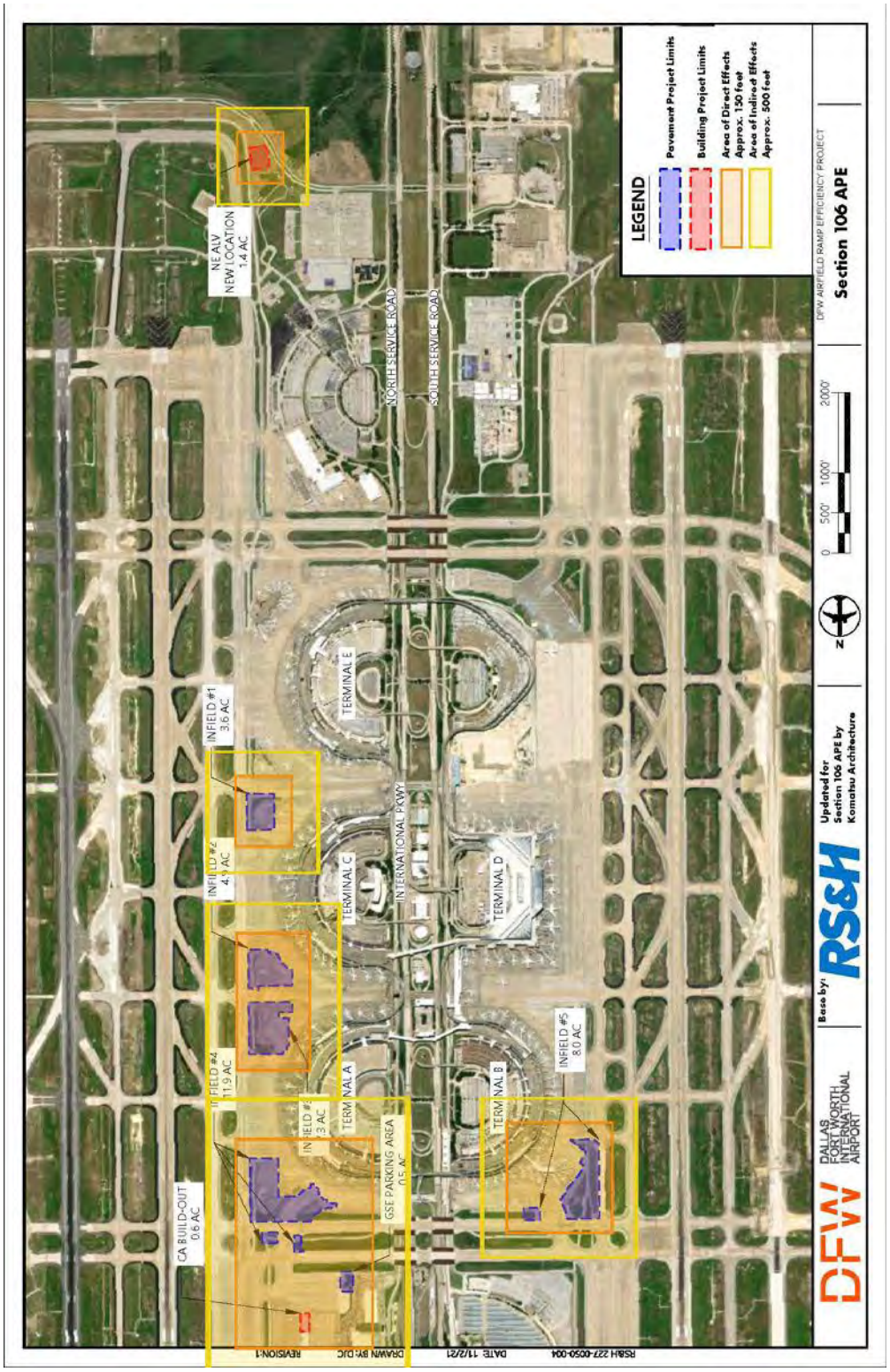
Attachments

A. Map of APE
B. Existing Conditions Photo Index
C. Proposed Project Drawings – The drawings are broken into three PDF files for the design teams organizational purposes.
    I. 100% Vault, Infield 1 and 4 Drawings Vol. 1a
    II. 70% Infield 2, 3, 5 and CA Remodel Drawings
D. Terminal C and Terminals A, B, E Cultural Resources Evaluation
E. Archeological Resources Desktop Analysis for the DFW Airport CTA Expansion by Integrated Environmental Solutions

References

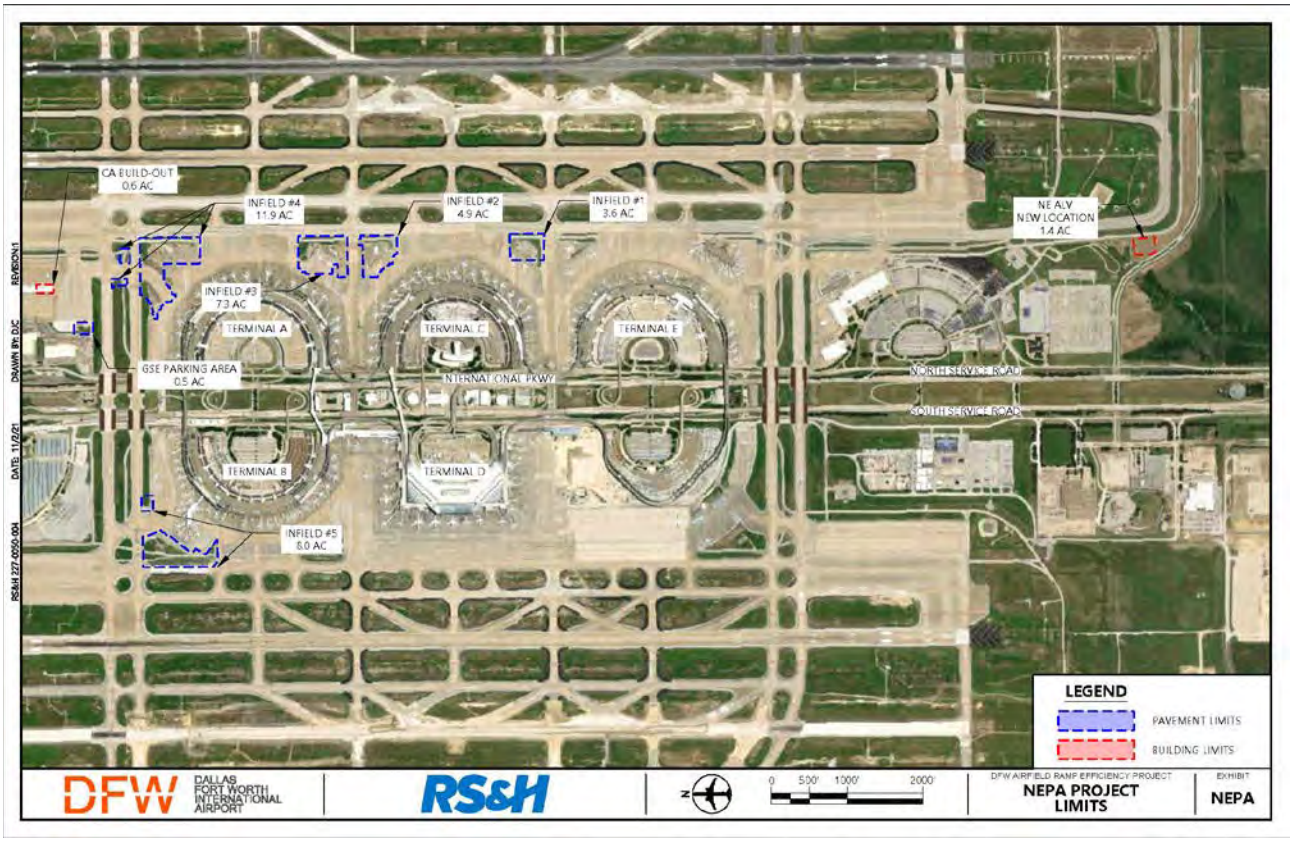
1. Design Criteria Package, Central Terminal Area Expansion – Terminal C – Chapter 1, May 07, 2021; by Merchant Aviation, ADP Ingenierie, and Moody Nolan
2. Design Criteria Package, Central Terminal Area Expansion – Terminal A – Chapter 1, May 07, 2021; by Merchant Aviation, ADP Ingenierie, and Moody Nolan
3. DFW Terminal A/C – Central Option – Site Plan; Sheet SP-01, May 26, 2021, by Merchant Aviation, ADP Ingenierie Group, and Moody Nolan

Attachment A: Map of APE



Attachment B: Existing Conditions Photo Index

AIRFIELD RAMP EFFICIENCY PROJECT AREA



INFIELD 1

Image 1: Aerial view of Infield 1.

Image 2: Example of concrete wall surrounding Infield 1.

Image 3: Gate at Infield 1.

Image 4: Grass and concrete wall surrounding Infield 1.

INFIELD 2

Image 5: Aerial view of Infield 2.

Image 6: Concrete wall at Infield 2.

Image 7: Utilities at Infield 2

Image 8: Concrete wall at Infield 2.

Image 9: Equipment at Infield 2.


Image 10: Exterior view of Infield 2.

Image 11: View of building at Infield 2.

Image 12: View of building at Infield 2.

INFIELD 3

Image 13: Aerial view of Infield 3.

Image 14: Exterior view of Infield 3.

Image 15: View of covered equipment parking inside Infield 3.

Image 16: Interior view of Infield 3.

Image 17: View of covered equipment parking inside Infield 3.

Image 18: Interior view of Infield 3.

Image 19: Utilities at Infield 3.

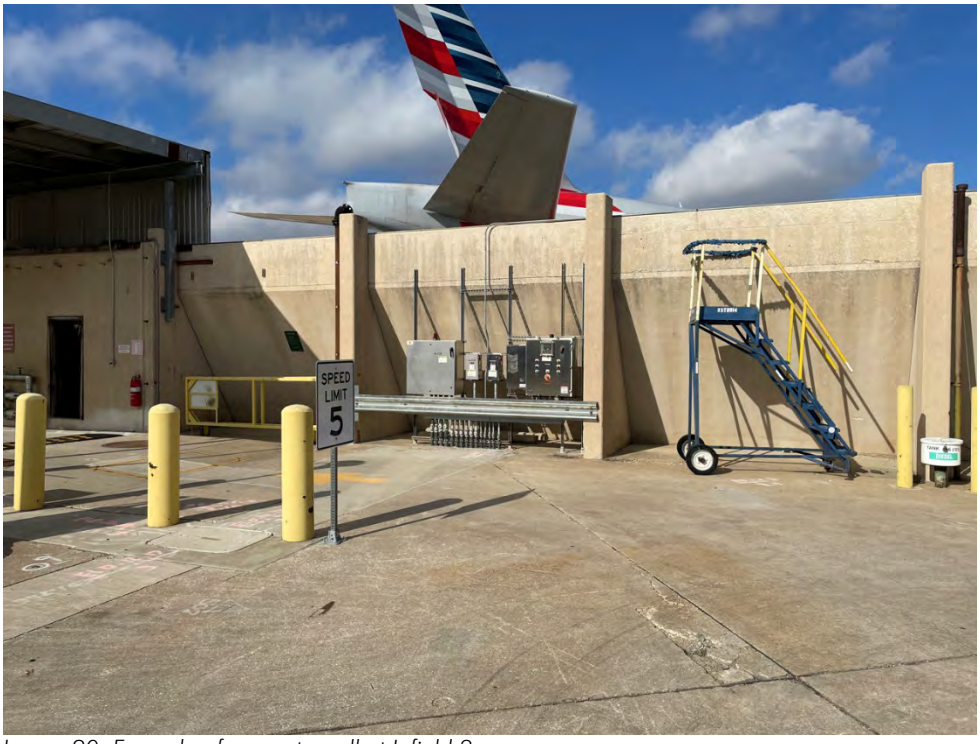


Image 20: Example of concrete wall at Infield 3.

Image 21: Temporary building at Infield 3.

Image 22: Tank at Infield 3.

INFIELD 4 & NORTHEAST AIRFIELD LIGHTING VAULT

Image 23: Aerial view of Infield 4 and Northeast Airfield Lighting Vault.


Image 24: View of mostly subgrade Lighting Vault parapet at Infield 4.

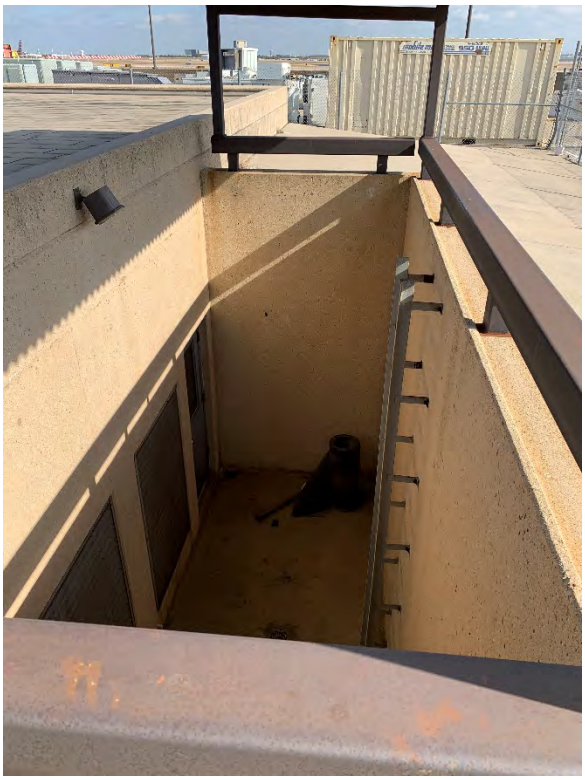


Image 25: Access to Lighting Vault at Infield 4.

Image 26: Temporary building at Infield 4.

Image 27: View of interior of Infield 4.

Image 28: View of interior of Infield 4.

Image 29: View of vehicle storage at Infield 4.

Image 30: View of gate at Infield 4.

INFIELD 5

Image 31: Aerial view of Infield 5.

Image 32: View of unpaved portion of Infield 5.

Image 33: View of paved portion of Infield 5.

Image 34: View of unpaved portion of Infield 5.

CORPORATE AVIATION BUILDING

Image 35: Front view of the existing Corporate Aviation Building.

Image 36: Rear view of the existing Corporate Aviation Building.

Image 37, 38: Exterior views of the existing Corporate Aviation Building.

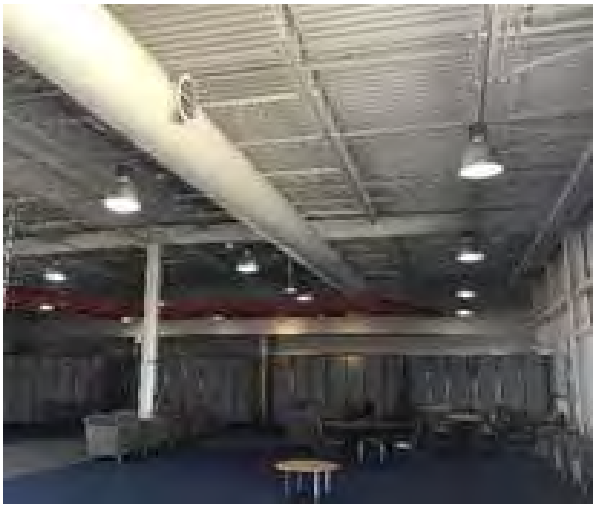


Image 39, 40, 41: Interior views of the existing Corporate Aviation Building.

Marie Oehlerking

From: noreply@thc.state.tx.us
Sent: Wednesday, April 20, 2022 1:23 PM
To: Marie Oehlerking; reviews@thc.state.tx.us
Subject: Section 106 Submission

Re: Project Review under Section 106 of the National Historic Preservation Act and/or the Antiquities Code of Texas
THC Tracking #202208258
Date: 04/20/2022
DFW Airport Airfield Ramp Efficiency Project
3003 South Service Road
Dallas,TX 75261

Description: This project includes the demolition, modification, and reconstruction of five Airport "Infields", the Northeast Lightning Vault, and interior remodel of the Corporate Aviation building.

Dear Marie Oehlerking:
Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act and the Antiquities Code of Texas.

The review staff, led by Justin Kockritz and Rebecca Shelton, has completed its review and has made the following determinations based on the information submitted for review:

Above-Ground Resources

- THC/SHPO concurs with information provided.
- No historic properties are present or affected by the project as proposed. However, if historic properties are discovered or unanticipated effects on historic properties are found, work should cease in the immediate area; work can continue where no historic properties are present. Please contact the THC's History Programs Division at 512-463-5853 to consult on further actions that may be necessary to protect historic properties.

Archeology Comments

- No historic properties affected. However, if cultural materials are encountered during construction or disturbance activities, work should cease in the immediate area; work can continue where no cultural materials are present. Please contact the THC's Archeology Division at 512-463-6096 to consult on further actions that may be necessary to protect the cultural remains.
- THC/SHPO concurs with information provided.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If the project changes, or if new historic properties are found, please contact the review staff. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers: justin.kockritz@thc.texas.gov, rebecca.shelton@thc.texas.gov.

This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit http://thc.texas.gov/etrac-system.

Sincerely,

for Mark Wolfe, State Historic Preservation Officer
Executive Director, Texas Historical Commission

Please do not respond to this email.

APPENDIX D – AIR QUALITY TECHNICAL REPORT

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AIR QUALITY ASSESSMENT FINAL TECHNICAL REPORT: AIRFIELD RAMP EFFICIENCY PROGRAM

Project no.	**1690015627-014**
Recipient	**Sandra Lancaster**
Date	**July 8, 2022**
Prepared by	**John Grant, Ramboll**
Checked by	**Krish Vijayaraghavan, Ramboll**
Approved by	**Megan Neiderhiser, Ramboll**

CONTENTS

TABLES

APPENDICES

Acronyms and Abbreviations

ACEIT	Airport Construction Emissions Inventory Tool
ACRP	Airport Cooperative Research Program
AEP	Apron Entry Point
APU	Auxiliary Power Unit
CAA	Federal Clean Air Act
CAP	Criteria Air Pollutant
CATEX	Categorical Exclusion
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_{2e}	Carbon Dioxide Equivalents
DFW	Dallas Fort Worth International Airport
EIS	Environmental Impact Statement
EV	Electric Vehicles
FAA	Federal Aviation Administration
GHG	Greenhouse Gases
GSE	Ground Support Equipment
GWP	Global Warming Potential
HAP	Hazardous Air Pollutants
MOVES	MOtor Vehicle Emission Simulator
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxides
O_3	Ozone
Pb	Lead
PM_{10}	Particulate Matter Less Than 10 Microns in Diameter
$PM_{2.5}$	Particulate Matter Less Than 2.5 Microns
RTC	Regional Transportation Council
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SOP	Standard Operating Procedure
TCEQ	Texas Commission on Environmental Quality

tpy	Tons Per Year
TRB	Transportation Research Board
USEPA	United States Environmental Protection Agency
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

Executive Summary

This technical report provides an assessment of the air quality impacts associated with the Airfield Ramp Efficiency Project at Dallas Fort Worth International Airport (the Airport or DFW) (the "Proposed Project"). The Proposed Action Alternative would improve the operational efficiency and safety of the airfield, relieve terminal area congestion, and reduce taxiing time to/from the existing terminal area.

Ramboll evaluated impacts to air quality due to the Proposed Project under the National Environmental Policy Act (NEPA) in accordance with the guidelines provided in the Federal Aviation Administration (FAA) Aviation Emissions and Air Quality Handbook Version 3 Update 1 (FAA Handbook); FAA Order 5050.4B, NEPA Implementing Instructions for Airport Actions; and FAA Order 1050.1F, Environmental Impacts: Policies and Procedures.

Ramboll estimated criteria air pollutant (CAP) and GHG emissions associated with construction and operation of the Proposed Project. Proposed project construction emission estimates were developed based on (i) activity estimates for vehicles, non-road equipment, and project dimensions provided by DFW and based on the Airport Construction Emissions Inventory Tool (ACEIT)[1] and (ii) emission factors from the United States Environmental Protection Agency (USEPA) MOtor Vehicle Emission Simulator, version 3 (MOVES3)[2] and USEPA AP-42 guidance[3]. Proposed Project operational emission estimates were developed based on (i) aircraft, ground support equipment (GSE) and auxiliary power unit (APU) activity estimates for the Proposed Project and No Action and (ii) Aviation Environmental Design Tool (AEDT) Version 3d[4].

Ramboll evaluated the Proposed Project's significance with respect to air quality impacts under NEPA by comparing project emissions to applicable USEPA *de minimis* levels established under the General Conformity Rule[5]. Dallas-Fort Worth is in a Serious Ozone Non-Attainment Area[6]; therefore, the project is subject to 50 tons per year (tpy) volatile organic compounds (VOC) and nitrogen oxides (NOx) *de minimis* thresholds under the General Conformity Rule, to determine compliance with the Clean Air Act (CAA) and the Texas Commission on Environmental Quality's (TCEQ) Dallas-Fort Worth Eight-Hour Ozone State Implementation Plan (SIP).

Table ES-1 shows that maximum projected annual Proposed Project emissions are below applicable *de minimis* thresholds under the current serious designation for the Dallas-Fort Worth Ozone Non-Attainment Area.

1 Transportation Research Board. 2014. Airport Construction Emissions Inventory Tool. Available at: https://www.trb.org/Main/Blurbs/170234.aspx. Accessed: March 2022.

2 US Environmental Protection Agency. 2021. Motor Vehicle Emission Simulator, Version 3 (MOVES3). Available at: https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves. Accessed: March 2022.

3 US Environmental Protection Agency. 1995. AP-42: Compilation of Air Emissions Factors. Available at: https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors. Accessed: March 2022.

4 Federal Aviation Administration. Aviation Environmental Design Tool (AEDT). Available at: https://aedt.faa.gov/. Accessed: March 2022.

5 75 FR 17254. Available at: https://www.govinfo.gov/content/pkg/FR-2010-04-05/pdf/2010-7047.pdf. Accessed online: March 2022.

6 USEPA. Greenbook. 2020. Texas Nonattainment/Maintenance Status for Each County By Year for All Criteria Pollutants. Dallas-Fort Worth . Available Online: https://www3.epa.gov/airquality/greenbook/anayo_tx.html. Accessed: March 2022.

Table ES-1. Proposed Project total emissions compared to applicable general conformity *de minimis* thresholds.

Project Year**	Project Emissions (tons/yr)		General Conformity De Minimis Threshold* (tons/yr)		Project Emissions greater than General Conformity De Minimis Threshold?	
	NOx	VOC	NOx	VOC	NOx	VOC
2022	3.16	0.26	50	50	No	No
2023	21.71	1.97	50	50	No	No
2024	5.01	-1.28	50	50	No	No
2025	-4.93	-2.16	50	50	No	No

* Source: 40 CFR 93 § 153 *de minimis* thresholds applied to Dallas-Fort Worth Non-attainment Area "serious" classification

** 2022 and 2023 include construction emissions only; 2024 and 2025 include construction and net operational emissions. 2025 net operational emissions are assumed equivalent to 2024 estimates. Proposed Project operational emissions are reduced relative to the No Action resulting in an overall NOx emissions decrease for 2025 and overall VOC emissions decreases for 2024 and 2025.

1. Introduction

This technical report has been prepared to discuss the potential environmental impacts associated with the Airfield Ramp Efficiency Project (the "Proposed Project"). In conformance with the NEPA, this analysis identifies and assesses the impacts that would result from the Proposed Project's emission of CAPs. It also discloses emissions of GHGs and describes potential hazardous air pollutant (HAP) emissions.

The Proposed Action consists of airside improvements that would increase operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to and from the existing terminal area. The project would add heavy-duty aircraft pavement in strategic locations near the terminal buildings; thereby, increasing the number of Apron Entry Point (AEP) locations available for passenger aircraft traveling to and from the terminal buildings, reducing "choke points," and increasing operational flexibility, efficiency, and capacity. The new AEP locations would increase aircraft taxi movement efficiency and provide additional flexible space during non-standard operations. Currently, these areas are being used for a variety of purposes including airfield lighting infrastructure, airline support facilities including ground support equipment (GSE) parking, aircraft hardstands, and other functions, including deicing.

The Proposed Action would remove existing infrastructure, as appropriate, and modify the subject locations for aircraft taxiing and aircraft parking. Actions supporting these efficiency modifications would include demolition of existing aboveground infrastructure; demolition and abandonment of underground utility infrastructure, minor expansion and modification of existing taxiways; abandonment, reallocation, and expansion of deicing pads and associated Spent Aircraft Deicing Fluid (SADF) infrastructure; relocation of lighting and signage; new underground utility infrastructure; new underground stormwater collection system infrastructure; and infill of previous aboveground infrastructure and grassed areas with heavy-duty concrete pavement to support widebody Aircraft Design Group (ADG) V class aircraft.

This technical report describes the scope and methodology for evaluation of air quality impacts from construction and operational sources, where relevant. The results of these evaluations are compared to the standards of significance identified by the Federal CAA.

1.1 Overall Approach and Regulatory Setting

NEPA provides for an environmental review process to disclose the potential impacts, including air quality, from a proposed federal action on the human environment. Per the USEPA, NEPA's basic policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment.

The impacts to air quality due to the Proposed Project for NEPA are determined in accordance with the guidelines provided in the FAA Aviation Emissions and Air Quality Handbook Version 3 Update 1 (FAA Handbook); FAA Order 5050.4B, NEPA Implementing Instructions for Airport Actions; and FAA Order 1050.1F, Environmental Impacts: Policies and Procedures. Potential air quality and climate impacts are categories that are required to be analyzed per these orders and guidance.

FAA 1050.1F, Exhibit 4-1 defines the significance threshold for air quality as when “[t]he action would cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards (NAAQS), as established by the USEPA under the CAA, for any of the time period analyzed, or to increase the frequency or severity of any such existing violations.” FAA guidance requests that air quality analysis focus on NAAQS criteria air pollutants and that a separate section should address Climate.

The CAA requires adoption of NAAQS, which are periodically updated, to protect public health and welfare from the effects of air pollution. Current federal standards are set for sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), and Lead (Pb).[7] Specific geographic areas are classified as either "attainment" or "non-attainment" areas for each pollutant based upon comparison of measured data with NAAQS. Those areas designated as “non-attainment” for purposes of NAAQS compliance are required to prepare regional air quality plans, which set forth a strategy for bringing an area into compliance with the standards. These regional air quality plans developed to meet federal requirements are included in an overall program referred to as the State Implementation Plan (SIP).

Dallas and Tarrant counties, where the Project site is located, have been designated by the USEPA as being in attainment and non-attainment depending on pollutant with the following NAAQS, respectively:[8]

- *Attainment or Unclassified:* CO (1-hr, 8-hr), NO_2 (1-hr, Annual), SO_2 (1-hr, 3-hr), PM_{10} (24-hr), $PM_{2.5}$ (24-hr, Annual), and Pb (Rolling 3-month average);
- *Non-Attainment:* O_3 (2008 8-hr, Serious), O_3 (2015 8-hr, Marginal).

Per above, the Dallas-Fort Worth area’s EPA NAAQS non-attainment designations are limited to O_3. O_3 is not directly emitted but is formed in the atmosphere when nitrogen oxides (NO_x) and volatile organic compounds (VOC) react in sunlight. O_3 is considered a regional pollutant because NO_x and VOC emissions throughout the air basin are involved in ozone formation. A regional photochemical model that considers emissions throughout the air basin would be required to explicitly model ozone concentrations. Instead, the potential impacts to ozone concentrations are typically based on annual or daily estimates of NO_x and VOC emissions. Air pollutant emissions from construction and any net increases in emissions associated with operation of the Proposed Project and Alternatives would be calculated as relevant to ozone formation and concentration.

1.2 Existing Conditions

DFW is located between owner cities Dallas and Fort Worth, Texas, with portions included in both Dallas and Tarrant counties. In 2019, it serviced over 73 million passengers to 258 nonstop destinations.

[7] USEPA. NAAQS Table. Available at: https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed: January 2022.

[8] USEPA. Greenbook. 2020. Texas Nonattainment/Maintenance Status for Each County By Year for All Criteria Pollutants. Dallas-Fort Worth. Available Online: https://www3.epa.gov/airquality/greenbook/anayo_tx.html

DFW currently encompasses 17,207 acres (approximately 27 square miles) in Dallas and Tarrant Counties, and contains five terminals (named Terminals A, B, C, D, and E), seven runways (13L/31R, 13R/31L, 17C/35C, 17L/35R, 17R/35L, 18L/36R, and 18R/36L), and 182 gates.

Currently, some areas of the DFW taxiway system are used for GSE equipment storage, which can conflict with airfield operations. In addition, moving some aircraft exit positions can improve efficiency of aircraft movement and increase safety. Figure 1-1 shows the layout of the airport and Proposed Project improvements.

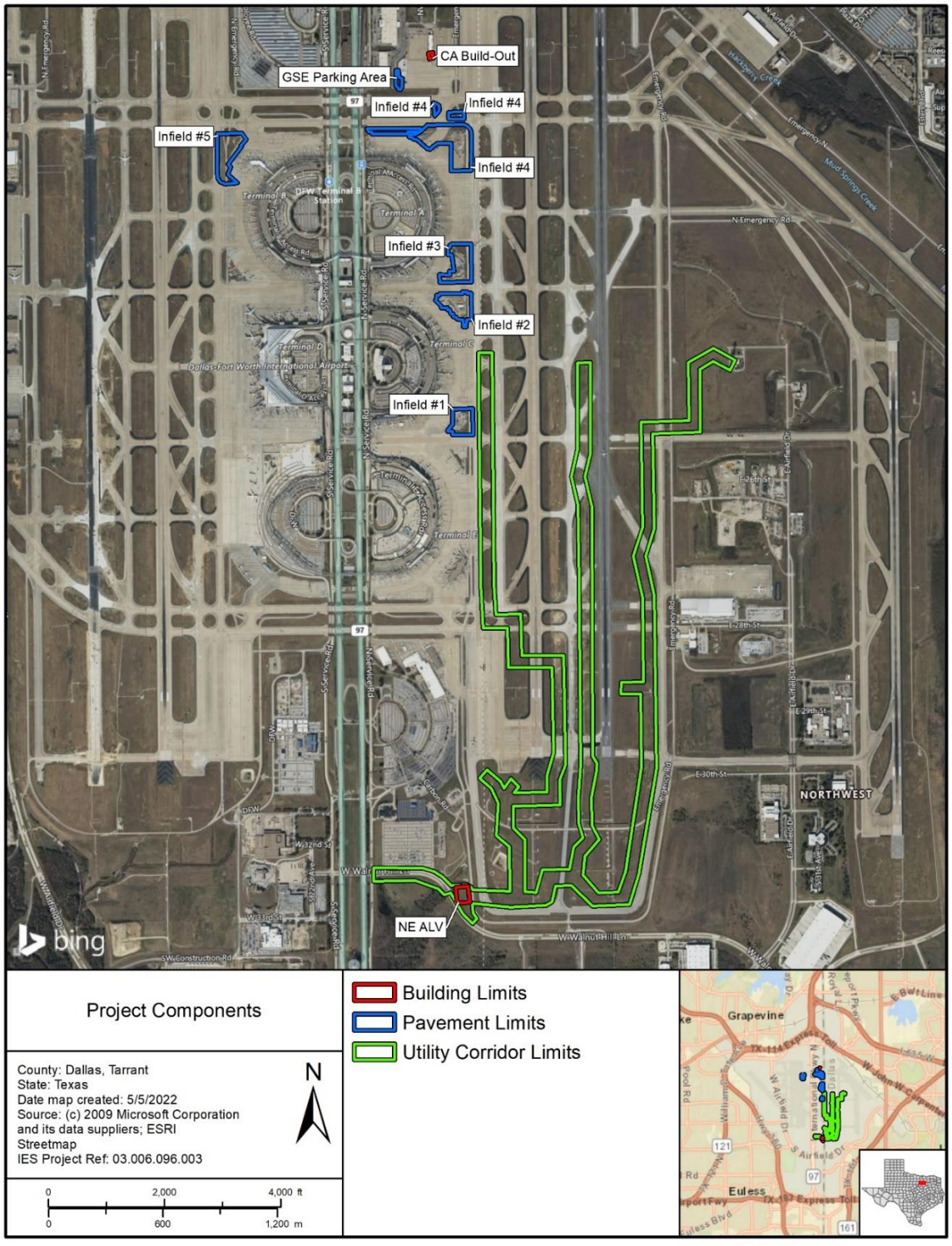

Figure 1-1. Site Layout and Project Elements

1.3 Proposed Project

The Airfield Ramp Efficiency Project will improve operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to/from the existing terminal area.

The Proposed Project includes the following elements (Figure 1-1):

- Creation or relocation of AEPs along Taxiway G, K, and Z
- Associated replacement and relocation of existing facilities (airfield lighting vault, and Terminal A South Triturator, etc.)
- Infill of five infield areas with heavy-duty concrete apron pavement
- Underground utility work related to the improvements listed above (electric, sanitary sewer, storm sewer, water, and communications)
- Relocation of Taxiway JY to improve aircraft operations and optimize utility service connections at the terminals for the renewable fuels and electricity

The infill of several infield areas will allow the efficient transition of aircraft between the DFW taxiway system and its ramp area. These changes will allow for more efficient aircraft movements to and from the aircraft movement area while reducing long term fuel burn by aircraft. These changes will enhance airfield efficiency and economy of aircraft movement while limiting the interaction between support vehicles and aircraft. Due to the implementation of the infills, several impacted utilities will need to be relocated to accommodate more efficient operations.

The airfield vault is currently located adjacent to aircraft maneuvering areas, making access difficult. Relocation of the airfield vault to a more accessible location will enhance airfield operational efficiency. It will also enhance safety by reducing potential conflicts between aircraft operations and vault facility and allow aircraft to better maneuver and park for passenger loading and unloading.

The existing aircraft lavatory waste triturator station is in a densely developed area between Terminals A and C and adjacent to the terminal access taxiways. This location conflicts with airfield operations. To allow aircraft to better maneuver and park for passenger loading and unloading, the trituration station is being relocated away from this busy area.

Air quality and greenhouse gas emissions from construction of the Proposed Project are analyzed for anticipated construction years 2022, 2023, 2024, and 2025. CAP and GHG emissions from operation of the Proposed Project are analyzed for 2022 to 2025. Net operational emissions are evaluated by comparison of Proposed Project and No Action emissions. Proposed Project construction and operational emissions are described in **Section 2.4.1** and **Section 2.4.2** and evaluated for significance in **Section 4.1.1** and **Section 4.1.2** of this technical report.

1.4 Project Design Features

The DFW Airport has on-going commitments to reduce its air emissions. The following are measures that are already implemented or will be implemented at the Airport:

Clean Air policy[9] (effective 8/1/2020), which includes the following required measures:

- 3.2.1 Ensure compliance by meeting or exceeding all applicable air quality laws, regulations, and Texas SIP requirements.
- 3.2.2 Achieve and maintain carbon neutrality certification on a pathway to net zero carbon emissions by 2030 in accordance with Level 4+ Airport Carbon Accreditation Program requirements.
- 3.2.3 Identify future air quality requirements and initiate procedures to meet or exceed them.
- 3.2.4 Incorporate energy efficiency and carbon emissions reduction priorities into the strategic plan.
- 3.2.5 Require use of 100 percent renewable energy in electricity supplied to the Board.
- 3.2.6 Develop and utilize innovative strategies in expanding the Board's current commitments to improve air quality.
- 3.2.7 Establish, track and analyze metrics to monitor air quality performance, and to set goals for continuous improvement.
- 3.2.8 Actively engage with tenants and other business partners to improve energy performance, optimize operational efficiency, and reduce emissions through their own reduction plans or through measures initiated by the airport.
- 3.2.9 Maintain a Clean Fleet Standard Operating Procedure (SOP) that prioritizes zero emission vehicle and equipment purchases for fleet operations in accordance with the Regional Transportation Council's (RTC) Clean Fleet Policy.
- 3.2.10 Actively promote the transition to electric vehicles (EVs) through the provision of required infrastructure, incentives, and partnerships.
- 3.2.11 Discourage vehicle idling in order to support regional efforts to improve air quality.
- 3.2.12 Continue to integrate energy efficiency into its facilities, systems, processes, and operations and ensure the best available technologies are utilized.
- 3.2.13 Partner with agencies, academia, nongovernmental organizations, business associations, and other interested stakeholders to develop effective and sustainable solutions to local air quality challenges.

[9] DFW. 2020. Clean Air policy.

2. Methodology and Inventory

The steps performed under this air quality analysis are consistent with the FAA Handbook as follows: (1) Determine the need for the assessment; (2) Select the assessment methodology; and (3) Conduct the assessment and assess the Proposed Project's impact relative to the numeric thresholds.

2.1 Need for Assessment

The FAA Handbook lays out the following steps to determine when an air quality assessment is required and the type of assessment that may be needed.

1. Determine the Project definition, described in **Section 1.3**.
2. Determine whether FAA involvement is associated with the Project; DFW has already been in discussions with the FAA regarding this Project. In this step, the Proposed Project has been confirmed not to fall under a categorical exclusion (CATEX), so an environmental assessment or environmental impact statement (EIS) will be developed.
3. Determine if the Project will cause or create a reasonably foreseeable increase in air emissions; as described further below, construction and operations of this Project may cause an increase in air emissions.
4. Establish the attainment/nonattainment status for the Project area and identify pollutants for which the area is designated nonattainment/maintenance, described in **Section 1.1**.
5. Evaluate agency/public scoping comments concerning air quality; this is only a requirement when preparing an EIS and is not addressed explicitly in this report.

Based on the results of Steps 1 through 4 above, an air quality assessment has been conducted as described below.

2.2 Assessment Methodology

The FAA Handbook describes several different potential assessment methodologies that could be pursued when an air quality assessment is needed. Figure 4-5 of the FAA Handbook provides examples that show which methodologies are appropriate, potentially appropriate, or unnecessary for various project action categories.

The potential methodologies for the Project air quality assessment are summarized below. The construction emissions inventory for this Project is described as "appropriate" and all other methodologies as "potentially appropriate." The decision to evaluate the "potentially appropriate" methodologies was assessed using Project-specific information. Selected analysis methods and analysis methods that were evaluated but not selected are summarized below.

<u>Selected Analysis Methods</u>

- Construction CAP Emissions Inventory: A construction emissions inventory is designed to quantify the mass of CAP emissions and precursors associated with construction activity in a proposed action. This is described in **Sections 2.3.1** and **2.4.1** below.

- Operational CAP Emissions Inventory: An operational emissions inventory is designed to quantify the mass of CAP emissions and precursors associated with operational activity in a proposed action. This is described in **Sections 2.3.2** and **2.4.2** below.
- Greenhouse Gas Emissions Inventory: A GHG emissions inventory is designed to quantify the mass of GHG emissions associated with a proposed action. Project GHG emissions are quantified for construction and operations.

Analysis Methods that were not Selected

- Qualitative Assessment: When it has been determined that the Project will not cause or create a reasonably foreseeable increase in air emissions, a qualitative assessment of air quality impacts is likely all that is necessary. This assessment should contain an explanation of the conditions and rationale upon which this finding is based. This is not necessary given that a quantitative analysis of construction and operational emissions has been performed as described above.
- Atmospheric Dispersion Modeling: Dispersion modeling is used to further refine the results of the operational and construction emissions inventory by distributing the emissions across a project area both spatially and temporally based on the operational and physical characteristics of the emission source(s) combined with meteorological and local terrain data. This is not necessary for this Project given the nonattainment pollutant of interest (O_3) and the results of the *de minimis* assessment below.
- Roadway "Hot-Spot" Analysis: Hot-spot modeling is designed to assess the effects of motor vehicle traffic emissions on local air quality conditions. This is not applicable to the Proposed Project given that it will not result in large increases in vehicle traffic.
- Hazardous Air Pollutants Emissions Inventory: A HAPs inventory is designed to quantify the mass of HAP emissions associated with operational activity in a proposed action. This is not performed as part of this Project because operational emissions increases are expected to be very small.

2.3 Scenarios Evaluated

2.3.1 Construction Scenarios Evaluated

Ramboll evaluated CAP and GHG emissions associated with the Proposed Project. A list of project types included is provided in **Table 2**. Construction activities would take place from 2022 to 2025. Construction emissions depend on the activity levels of heavy-duty construction equipment, haul truck trips, and vehicle trips made by construction workers and vendors traveling to and from the Proposed Project site.

A list of associated project types, schedule, and the proportion of activity in each year by project type is provided in **Table 2**. Activity and schedule inputs were derived from DFW provided (i) ACEIT inputs[10], (ii) construction equipment rosters[11] and total operating hours estimates[12], (iii) material delivery vehicle

[10] Email from DFW Airport (Alexandria Vieth) to Ramboll (John Grant). 18 May 2022.

[11] Construction equipment rosters basis: DFW Airport, 2022. Environmental Technical Memo: Traffic Flow During Construction – Airfield Efficiency Improvements (AEI). 2022-05-13.

[12] Total operating hours basis: Email from RS&H (Chad Mathes) to DFW Airport (Alexandria Vieth). 15 May 2022.

hours of operation[13] assuming an average vehicle speed of 20 miles per hour consistent with the urban dynamometer driving schedule, and (iv) employee commute vehicle trips and mileage estimates[14].

Table 2. Proposed Project schedule by project type.

Project Type	ACEIT Project Type	Start Date	End Date	Annual Days in 2022	Annual Days in 2023	Annual Days in 2024	Annual Days in 2025	% Project in 2022	% Project in 2023	% Project in 2024	% Project in 2025
Drainage System	Drainage System	12/1/2022	12/1/2025	31	365	366	334	3%	33%	33%	30%
Fencing	Fencing	3/1/2023	12/1/2023	0	306	0	0	0%	100%	0%	0%
Building - 10000 sqft-1 story	Building - 10000 sqft-1 story	12/1/2022	9/1/2024	31	365	244	0	5%	57%	38%	0%
Site Work - 10000 sqft	Site Work - 10000 sqft	12/1/2022	7/1/2025	31	365	366	181	3%	39%	39%	19%
Demolition - Asphalt	Demolition - Asphalt	12/1/2022	7/1/2025	31	365	366	181	3%	39%	39%	19%
Demolition - Concrete	Demolition - Concrete	12/1/2022	7/1/2025	31	365	366	181	3%	39%	39%	19%
Demolition - Building	Demolition - Building	12/1/2022	7/1/2025	31	365	366	181	3%	39%	39%	19%
Taxiway Exit	Taxiway Exit	12/1/2022	7/1/2025	31	365	366	181	3%	39%	39%	19%
Terminal Apron	Terminal Apron	12/1/2022	7/1/2025	31	365	366	181	3%	39%	39%	19%
Fugitive Dust Control	Fugitive Dust Control	12/1/2022	12/1/2025	31	365	366	334	3%	33%	33%	30%
Onroad	Employee Commute	12/1/2022	12/1/2025					3%	33%	33%	31%
Onroad	Material Delivery	12/1/2022	12/1/2025					8%	55%	32%	5%
Nonroad	Nonroad	12/1/2022	12/1/2025					8%	58%	30%	4%

2.3.2 Operational Scenarios Evaluated

Ramboll evaluated incremental operational emissions resulting from the Proposed Project. Operational emissions for a No Action alternative and the Proposed Action scenario were evaluated for Calendar Year 2024. The Proposed Project is not expected to increase the number of aircraft operations relative to No Action, as the Proposed Project would not modify runway length, capacity, or usage. However, the Proposed Project is expected to improve access to and from Terminals A, B, and C, and therefore result in reduced taxi-in and taxi-out times for aircraft relative to No Action. Net change in operational emissions were calculated as the difference between emissions under the No Action and Proposed Project alternatives.

Section 2.4.2 below describes the methodology by which incremental operational emissions from the Proposed Project were estimated.

2.4 Emission Inventory Development

This section describes the methodology that Ramboll used to develop construction and operational emissions inventories for the Proposed Project. This analysis evaluates CAPs and GHGs. Disclosure

[13] Email from RS&H (Chad Mathes) to DFW Airport (Alexandria Vieth). 15 May 2022.

[14] DFW Airport, 2022. Environmental Technical Memo: Traffic Flow During Construction – Airfield Efficiency Improvements (AEI). 2022-05-13.

of HAPs is recommended for operational emissions but not for construction. Operational emissions are expected to be very small; therefore, HAPs are not considered. For this analysis, the following pollutants were considered:

- O_3 precursors: VOCs and NOx
- CAPs: CO, SO_2, PM_{10}, and $PM_{2.5}$
- GHGs: CO_2 (carbon dioxide), CH_4 (methane), N_2O (nitrous oxide); total GHG emissions are reported as CO_2e (carbon dioxide equivalents)

Because O_3 is a secondary pollutant (i.e., it is not directly emitted but is formed in the atmosphere), emissions of VOCs and NO_x, which react in the presence of sunlight to form ozone, were used to assess impacts on ozone levels.

CO_2e emissions were estimated based on 20-year global warming potential (GWP) estimates for CH_4 (82.5) and N_2O (273)[15], conservatively, as 20-year GWPs will result in higher CO_2e estimates compared to 100-year GWP estimates.

To estimate CAP and GHG emissions from the Proposed Project, Ramboll directly or indirectly relied primarily on emissions estimation guidance from government-sponsored organizations, project specific studies (e.g., design documents), and emission estimation software.

This emission inventory includes all project elements which are not Presumed to Conform. The project includes the operation of a concrete batch plant during construction. Batch plant emissions from mobile source vehicles, off-construction equipment, and fugitive dust sources are included in this emission inventory. Batch plant operation also includes stationary sources of air emissions permitted through the TCEQ New Source Review (NSR) permit program. Emissions from permitted stationary sources are accounted for in the SIP, are Presumed to Conform, and therefore are not included in this emission inventory. The NSR permit process would be completed and approved for the batch plant before construction begins. Except for stationary sources at the batch plant permitted through the NSR permit program, all other project elements are Presumed Not to Conform.

2.4.1 Construction Emissions Inventory

The Proposed Action would generate criteria air pollutant (CAP) emissions from heavy-duty construction equipment activity, truck haul trips, and construction worker and vendor truck trips to and from the project areas. Construction emissions include both on-road mobile and off-road source categories.

Mobile source exhaust and fugitive dust emissions would be generated from on-road vehicles and construction equipment, including but not limited to dump trucks, mixers, passenger vehicles, flatbed trucks, and tractor trailers. Fugitive VOC emissions would be generated by asphalt drying. Emissions of CAPs and O_3 precursors include emissions of NO_X, CO, SO_2, VOC, PM_{10}, and $PM_{2.5}$. Of these, NO_X and VOC are the two primary precursors to O_3 formation.

[15] IPCC, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. https://www.ipcc.ch/report/ar6/wg1/. Accessed: March 2022.

Construction equipment usage would cause a short-term increase in air emissions. The estimated construction emissions from diesel-powered on-road vehicles and off-road construction equipment were modeled using the USEPA Motor Vehicles Emissions Simulator, version 3 (MOVES3)[1]. Emissions were calculated using the activity estimates for each project component combined with the most recent emission factors from the USEPA MOVES3 and USEPA AP-42 guidance.

2.4.1.1 Emissions Inventory Activities

2.4.1.1.1 Project Schedule by Phase

Proposed Action construction is anticipated from December 2022 through December 2025. The annual Proposed Action-related construction emissions are well below the *de minimis* levels of 50 tpy for NO_X and VOC. Since the Proposed Action is below the *de minimis* threshold of 50 tpy, batch plant emissions will be considered as part of the New Source Review permitting for each plant and would be contained under the SIP. The anticipated construction project types and phasing are shown in **Table 2**. The proportion of construction activities for project elements which are anticipated to take place in each calendar year is shown in **Appendix A.**

Table 3. Project types and construction activities for the Proposed Project.

Project Type	Construction Activities
Drainage System	Drainage - 24 inch Reinforced Concrete Pipe, Drainage - 24 inch SICPP, Drainage Structures, Employee Commute, Hydroseeding, Material Movement (Paved Roads), Material Movement (Unpaved Roads), Soil Erosion/Sediment Control, Soil Handling, Topsoil Placement, Unstabilized Land and Wind Erosion
Fencing	Clearing and Grubbing, Employee Commute, Excavation (Cut to Fill), Fencing, Grading, Hydroseeding, Material Delivery, Material Movement (Paved Roads), Material Movement (Unpaved Roads), Soil Erosion/Sediment Control, Soil Handling, Topsoil Placement, Unstabilized Land and Wind Erosion
Building - 10000 sqft- 1 story	Concrete Foundations, Concrete Mixing/Batching, Construction Mob & Layout, Employee Commute, Exterior Wall Framing, Interior Build-Out/ Finishes, Material Delivery, Material Movement (Paved Roads), Material Movement (Unpaved Roads), Roofing, Security & Safety Systems, Structural Steel Erection,
Site Work - 10000 sqft	Construction Mob & Layout, Employee Commute, Material Delivery, Material Movement (Paved Roads), Material Movement (Unpaved Roads), Site Clearing- Remove Trees & Shrubs, Site Restoration- Landscaping (Curbing), Site Restoration- Landscaping (Rough Grading), Site Restoration- Landscaping (Top Soil Seed and Plantings), Soil Handling, Underground Services to 5 ft. of Building, Unstabilized Land and Wind Erosion
Demolition - Asphalt	Asphalt Demolition, Employee Commute, Material Delivery, Material Movement (Paved Roads), Material Movement (Unpaved Roads), Soil Handling, Unstabilized Land and Wind Erosion
Demolition - Concrete	Concrete Demolition, Employee Commute, Material Delivery, Material Movement (Paved Roads), Material Movement (Unpaved Roads), Soil Handling, Unstabilized Land and Wind Erosion
Demolition - Building	Building Demolition, Employee Commute, Material Delivery
Taxiway Exit	Asphalt Drying, Asphalt Placement, Asphalt Storage and Batching, Clearing and Grubbing, Drainage – 24 inch SICPP, Drainage – 6 inch Perforated Underdrain, Dust Control, Employee Commute, Excavation (Borrow), Excavation (Cut to Fill), Excavation (Topsoil Stripping), Fencing, Grading, Hydroseeding, Lighting, Markings, Material Delivery, Material Movement (Paved Roads), Material Movement (Unpaved Roads), Soil Erosion/Sediment Control, Soil Handling, Subbase Placement, Topsoil Placement, Unstabilized Land and Wind Erosion
Terminal Apron	Asphalt Drying, Asphalt Placement, Asphalt Storage and Batching, Clearing and Grubbing, Concrete Mixing, Concrete Placement, Drainage – 24 inch SICPP, Drainage – 6 inch Perforated Underdrain, Dust Control, Employee Commute, Excavation (Borrow), Excavation (Cut to Fill), Excavation (Topsoil Stripping), Fencing, Grading, Hydroseeding, Lighting, Markings, Material Delivery, Material Movement (Paved Roads), Material Movement (Unpaved Roads), Sealing/Fuel Resistant, Soil Erosion/Sediment Control, Soil Handling, Subbase Placement, Topsoil Placement, Unstabilized Land and Wind Erosion
Onroad	Employee Commute, Material Delivery associated with specific project types listed above
Nonroad	Construction Equipment usage associated with specific project types listed above
Fugitive Dust Control	General Use

[1] While DFW anticipates using concrete for paving, this analysis conservatively adds fugitive emissions from the potential use of asphalt for a portion of paving activity.

2.4.1.1.2 Construction Emissions Inventory Activity Inputs

The Transportation Research Board (TRB) developed the Airport Construction Emissions Inventory Tool (ACEIT)[1] to provide a consistent approach and default values for construction emissions for airport projects. It includes default construction information based on surveys of airports. While ACEIT generates both construction activity and emission estimates, for this project, ACEIT was used exclusively to generate activity estimates for fugitive emission sources. ACEIT was not used to estimate emissions because emission factors included in ACEIT for on-road vehicles and construction equipment are not based on the most recent version of MOVES released by USEPA (MOVES3), which is required for this analysis.

ACEIT provides activity assumptions for fugitive emission sources. ACEIT output activity was split between 2022, 2023, 2024, and 2025 based on schedule by project type (see **Table 2**).

The basis of construction emission inventory activity inputs is described below:

- **On-road heavy-duty trucks:** Material delivery and other heavy-duty vehicle (excepting water trucks used for dust control) activity estimates and scheduling was based on DFW project specific estimates.
- **On-road light duty vehicles:** Employee commute activity and scheduling were based on DFW project specific estimates.
- **Non-road equipment:** Equipment hours, rated horsepower, and scheduling were based on DFW project specific estimates. Equipment average load factor was based on MOVES3.
- **Fugitive dust**: Activity inputs for use in fugitive dust emission calculations were based on ACEIT.
- **Water trucks:** Daily water truck operation for fugitive dust control was conservatively assumed for the duration of the project. Per DFW, two water trucks will be in operation. Daily water truck operation is conservatively assumed for the duration of the project for eight hours, forty miles, and eight starts per day.

Project-specific inputs are provided in **Appendix A**.

2.4.1.2 Emission Factors

ACEIT default vehicle emission factors for non-road (off-road) equipment and on-road vehicles are from older versions of the NON-ROAD and MOVES models, respectively.[16] Thus, Ramboll has not relied upon ACEIT emission factors for on-road vehicles or non-road equipment in this analysis. Ramboll developed emission factors for on-road vehicles and non-road equipment for Dallas County using the latest MOVES model available at the time this work was conducted, MOVES3. Ramboll also applied AP-42 fugitive dust emission factors which are more relevant to the project than those output by ACEIT, as described in **Section 2.4.1.2.3**.

2.4.1.2.1 On-road Emission Factors

Ramboll used MOVES3 to estimate on-road vehicle emission factors for calendar years 2022, 2023, 2024, and 2025. MOVES3 was run at a national scale for Dallas County, Texas. The DFW airport is located in both Tarrant and Dallas counties. We have followed ACRP Report 102 guidance on county choice: "If the project spans multiple counties, the county with the greatest population should be used to select the appropriate emission factors (based on fuel characteristics that are representative of each county)."[8] Emissions and activity were output from MOVES by vehicle type, fuel type, road type, and process type for each calendar year. Emissions were aggregated over six emission process types to facilitate application to activity for development of Proposed Project emissions.

Table 4 lists MOVES emission process types, aggregate groupings, road type and activity surrogates. Emission factors were estimated by aggregate grouping by dividing MOVES output emissions by MOVES output activity.

[16] Transportation Research Board. ACRP Report 102: Guidance for Estimating Airport Construction Emissions. Available at: http://www.trb.org/main/blurbs/170234.aspx. Accessed: October 2020.

Table 4. MOVES process grouping and activity surrogates.

MOVES Emission Process	Aggregate Grouping	Road Type	Activity Surrogate	
			Description	Metric
Crankcase Running Exhaust	RPD [2]	Urban Unrestricted Access	Distance	Miles
Running Exhaust	RPD [2]	Urban Unrestricted Access	Distance	Miles
Brake Wear	RPD_WEAR [3]	Urban Unrestricted Access	Distance	Miles
Tire Wear	RPD_WEAR [3]	Urban Unrestricted Access	Distance	Miles
Evaporation Fuel Leaks	RPD_EVAP [4]	Urban Unrestricted Access	Distance	Miles
Evaporation Fuel Vapor Venting	RPD_EVAP [4]	Urban Unrestricted Access	Distance	Miles
Evaporation Permeation	RPD_EVAP [4]	Urban Unrestricted Access	Distance	Miles
Crankcase Start Exhaust	RPV_START [5]	Off-Network	Starts	One-Way Trips[1]
Start Exhaust	RPV_START [5]	Off-Network	Starts	One-Way Trips[1]
Evaporation Fuel Vapor Venting	DIURNAL [6]	Off-Network	Vehicle Population	Vehicle-days
Evaporation Fuel Leaks	RPV_EVAP [7]	Off-Network	Vehicle Population	Vehicle-days
Evaporation Permeation	RPV_EVAP [7]	Off-Network	Vehicle Population	Vehicle-days

[1] Number of starts is assumed to be equivalent to number of one-way trips

[2] RPD: rate per distance for exhaust processes

[3] RPD_WEAR: rate per distance for brake wear and tire wear processes

[4] RPD_EVAP: rate per distance for evaporative processes

[5] RPV_START: rate per vehicle for start processes

[6] DIURNAL: (rate per vehicle for) diurnal processes

[7] RPV_EVAP: rate per vehicle for evaporative processes

Detailed tables describing Proposed Project on-road vehicle data used (i.e., vehicle activity, vehicle emission factors, and vehicle emissions) to estimate emissions are provided in **Appendix B**.

2.4.1.2.2 Non-road Emission Factors

Ramboll used MOVES3 to estimate nonroad equipment emission factors for calendar years 2022, 2023, 2024, and 2025. MOVES3 was run at a national scale for Dallas County, Texas. The DFW airport is located in both Tarrant and Dallas County. We have followed ACRP Report 102 guidance on county choice: “If the project spans multiple counties, the county with the greatest populace should be used, as the county is used to select the appropriate emission factors (based on fuel characteristics that are representative of each county).”[8] Emission and activity data were output from MOVES by equipment type, fuel type, and horsepower bin for construction, industrial, recreational, and lawn/garden sectors for each calendar year. ACEIT equipment activity was cross-referenced to MOVES equipment types based on the *Guidance for Estimating Airport Construction Emissions Final Report* (MOVES and ACEIT equipment types are shown in **Appendix C**). Emission factors were estimated for each equipment type and fuel type by dividing output emissions by output energy consumption. MOVES3 does not estimate N_2O emissions; therefore, the non-road N_2O emission factor

was taken from the USEPA Inventory of U.S. Greenhouse Gas Emissions and Sinks[17]. A complete list of project non-road emission factors can be found in **Appendix C.**

2.4.1.2.3 Fugitive Emission Factors

Fugitive emission inputs from all fugitive source types are obtained from ACEIT. Calculation methodologies applied in ACEIT are based on the most recent applicable USEPA AP-42 guidance documents. Ramboll reviewed ACEIT emission estimation methodology, emission factors and ancillary factors and made project-specific adjustments for the development of fugitive emissions as described in **Table 5** below**.**

Table 5. Fugitive emissions estimation methodology and project-specific adjustments.

Fugitive Source	Methodology	Project-specific Input Adjustments
Concrete Mixing/Batching	AP-42 11.12	Emission inputs unchanged from ACEIT output.
Soil Handling	AP-42 13.2.4	Applied average annual wind speed of 10.5 mph at DFW [1]
Unstabilized Land and Wind Erosion	AP-42 11.9	Emission inputs unchanged from ACEIT output
Asphalt Drying	FAA Aviation Emissions and Air Quality Handbook Version 3 Update 1	Emission inputs unchanged from ACEIT output
Material Movement (Paved Roads)	AP-42 13.2.1	ACEIT default VMT scaled to Proposed Project square footage for building and site work project types.
Material Movement (Unpaved Roads)	AP-42 13.2.2	ACEIT default VMT scaled to Proposed Project square footage for building and site work project types.

[1] Dallas/Fort Worth - Normals (1981-2010), Means, and Extremes, NWS) https://www.weather.gov/fwd/dfwann, Accessed October 2020.

The ratio of $PM_{2.5}$ to PM_{10} emissions for fugitives is provided in **Table 6** by construction activity.

Table 6. Fugitives $PM_{2.5}$ to PM_{10} emission ratios.

Construction Activity	$PM_{2.5}/PM_{10}$	Source
Asphalt Drying	-	No PM Emissions
Asphalt Storage and Batching	0.06	AP-42 11.1-2
Concrete Mixing/Batching	0.15	AP-42 11.12
Material Movement (Paved Roads)	0.25	AP-42 13.2.1-1
Material Movement (Unpaved Roads)	0.1	AP-42 13.2.2-2
Soil Handling	0.15	AP-42 13.2.4
Unstabilized Land and Wind Erosion	0.15	AP-42 13.2.5

A complete list of fugitive inputs and emissions by project type and construction activity is provided in **Appendix D**.

2.4.2 Operational Emissions

This section outlines the approach used to calculate operational emissions for both the No Action and Proposed Action scenarios.

While the Proposed Project does not increase aircraft activity relative to the No Action alternative, the Proposed Project is expected to improve access to and from Terminals A, B, and C, and therefore

[17] US Environmental Protection Agency. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018, Annex A. Available at https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2018. Accessed: October 2020.

result in reduced taxi-in and taxi-out times for aircraft relative to No Action. Therefore, this assessment evaluates changes to operational emissions for Calendar Year 2024 described in **Section 2.3.2**.

The operational inventory consists of emissions from aircraft activities, auxiliary power units (APUs) on board aircraft and GSE associated with aircraft operations at the airport. The Proposed Project is not expected to result in changes to emissions from other operational sources at the airport, such as on-road mobile sources and stationary sources, both in the long-term as well as the construction period.

2.4.2.1 Aircraft Activity and Fleet Forecast

The air quality assessment is based on aircraft activity forecasts for 2024. This study obtained the FAA 2020 Terminal Area Forecast (TAF) released in May 2021 for DFW and the DFW Aviation Activity Forecast (AAF) published in June 2019. The FAA TAF includes the effects of the COVID-19 pandemic and the AAF does not as it was released prior to the pandemic. Therefore, the FAA TAF and DFW's AAF published in June 2019 were compared for existing and future study years. The comparison demonstrated that existing operations for DFW ending September 30, 2021, were over 17 percent higher than the FAA TAF for fiscal year (FY) 2021 but 16 percent below the AAF FY 2021 forecast. The TAF includes a slower return to pre-COVID levels for DFW; whereas, the AAF continues to forecast an increase in operations from the FY 2021 levels. Due to the faster than predicted return to operation levels at DFW, and in the FAA TAF, the uncertainty in future schedules due to COVID-19, the forecast used the FAA TAF forecast with an increase of 5 percent for the Commercial Operations (Air Carrier and Air Taxi) in the FAA TAF.

Table 7 provides the level of aircraft operations that were modeled[18]. As mentioned previously, the aircraft activity levels would be the same for the No Action and Proposed Project scenarios. This is because the Proposed Project improves the efficiency of aircraft taxiing to and from the gates at Terminals A and C and would not alter the number of gates, length of the runways or their use in the future. Because the FAA TAF data is based on a fiscal year (FY) rather than a calendar year (CY), DFW developed a forecast to cover the 12-month calendar year period of the EA by combining activity forecasts for 9 months (January – September) in FY 2024 and 3 months (October – December) in FY 2025, as shown in **Table 7.**

Table 7. Forecast No Action and Proposed Project Alternative Operations.

Period	Air Carrier	Air Taxi	Total Commercial	General Aviation	Military	Total
FY 2024 – 9 months	499,455	17,716	517,172	5,105	159	522,436
FY 2025 – 3 months	179,591	6,160	185,750	1,707	53	187,510
12-month CY 2024 Total	**679,046**	**23,876**	**702,922**	**6,812**	**212**	**709,946**

Source: FAA OPSNET, FAA 2020 TAF, HMMH

The 709,946 annual operations translate to 1,940 average annual day (AAD)[1] operations to be modeled for the 2024 No Action Alternative and Proposed Project emission inventories. **Table 7** provides representative aircraft and engine combinations and the number of average daily operations that were modeled in AEDT for the Future (2024) No Action Alternative and Proposed Project. The future fleet mix includes a reduction in Air

[18] HMMH, 2022. Technical Memorandum: DFW Ramp Efficiency Environmental Assessment - Baseline and Forecast Operations. February 21, 2022.

Taxi fleet operations (reduction in 50 seat and smaller regional jets) compared to the existing conditions and changes in the Air Carrier fleet mix (the retirement of the older less fuel efficient MD83 and introduction of the newer 737 MAX aircraft).

Table 7. DFW Modeled AAD Aircraft Operations for NAA and Proposed Action Alternative (2024)

Tower Category	Propulsion	ANP Type	Arrivals			Departures			Total
			Day	Night	Total	Day	Night	Total	
Air Carrier	Jet	717200	2	<1	2	2	<1	2	5
		737700	15	2	17	16	<1	17	33
		737800*	168	17	185	168	17	185	370
		7378MAX	2	<1	2	2	<1	2	4
		747400	2	1	3	2	2	3	6
		7478	<1	<1	2	<1	<1	2	3
		757PW	<1	3	3	<1	3	3	6
		757RR	<1	3	3	<1	3	3	7
		767300	1	<1	1	<1	<1	1	3
		7673ER	3	3	6	4	2	6	12
		767CF6	2	<1	2	1	<1	2	4
		777200	12	3	15	14	1	15	30
		777300	<1	1	2	1	1	2	5
		7773ER	5	1	6	6	<1	6	13
		7878R	14	3	17	16	<1	17	34
		A300-622R	3	2	5	2	3	5	10
		A319-131	94	11	105	94	10	105	209
		A320-211	24	4	28	24	4	28	56
		A320-232	32	7	38	34	4	38	77
		A320-271N	<1	<1	<1	<1	<1	<1	1
		A321-232	166	19	185	166	18	185	369
		A350-941	<1	0	<1	<1	0	<1	2
		A380-841	<1	<1	<1	<1	<1	<1	2
		DC1010	<1	<1	1	<1	<1	1	3
		EMB190	2	<1	2	2	<1	2	4
		MD11GE	<1	<1	2	1	<1	2	3
		MD11PW	2	2	4	2	1	4	7
	Regional Jet	CRJ9-ER	158	11	169	155	14	169	337
		EMB170	96	7	103	95	8	103	207
		EMB175	15	2	18	15	3	18	35
	Subtotal		**824**	**104**	**928**	**827**	**101**	**928**	**1,856**
Air Taxi	Regional Jet	CL600	1	<1	1	1	<1	1	2
		EMB14L	28	2	30	28	2	30	59
	Non-jet	1900D	<1	<1	<1	<1	<1	<1	<1
		CNA208	<1	<1	1	<1	<1	1	2
		DHC6	<1	<1	<1	<1	<1	<1	<1
	Subtotal		**31**	**2**	**33**	**30**	**3**	**33**	**65**
General Aviation	Jet	CL600	<1	0	<1	<1	<1	<1	<1
		CNA525C	<1	<1	<1	<1	<1	<1	<1
		CNA55B	<1	<1	<1	<1	<1	<1	<1
		CNA560XL	<1	<1	<1	<1	<1	<1	<1
		CNA750	<1	<1	<1	<1	<1	<1	<1
		G650ER	<1	0	<1	<1	0	<1	<1
		GIV	0	<1	<1	0	<1	<1	<1
		GV	<1	0	<1	<1	0	<1	<1
		LEAR35	<1	<1	<1	<1	<1	<1	<1
	Non-jet	CNA208	7	<1	7	7	<1	7	14
		DHC6	1	<1	1	1	<1	1	3
	Subtotal		9	<1	9	9	<1	9	19
Grand Total			**863**	**107**	**970**	**866**	**104**	**970**	**1,940**

Note: Totals may not match exactly due to rounding. *ANP Type 737800 represents both B738 and B739 operations, which account for 98 percent and 2 percent, respectively.
Source: DFW Noise and Operations Monitoring System (NOMS), FAA TAF

2.4.2.2 Aircraft Taxi Time Estimates

No Action Alternative

Average taxi-time by runway end was provided by DFW for the future No Action Alternative, as summarized in **Table 8**.[19] In cases where DFW did not provide taxi times (e.g., notably for runways with little usage), the taxi times were taken from the FAA Aviation System Performance Metrics (ASPM) database for the period between March 16, 2019, to March 15, 2020. The estimates are for all operations weighted by DFW flow use (70 percent south flow, 30 percent north flow), in minutes per operation. Taxi-times in **Table 8** are shown in minutes.

Table 8. DFW Taxi Time Summary – No Action Alternative

FAA ASPM		
No Action Alternative (All Phases)		
	Departure	Arrivals
Runway	Taxi Out Minutes	Taxi In Minutes
13L	21.9	4.2
13R	18.0	11.8
17C	12.0	13.4
17L	18.5	15.1
17R	22.0	6.9
18L	21.4	8.9
18R	11.6	12.7
31L	20.4	11.8
31R	0.0	4.2
35C	12.0	13.4
35L	22.0	6.8
35R	19.5	15.1
36L	11.6	12.7
36R	21.4	8.9

Source: DFW DCC Nov 29, 2021, Memorandum

Proposed Project Alternative

The Proposed Project will improve operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to/from the existing terminal area. Specifically, the Proposed Project improves access to and from Terminals A, B, and C which are utilized by American Airlines. Therefore, modified taxi times resulting from the Proposed Project were only applied to American Airlines operations. For all other operations, the same taxi times as the No Action alternative given in **Table 8** were applied. In 2024, approximately 630,000 operations (1,722 average annual day operations or ~89% of operations) are assumed to be performed by American Airlines, based on existing conditions per radar data from DFW NOMS and the FAA's Operational Network (OPSNET) for March 16, 2019, to March 15, 2020. **Table 9** shows the taxi times applied to operations in the Proposed Project scenario.

[19] DFW DCC January 4, 2022, email

Table 9. DFW Taxi Time Summary – Proposed Project

Proposed Project				
	Departures (All Other Airlines)	Departures (American Airlines Only)	Arrivals (All Other Airlines)	Arrivals (American Airlines Only)
Runway	Taxi Out Minutes	Taxi Out Minutes	Taxi In Minutes	Taxi in Minutes
13L	21.9	21.9	4.2	4.1
13R	18.0	18.0	11.8	11.7
17C	12.0	12.0	13.4	13.3
17L	18.5	18.5	15.1	14.9
17R	22.0	21.8	6.9	6.9
18L	21.4	21.2	8.9	8.9
18R	11.6	11.6	12.7	12.5
31L	20.4	20.4	11.8	11.7
31R	0.0	0.0	4.2	4.1
35C	12.0	12.0	13.4	13.3
35L	22.0	21.8	6.8	6.8
35R	19.5	19.5	15.1	14.9
36L	11.6	11.6	12.7	12.5
36R	21.4	21.2	8.9	8.9

Source: DFW DCC Nov 29, 2021, Memorandum

Note: Taxi times indicated with "N/A" reflect cases where operations during the specified Phase do not occur at the specified runway end.

2.4.2.3 Emissions modeling using AEDT

The emissions modeling analysis uses AEDT Version 3d (released 29 March 2021). All AEDT modeling conducted for this study adheres to "Guidance on Using the AEDT to Conduct Environmental modeling for FAA Actions Subject to NEPA" (FAA 2017). AEDT is a combined emissions and dispersion modeling software for assessing air quality at civilian airports and military air bases.[20,21] The model was developed by the FAA in cooperation with the United States Air Force. The model is used to produce an inventory of emissions generated by sources on and around the airport or air base, and to calculate pollutant concentrations in these environments. AEDT is also used to perform noise analyses.

AEDT performs two primary air quality functions: generating emissions inventories and performing dispersion analyses. AEDT calculates emissions for several types of airport sources, based on aircraft engine performance, times in mode, and landing-takeoff cycles (LTOs), by engine type, for each inventory. AEDT incorporates both USEPA-approved emissions inventory methodologies and a dispersion model to ensure that analyses performed with the application conform to USEPA guidelines. The AEDT setup used to calculate aircraft emissions is consistent with the model setup that was used

[20] Federal Aviation Administration. Aviation Environmental Design Tool (AEDT). Available at: https://aedt.faa.gov/. Accessed: March 2022.

[21] AEDT replaced the FAA's Emissions and Dispersion Modeling System (EDMS) as of May 2015.

to assess noise impacts for this project and is based on the same set of inputs to AEDT such as the number of modeled operations, aircraft types and other operational parameters.

AEDT was used to quantify CAP and GHG emissions from aircraft, APUs, and GSE.

Aircraft
The total number of aircraft operations shown in **Table 7** were modeled in AEDT. Aircraft emissions were calculated for start-up, taxi-out, taxi-in, takeoff, landing and airborne operations up to the mixing height of 3,000 feet above field elevation. For each of the No Action and proposed Project scenario, a single AEDT run was configured with individual taxi times assigned to each operation based on the assigned runway end as presented in **Table 8** and **Table 9**. Other inputs to AEDT, such as fleet mix, airframe-engine assignments and stage length, were held constant between the No Action and Proposed Project scenarios, and are consistent with inputs to the Noise modeling and evaluation.

Auxiliary Power Units (APUs)
Emissions from APUs were calculated by utilizing AEDT default APU assignments (engine type/horsepower) by aircraft class. APUs were assumed to operate for 26 minutes per LTO, which is the default assumption in AEDT.

Ground Support Equipment
Emissions from GSE equipment, including air conditioners, air starts, aircraft tractors, baggage tractors, belt loaders, cabin service trucks, cargo loaders, catering trucks, forklifts, fuel trucks, hydrant trucks, lavatory trucks, service trucks and water service equipment, were calculated based on AEDT defaults for each aircraft type. AEDT defaults include fuel type, operating time, horsepower, and load factor.

2.4.2.4 Other Sources, With No Net Increase in Emissions

Long-term operation of the Proposed Project would result in no net increase in emissions from any source at the airport. For informational purposes, this section describes each potential emissions source and the reasoning for which the Project would not result in an increase in emissions above the *de minimis* thresholds.

- Mobile Sources: Mobile sources associated with the Airport's day-to-day operations include landside and airside vehicles owned and operated by the Airport and by third parties, such as on-site maintenance trucks, shuttle services, employee and passenger transportation, and other off-road equipment not included in GSE above. The Proposed Project would not increase passenger throughput or the number of workers at DFW and thus would not increase mobile source emissions. Therefore, the Proposed Project would not increase operational emissions from this source category.
- DFW-Owned Airside Equipment: The Proposed Project would not increase aircraft operations or landscaping needs at DFW and thus would not increase the use of non-GSE off-road equipment. Therefore, the Proposed Project would not increase operational emissions from this source category.
- Stationary and Area Sources: Stationary and area sources may include heaters/boilers, emergency generators, gasoline and diesel dispensing facilities, fuel storage tanks, cooling

towers, coating and painting operations, incinerators, live-fire training facilities, solvent degreasers, and sand/salt piles. The Proposed Project will not create an increase in operational emissions from stationary source emissions.

- Indirect Electricity Emissions: Purchased electricity generates indirect GHG emissions. The Proposed Project would not result in increases to total electricity consumption, and therefore this source would not increase GHG emissions.

3. Significance Thresholds

This section discusses the criteria and general methods used to evaluate the Proposed Project's significance with respect to air quality impacts under NEPA.

The emissions inventories are used to determine the projected net annual increase in emissions, and the potential impact to air quality in the vicinity of DFW due to the Proposed Project. The General Conformity Rule ensures that federal activities do not cause or contribute to a violation of NAAQS. The General Conformity process begins with an Applicability Analysis. If General Conformity applies, the Agency must prepare a General Conformity Determination. Then federal, state and local air quality governance are engaged in a public review process of the agency's determination.

When performing a General Conformity applicability analysis, the FAA considers a range of factors, including:

- If action will occur in a Non-attainment or Maintenance Area
- If specific exemptions in the General Conformity Rule apply
- If the action is on the federal agency's list of "Presumed to conform" activities
- If total emissions exceed General Conformity *de minimis* thresholds, and
- If an EPA-approved SIP has an emissions budget for which emissions with the action could be compared

If an action is not exempt or Presumed to conform or found to cause emissions above applicable *de minimis* thresholds in any nonattainment or maintenance area, the agency must prepare a General Conformity Determination prior to taking the action.

DFW is in a Serious Ozone Non-Attainment Area[22] (2008 standards)[23]; therefore, the 50 tpy VOC and NO_x *de minimis* thresholds apply to this Project[24]. The maximum annual Project emissions are compared to applicable *de minimis* thresholds below to determine compliance under the General Conformity Rule and compliance with the CAA and the Texas SIP.

[22] DFW Airport sits in both Dallas and Tarrant Counties. Both Counties in their entirety are within 2008 Serious Ozone Non-Attainment Areas.

[23] EPA. 2020. Greenbook Non-Attainment Areas by County. Available online: https://www3.epa.gov/airquality/greenbook/anayo_tx.html

[24] FAA. 2015. Aviation Emissions & Air Quality Handbook, Version 3, Update 1. Section 8.1.1.4. January.

4. Results

4.1 Emission Inventories Results

The following analysis addresses whether the Project would exceed the *de minimis* thresholds described above. If *de minimis* thresholds are exceeded, a General Conformity Determination would be needed. If a project's emissions do not exceed the *de minimis* thresholds, then the project is Presumed to conform.

Criteria air pollutant, ozone precursor, and GHG mass emissions were calculated based on methodology described in **Section 2.4** above.

4.1.1 Construction Emissions Inventory

Table 10 presents CAP emissions associated with all construction elements of the Proposed Project by emissions source and year. **Table 11** presents CAP emissions associated with all construction elements of the Proposed Project by source type and year.

Table 10. Proposed Action total annual criteria air pollutant emissions by emission source.

Project Year	Emissions Source	Emissions (tons/yr) *					
		NOx	CO	VOC	SO_2	Total PM_{10}	Total $PM_{2.5}$
2022	On-road	2.41	1.43	0.09	0.00	0.17	0.06
2022	Non-road	0.75	3.43	0.13	0.00	0.06	0.06
2022	Fugitives	-	-	0.04	-	0.33	0.05
2022	**Total**	**3.16**	**4.87**	**0.26**	**0.00**	**0.56**	**0.17**
2023	On-road	16.63	11.00	0.63	0.02	1.20	0.41
2023	Non-road	5.08	25.12	0.91	0.01	0.42	0.41
2023	Fugitives	-	-	0.44	-	3.94	0.58
2023	**Total**	**21.71**	**36.11**	**1.97**	**0.03**	**5.56**	**1.40**
2024	On-road	9.23	7.04	0.35	0.01	0.69	0.22
2024	Non-road	2.46	13.03	0.45	0.00	0.19	0.19
2024	Fugitives	-	-	0.44	-	3.89	0.58
2024	**Total**	**11.69**	**20.07**	**1.24**	**0.02**	**4.78**	**0.99**
2025	On-road	1.42	2.49	0.09	0.00	0.13	0.04
2025	Non-road	0.34	1.91	0.06	0.00	0.03	0.02
2025	Fugitives	-	-	0.22	-	2.84	0.42
2025	**Total**	**1.76**	**4.40**	**0.37**	**0.00**	**3.00**	**0.48**

Table 11. Proposed Action total annual criteria air pollutant emissions by project type and year.

Project Type	Project Year	Emissions (tons/yr)					
		NOx	CO	VOC	SO_2	Total PM_{10}	Total $PM_{2.5}$
Drainage System	2022	-	-	-	-	0.19	0.03
Fencing	2022	-	-	-	-	-	-
Building - 10000 sqft- 1 story	2022	-	-	-	-	0.00	0.00
Site Work - 10000 sqft	2022	-	-	-	-	0.00	0.00
Demolition - Asphalt	2022	-	-	-	-	0.02	0.00
Demolition - Concrete	2022	-	-	-	-	0.05	0.01
Demolition - Building	2022	-	-	-	-	-	-
Taxiway Exit	2022	-	-	0.04	-	0.06	0.01
Terminal Apron	2022	-	-	0.00	-	0.01	0.00
Fugitive Dust Control	2022	0.01	0.00	0.00	0.00	0.00	0.00
Onroad	2022	2.40	1.43	0.09	0.00	0.17	0.06
Nonroad	2022	0.75	3.43	0.13	0.00	0.06	0.06
2022 Emission Totals		**3.16**	**4.87**	**0.26**	**0.004**	**0.56**	**0.173**
Drainage System	2023	-	-	-	-	2.21	0.33
Fencing	2023	-	-	-	-	0.04	0.01
Building - 10000 sqft- 1 story	2023	-	-	-	-	0.04	0.01
Site Work - 10000 sqft	2023	-	-	-	-	0.03	0.00
Demolition - Asphalt	2023	-	-	-	-	0.23	0.03
Demolition - Concrete	2023	-	-	-	-	0.58	0.09
Demolition - Building	2023	-	-	-	-	-	-
Taxiway Exit	2023	-	-	0.43	-	0.75	0.11
Terminal Apron	2023	-	-	0.01	-	0.06	0.01
Fugitive Dust Control	2023	0.07	0.04	0.00	0.00	0.01	0.00
Onroad	2023	16.56	10.95	0.62	0.02	1.20	0.41
Nonroad	2023	5.08	25.12	0.91	0.01	0.42	0.41
2023 Emission Totals		**21.71**	**36.11**	**1.97**	**0.033**	**5.56**	**1.401**
Drainage System	2024	-	-	-	-	2.22	0.33
Fencing	2024	-	-	-	-	-	-
Building - 10000 sqft- 1 story	2024	-	-	-	-	0.03	0.00
Site Work - 10000 sqft	2024	-	-	-	-	0.03	0.00
Demolition - Asphalt	2024	-	-	-	-	0.23	0.03
Demolition - Concrete	2024	-	-	-	-	0.58	0.09

Project Type	Project Year	Emissions (tons/yr)					
		NOx	CO	VOC	SO_2	Total PM_{10}	Total $PM_{2.5}$
Demolition - Building	2024	-	-	-	-	-	-
Taxiway Exit	2024	-	-	0.43	-	0.75	0.11
Terminal Apron	2024	-	-	0.01	-	0.06	0.01
Fugitive Dust Control	2024	0.06	0.04	0.00	0.00	0.01	0.00
Onroad	2024	9.16	7.00	0.35	0.01	0.69	0.22
Nonroad	2024	2.46	13.03	0.45	0.00	0.19	0.19
2024 Emission Totals		**11.69**	**20.07**	**1.24**	**0.019**	**4.78**	**0.989**
Drainage System	2025	-	-	-	-	2.03	0.30
Fencing	2025	-	-	-	-	-	-
Building - 10000 sqft- 1 story	2025	-	-	-	-	-	-
Site Work - 10000 sqft	2025	-	-	-	-	0.01	0.00
Demolition - Asphalt	2025	-	-	-	-	0.11	0.02
Demolition - Concrete	2025	-	-	-	-	0.29	0.04
Demolition - Building	2025	-	-	-	-	-	-
Taxiway Exit	2025	-	-	0.21	-	0.37	0.05
Terminal Apron	2025	-	-	0.01	-	0.03	0.00
Fugitive Dust Control	2025	0.06	0.04	0.00	0.00	0.01	0.00
Onroad	2025	1.36	2.45	0.08	0.00	0.13	0.04
Nonroad	2025	0.34	1.91	0.06	0.00	0.03	0.02
2025 Emission Totals		**1.76**	**4.40**	**0.37**	**0.004**	**3.00**	**0.485**

Table 12 presents GHG emissions associated with construction elements of the Proposed Project by emissions source and year. **Table 13** presents unmitigated GHG emissions associated with construction elements of the Proposed Project by source type and year.

Table 12. Proposed Action total annual GHG emissions by emission source.

Project Year	Emissions Source	Project Year	Emissions Source	Emissions (tons/yr)			
				CH_4	N_2O	CO_2	CO_2e
2022	On-road	2022	On-road	0.015	0.002	937	939
2022	Non-road	2022	Non-road	0.013	0.021	442	449
2022	Fugitives	2022	Fugitives	-	-	-	-
2022	**Total**	**2022**	**Total**	**0.027**	**0.023**	**1,379**	**1,388**
2023	On-road	2023	On-road	0.102	0.014	6,800	6,812
2023	Non-road	2023	Non-road	0.092	0.157	3,283	3,333
2023	Fugitives	2023	Fugitives	-	-	-	-

Project Year	Emissions Source	Project Year	Emissions Source	Emissions (tons/yr)			
				CH_4	N_2O	CO_2	CO_2e
2023	**Total**	**2023**	**Total**	**0.194**	**0.170**	**10,083**	**10,146**
2024	On-road	2024	On-road	0.059	0.009	3,963	3,970
2024	Non-road	2024	Non-road	0.047	0.082	1,724	1,751
2024	Fugitives	2024	Fugitives	-	-	-	-
2024	**Total**	**2024**	**Total**	**0.106**	**0.091**	**5,687**	**5,721**
2025	On-road	2025	On-road	0.014	0.003	781	783
2025	Non-road	2025	Non-road	0.007	0.012	256	260
2025	Fugitives	2025	Fugitives	-	-	-	-
2025	**Total**	**2025**	**Total**	**0.021**	**0.015**	**1,037**	**1,043**

Table 13. Proposed Action total annual GHG emissions by project type and year.

Project Type	Project Year	Emissions(tons/yr)			
		CH_4	N_2O	CO_2	CO_2e
Drainage System	2022	-	-	-	-
Fencing	2022	-	-	-	-
Building - 10000 sqft- 1 story	2022	-	-	-	-
Site Work - 10000 sqft	2022	-	-	-	-
Demolition - Asphalt	2022	-	-	-	-
Demolition - Concrete	2022	-	-	-	-
Demolition - Building	2022	-	-	-	-
Taxiway Exit	2022	-	-	-	-
Terminal Apron	2022	-	-	-	-
Fugitive Dust Control	2022	0.00	0.00	3	3
Onroad	2022	0.01	0.00	934	936
Nonroad	2022	0.01	0.02	442	449
2022 Emission Totals		**0.027**	**0.023**	**1,379**	**1,388**
Drainage System	2023	-	-	-	-
Fencing	2023	-	-	-	-
Building - 10000 sqft- 1 story	2023	-	-	-	-
Site Work - 10000 sqft	2023	-	-	-	-
Demolition - Asphalt	2023	-	-	-	-
Demolition - Concrete	2023	-	-	-	-
Demolition - Building	2023	-	-	-	-
Taxiway Exit	2023	-	-	-	-

Project Type	Project Year	Emissions(tons/yr)			
		CH_4	N_2O	CO_2	CO_2e
Terminal Apron	2023	-	-	-	-
Fugitive Dust Control	2023	0.00	0.00	34	34
Onroad	2023	0.10	0.01	6,766	6,778
Nonroad	2023	0.09	0.16	3,283	3,333
2023 Emission Totals		**0.194**	**0.170**	**10,083**	**10,146**
Drainage System	2024	-	-	-	-
Fencing	2024	-	-	-	-
Building - 10000 sqft- 1 story	2024	-	-	-	-
Site Work - 10000 sqft	2024	-	-	-	-
Demolition - Asphalt	2024	-	-	-	-
Demolition - Concrete	2024	-	-	-	-
Demolition - Building	2024	-	-	-	-
Taxiway Exit	2024	-	-	-	-
Terminal Apron	2024	-	-	-	-
Fugitive Dust Control	2024	0.00	0.00	34	34
Onroad	2024	0.06	0.01	3,930	3,937
Nonroad	2024	0.05	0.08	1,724	1,751
2024 Emission Totals		**0.106**	**0.091**	**5,687**	**5,721**
Drainage System	2025	-	-	-	-
Fencing	2025	-	-	-	-
Building - 10000 sqft- 1 story	2025	-	-	-	-
Site Work - 10000 sqft	2025	-	-	-	-
Demolition - Asphalt	2025	-	-	-	-
Demolition - Concrete	2025	-	-	-	-
Demolition - Building	2025	-	-	-	-
Taxiway Exit	2025	-	-	-	-
Terminal Apron	2025	-	-	-	-
Fugitive Dust Control	2025	0.00	0.00	30	30
Onroad	2025	0.01	0.00	751	753
Nonroad	2025	0.01	0.01	256	260
2025 Emission Totals		**0.021**	**0.015**	**1,037**	**1,043**

4.1.2 Operational Emissions

Table 16 shows the operational emissions quantified for the No Action scenario and the Proposed Project scenario. As discussed in **Section 2.4.2**, operational emissions from aircraft and related sources were quantified for Calendar year 2024. Furthermore, the Proposed Project is not expected to change any other source of operational emissions either in the near-term or long-term.

Table 16 also shows the difference between the No Action and Proposed Project scenarios to quantify the incremental operational emissions occurring due to the Proposed Project. Aircraft emissions decrease under the Proposed Project scenario relative to the No Action scenario, with NOx emissions decreasing by approximately 6.7 tons during the CY2024 period modeled in AEDT. This decrease is driven almost entirely by the reduced taxi times in the Proposed Action scenario relative to the No Action scenario resulting from the operational efficiency improvements to Terminals A, B and C. Emissions from APUs and GSE are not expected to change as a result of the Proposed Action.

Table 14. Aircraft operational emissions for Proposed Project and No Action with emission changes.

Mode	Emissions (short tons/year)						
	VOC	CO	NOx	PM_{10}	$PM_{2.5}$	SOx	CO_2
No Action							
Aircraft*	487	3,836	4,131	39	39	400	1,078,762
Ground Support Equipment (GSE)	21	554	54	3	3	0	0
Auxiliary Power Unit (APU)	10	126	130	17	17	17	0
2024 No Action Total	**518**	**4,516**	**4,315**	**60**	**60**	**418**	**1,078,762**
Proposed Project							
Aircraft*	484	3,806	4,125	39	39	399	1,073,994
Ground Support Equipment (GSE)	21	554	54	3	3	0	0
Auxiliary Power Unit (APU)	10	126	130	17	17	17	0
2024 Proposed Action Total	**516**	**4,486**	**4,308**	**60**	**60**	**417**	**1,073,994**
Difference (Proposed Project - No Action)							
Aircraft*	-3	-30	-7	0	0	-2	-4,768
Ground Support Equipment (GSE)**	0	0	0	0	0	0	0
Auxiliary Power Unit (APU)**	0	0	0	0	0	0	0
2024 Proposed Action Total	-3	-30	-7	0	0	-2	-4,768

* Includes emissions associated with taxi-in, taxi-out and in-flight operations below mixing height
** Difference in emissions is <0.001 tons/year

4.1.3 General Conformity *De Minimis* Thresholds

As shown in **Table 17**, Proposed Project emissions for sources are below *de minimis* thresholds for all years.

Table 15. Proposed Project total emissions compared to applicable general conformity *de minimis* thresholds.

Project Year**	Project Emissions (tons/yr)		General Conformity De Minimis Threshold* (tons/yr)		Project Emissions greater than General Conformity De Minimis Threshold?	
	NOx	VOC	NOx	VOC	NOx	VOC
2022	3.16	0.26	50	50	No	No
2023	21.71	1.97	50	50	No	No
2024	5.01	-1.28	50	50	No	No
2025	-4.93	-2.16	50	50	No	No

* Source: 40 CFR 93 § 153 *de minimis* thresholds applied to Dallas-Fort Worth Non-attainment Area "serious" classification

** 2022 and 2023 include construction emissions only; 2024 and 2025 include construction and net operational emissions. 2025 net operational emissions are assumed equivalent to 2024 net operation emissions estimates. Proposed Project operational emissions are reduced relative to the No Action resulting in an overall NOx emissions decrease for 2025 and overall VOC emissions decreases for 2024 and 2025.

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4.2 Project Alternatives

Under the No Action Alternative, DFW would not implement the Proposed Project. The No Action Alternative would not involve any construction activities; therefore, no construction emissions would be associated with the No Action Alternative. The No Action Alternative was not assessed because it does not meet the stated purpose and need for this project, nor are any emission impacts expected from the No Action Alternative.

No other action alternative was assessed for this Project.

APPENDIX A: ACEIT INPUTS FOR PROPOSED PROJECT ELEMENTS

Table A1. ACEIT Inputs.

Table A1. ACEIT Inputs.

Project Type	Parameter	Project Estimate	Units
Building - 10000 sqft- 1 story	What is the estimated cost of the project?	49.123	$ Million(s)
Demolition - Asphalt	What is the estimated cost of the project?	1.545	$ Million(s)
Demolition - Asphalt	What is the maximum length of demolition area (L) in feet?	518	Feet
Demolition - Asphalt	What is the maximum width of demolition area (W) in feet?	518	Feet
Demolition - Building	How many square feet of building will be demolished?	15,000	Square Feet
Demolition - Building	What is the estimated cost of the project?	1.226	$ Million(s)
Demolition - Building	What is the height of building (H) in feet?	20	Feet
Demolition - Building	What is the open space height (H) in feet?	10	Feet
Demolition - Concrete	What is the estimated cost of the project?	11.779	$ Million(s)
Demolition - Concrete	What is the maximum length of demolition area (L) in feet?	861	Feet
Demolition - Concrete	What is the maximum width of demolition area (W) in feet?	861	Feet
Drainage System	What is the estimated cost of the project?	2.799	$ Million(s)
Drainage System	What is the maximum depth of the drainage system (D) in feet?	15	Feet
Drainage System	What is the maximum length of the drainage system (L) in feet?	1,870	Feet
Drainage System	What is the maximum width of the drainage system (W) in feet?	1,870	Feet
Fencing	What is the estimated cost of the project?	0.16	$ Million(s)
Fencing	What is the maximum length of the fence (L) in feet?	730	Feet
Site Work - 10000 sqft	What is the estimated cost of the project?	86.98	$ Million(s)
Taxiway Exit	What is the estimated cost of the project?	1	$ Million(s)
Taxiway Exit	What is the maximum length of the taxiway exit (L) in feet?	950	Feet
Taxiway Exit	What is the maximum width of the taxiway exit (W) in feet?	950	Feet
Terminal Apron	What is the estimated cost of the project?	1	$ Million(s)
Terminal Apron	What is the maximum length of the terminal apron (L) in feet?	295	Feet
Terminal Apron	What is the maximum width of the terminal apron (W) in feet?	74	Feet

APPENDIX B: DETAILED ON-ROAD EMISSION INVENTORY DATA FOR PROPOSED PROJECT ELEMENTS

Table B1. Construction-phase on-road vehicle activity.

Project Type	Construction Activity	Vehicle	MOVES Source Type	Fuel	Emission Process	Activity Surrogate	Total Activity	Activity - 2022	Activity - 2023	Activity - 2024	Activity - 2025
Onroad	Material Delivery	Heavy-Duty Truck	Combination Short-haul Truck	Diesel	RPD	Miles	6251200	477120	3468320	2004320	301440
Onroad	Employee Commute	Passenger Car	Passenger Car	Gasoline	RPD	Miles	1911000	54101	637000	637000	582899
Onroad	Material Delivery	Heavy-Duty Truck	Combination Short-haul Truck	Diesel	RPD_WEAR	Miles	6251200	477120	3468320	2004320	301440
Onroad	Employee Commute	Passenger Car	Passenger Car	Gasoline	RPD_WEAR	Miles	1911000	54101	637000	637000	582899
Onroad	Material Delivery	Heavy-Duty Truck	Combination Short-haul Truck	Diesel	RPD_EVAP	Miles	6251200	477120	3468320	2004320	301440
Onroad	Employee Commute	Passenger Car	Passenger Car	Gasoline	RPD_EVAP	Miles	1911000	54101	637000	637000	582899
Onroad	Material Delivery	Heavy-Duty Truck	Combination Short-haul Truck	Diesel	RPV_START	One-Way Trips	240431	18351	133397	77089	11594
Onroad	Employee Commute	Passenger Car	Passenger Car	Gasoline	RPV_START	One-Way Trips	73500	2081	24500	24500	22419
Onroad	Material Delivery	Heavy-Duty Truck	Combination Short-haul Truck	Diesel	DIURNAL	Vehicle-days	2842721	216969	1577212	911461	137079
Onroad	Employee Commute	Passenger Car	Passenger Car	Gasoline	DIURNAL	Vehicle-days	7379633	208921	2459878	2459878	2250956
Onroad	Material Delivery	Heavy-Duty Truck	Combination Short-haul Truck	Diesel	RPV_EVAP	Vehicle-days	2842721	216969	1577212	911461	137079
Onroad	Employee Commute	Passenger Car	Passenger Car	Gasoline	RPV_EVAP	Vehicle-days	7379633	208921	2459878	2459878	2250956
Fugitive Dust Control	Fugitive Dust Control	Water Truck	Single Unit Short-haul Truck	Diesel	DIURNAL	Vehicle-days	17536	496	5840	5856	5344
Fugitive Dust Control	Fugitive Dust Control	Water Truck	Single Unit Short-haul Truck	Diesel	RPD	Miles	87680	2480	29200	29280	26720
Fugitive Dust Control	Fugitive Dust Control	Water Truck	Single Unit Short-haul Truck	Diesel	RPD_EVAP	Miles	87680	2480	29200	29280	26720

Project Type	Construction Activity	Vehicle	MOVES Source Type	Fuel	Emission Process	Activity Surrogate	Total Activity	Activity - 2022	Activity - 2023	Activity - 2024	Activity - 2025
Fugitive Dust Control	Fugitive Dust Control	Water Truck	Single Unit Short-haul Truck	Diesel	RPD_WEAR	Miles	87680	2480	29200	29280	26720
Fugitive Dust Control	Fugitive Dust Control	Water Truck	Single Unit Short-haul Truck	Diesel	RPV_EVAP	Vehicle-days	17536	496	5840	5856	5344
Fugitive Dust Control	Fugitive Dust Control	Water Truck	Single Unit Short-haul Truck	Diesel	RPV_START	One-Way Trips	17536	496	5840	5856	5344

Table B2. 2022 construction-phase on-road vehicle criteria air pollutant emission factors.

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors					
					NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onroad	Material Delivery	Heavy-Duty Truck	RPD	g/mi	4.53E+00	2.34E+00	1.58E-01	5.81E-03	9.44E-02	8.68E-02
Onroad	Employee Commute	Passenger Car	RPD	g/mi	1.06E-01	2.87E+00	3.21E-02	2.25E-03	2.18E-03	1.93E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-01	2.82E-02
Onroad	Employee Commute	Passenger Car	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.87E-02	6.34E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	g/mi	0.00E+00	0.00E+00	3.57E-02	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	g/one-way trip	5.77E-01	8.87E-01	1.25E-01	1.18E-04	1.67E-03	1.53E-03
Onroad	Employee Commute	Passenger Car	RPV_START	g/one-way trip	2.31E-01	4.62E+00	3.38E-01	5.86E-04	1.04E-02	9.24E-03
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	1.04E-04	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors					
					NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onroad	Employee Commute	Passenger Car	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	1.84E-04	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD	g/mi	2.20E+00	1.38E+00	1.31E-01	3.60E-03	5.69E-02	5.23E-02
General Use	Fugitive Dust Control	Water Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-01	2.21E-02
General Use	Fugitive Dust Control	Water Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPV_START	g/one-way trip	3.11E-01	2.01E-01	8.70E-02	6.19E-05	6.46E-04	5.94E-04

Table B3. 2022 construction-phase on-road vehicle greenhouse gas emission factors.

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors			
					CH_4	N_2O	CO_2	CO_2e
Onroad	Material Delivery	Heavy-Duty Truck	RPD	g/mi	2.37E-02	2.80E-03	1.74E+03	1.74E+03
Onroad	Employee Commute	Passenger Car	RPD	g/mi	9.78E-03	2.03E-03	3.39E+02	3.41E+02
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	g/one-way trip	6.89E-02	5.06E-03	3.54E+01	4.24E+01
Onroad	Employee Commute	Passenger Car	RPV_START	g/one-way trip	4.18E-02	2.99E-02	8.82E+01	9.99E+01

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors			
					CH_4	N_2O	CO_2	CO_2e
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD	g/mi	1.86E-02	3.29E-03	1.07E+03	1.08E+03
General Use	Fugitive Dust Control	Water Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPV_START	g/one-way trip	4.94E-02	5.06E-03	1.84E+01	2.39E+01

Table B4. 2023 construction-phase on-road vehicle criteria air pollutant emission factors.

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors					
					NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onroad	Material Delivery	Heavy-Duty Truck	RPD	g/mi	4.29E+00	2.29E+00	1.43E-01	5.71E-03	8.34E-02	7.68E-02
Onroad	Employee Commute	Passenger Car	RPD	g/mi	9.52E-02	2.76E+00	2.98E-02	2.20E-03	2.11E-03	1.86E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-01	2.83E-02
Onroad	Employee Commute	Passenger Car	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.87E-02	6.34E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors					
					NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onroad	Employee Commute	Passenger Car	RPD_EVAP	g/mi	0.00E+00	0.00E+00	3.48E-02	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	g/one-way trip	5.93E-01	8.40E-01	1.24E-01	1.18E-04	1.61E-03	1.48E-03
Onroad	Employee Commute	Passenger Car	RPV_START	g/one-way trip	2.18E-01	4.41E+00	3.21E-01	5.81E-04	1.07E-02	9.50E-03
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	9.97E-05	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	1.79E-04	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD	g/mi	2.05E+00	1.34E+00	1.12E-01	3.54E-03	4.76E-02	4.38E-02
General Use	Fugitive Dust Control	Water Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-01	2.22E-02
General Use	Fugitive Dust Control	Water Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPV_START	g/one-way trip	3.10E-01	1.86E-01	8.60E-02	6.15E-05	6.08E-04	5.60E-04

Table B5. 2023 construction-phase on-road vehicle greenhouse gas emission factors.

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors			
					CH_4	N_2O	CO_2	CO_2e
Onroad	Material Delivery	Heavy-Duty Truck	RPD	g/mi	2.17E-02	2.80E-03	1.71E+03	1.71E+03
Onroad	Employee Commute	Passenger Car	RPD	g/mi	9.28E-03	1.98E-03	3.31E+02	3.32E+02

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors			
					CH_4	N_2O	CO_2	CO_2e
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	g/one-way trip	6.91E-02	5.06E-03	3.52E+01	4.23E+01
Onroad	Employee Commute	Passenger Car	RPV_START	g/one-way trip	3.95E-02	2.88E-02	8.75E+01	9.86E+01
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD	g/mi	1.73E-02	3.29E-03	1.06E+03	1.06E+03
General Use	Fugitive Dust Control	Water Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPV_START	g/one-way trip	4.97E-02	5.06E-03	1.83E+01	2.38E+01

Table B6. 2024 construction-phase on-road vehicle criteria air pollutant emission factors.

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors					
					NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onroad	Material Delivery	Heavy-Duty Truck	RPD	g/mi	4.10E+00	2.25E+00	1.31E-01	5.60E-03	7.41E-02	6.82E-02
Onroad	Employee Commute	Passenger Car	RPD	g/mi	7.45E-02	2.64E+00	2.37E-02	2.14E-03	1.98E-03	1.75E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.21E-01	2.84E-02
Onroad	Employee Commute	Passenger Car	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.87E-02	6.34E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	g/mi	0.00E+00	0.00E+00	3.38E-02	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	g/one-way trip	6.04E-01	8.09E-01	1.23E-01	1.17E-04	1.55E-03	1.43E-03
Onroad	Employee Commute	Passenger Car	RPV_START	g/one-way trip	2.04E-01	4.19E+00	3.04E-01	5.77E-04	1.09E-02	9.61E-03
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	9.48E-05	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	1.74E-04	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD	g/mi	1.93E+00	1.30E+00	9.55E-02	3.47E-03	4.07E-02	3.74E-02
General Use	Fugitive Dust Control	Water Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-01	2.23E-02
General Use	Fugitive Dust Control	Water Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors					
					NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
General Use	Fugitive Dust Control	Water Truck	RPV_START	g/one-way trip	3.09E-01	1.75E-01	8.52E-02	6.11E-05	5.76E-04	5.30E-04

Table B7. 2024 construction-phase on-road vehicle greenhouse gas emission factors.

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors			
					CH_4	N_2O	CO_2	CO_2e
Onroad	Material Delivery	Heavy-Duty Truck	RPD	g/mi	2.06E-02	2.80E-03	1.67E+03	1.68E+03
Onroad	Employee Commute	Passenger Car	RPD	g/mi	8.12E-03	1.85E-03	3.23E+02	3.24E+02
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	g/one-way trip	6.95E-02	5.06E-03	3.51E+01	4.22E+01
Onroad	Employee Commute	Passenger Car	RPV_START	g/one-way trip	3.72E-02	2.77E-02	8.69E+01	9.75E+01
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD	g/mi	1.64E-02	3.29E-03	1.04E+03	1.04E+03

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors			
					CH_4	N_2O	CO_2	CO_2e
General Use	Fugitive Dust Control	Water Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPV_START	g/one-way trip	5.00E-02	5.06E-03	1.82E+01	2.38E+01

Table B8. 2025 construction-phase on-road vehicle criteria air pollutant emission factors.

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors					
					NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onroad	Material Delivery	Heavy-Duty Truck	RPD	g/mi	3.94E+00	2.20E+00	1.20E-01	5.49E-03	6.62E-02	6.09E-02
Onroad	Employee Commute	Passenger Car	RPD	g/mi	6.29E-02	2.50E+00	2.11E-02	2.09E-03	1.87E-03	1.65E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.21E-01	2.84E-02
Onroad	Employee Commute	Passenger Car	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.87E-02	6.34E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	g/mi	0.00E+00	0.00E+00	3.29E-02	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	g/one-way trip	6.12E-01	7.86E-01	1.23E-01	1.17E-04	1.50E-03	1.38E-03
Onroad	Employee Commute	Passenger Car	RPV_START	g/one-way trip	1.93E-01	3.99E+00	2.88E-01	5.74E-04	1.10E-02	9.77E-03
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	9.02E-05	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors					
					NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onroad	Employee Commute	Passenger Car	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	1.69E-04	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD	g/mi	1.83E+00	1.27E+00	8.20E-02	3.41E-03	3.39E-02	3.12E-02
General Use	Fugitive Dust Control	Water Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-01	2.24E-02
General Use	Fugitive Dust Control	Water Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPV_START	g/one-way trip	3.07E-01	1.67E-01	8.45E-02	6.08E-05	5.49E-04	5.05E-04

Table B9. 2025 construction-phase on-road vehicle greenhouse gas emission factors.

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors			
					CH_4	N_2O	CO_2	CO_2e
Onroad	Material Delivery	Heavy-Duty Truck	RPD	g/mi	1.97E-02	2.80E-03	1.64E+03	1.65E+03
Onroad	Employee Commute	Passenger Car	RPD	g/mi	7.53E-03	1.73E-03	3.14E+02	3.16E+02
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	g/one-way trip	6.99E-02	5.06E-03	3.50E+01	4.22E+01
Onroad	Employee Commute	Passenger Car	RPV_START	g/one-way trip	3.51E-02	2.67E-02	8.64E+01	9.66E+01

Project Type	Construction Activity	Vehicle	Emission Process	Emission Factor Units	Emission Factors			
					CH_4	N_2O	CO_2	CO_2e
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	DIURNAL	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD	g/mi	1.57E-02	3.29E-03	1.02E+03	1.02E+03
General Use	Fugitive Dust Control	Water Truck	RPD_EVAP	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPD_WEAR	g/mi	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPV_EVAP	g/vehicle-day	0.00E+00	0.00E+00	0.00E+00	0.00E+00
General Use	Fugitive Dust Control	Water Truck	RPV_START	g/one-way trip	5.03E-02	5.06E-03	1.82E+01	2.37E+01

Table B10. 2022 construction-phase on-road vehicle criteria air pollutant emissions.

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)					
				NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onroad	Material Delivery	Heavy-Duty Truck	RPD	2.38E+00	1.23E+00	8.33E-02	3.06E-03	4.96E-02	4.57E-02
Onroad	Employee Commute	Passenger Car	RPD	6.31E-03	1.71E-01	1.92E-03	1.34E-04	1.30E-04	1.15E-04
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-01	1.49E-02
Onroad	Employee Commute	Passenger Car	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-03	3.78E-04
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	0.00E+00	0.00E+00	2.13E-03	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)					
				NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	1.17E-02	1.80E-02	2.52E-03	2.40E-06	3.37E-05	3.10E-05
Onroad	Employee Commute	Passenger Car	RPV_START	5.31E-04	1.06E-02	7.75E-04	1.34E-06	2.39E-05	2.12E-05
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	0.00E+00	0.00E+00	2.40E-05	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	0.00E+00	0.00E+00	4.23E-05	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD	6.00E-03	3.78E-03	3.58E-04	9.85E-06	1.55E-04	1.43E-04
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.73E-04	6.05E-05
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_START	1.70E-04	1.10E-04	4.76E-05	3.38E-08	3.53E-07	3.25E-07

Table B11. 2022 construction-phase on-road vehicle greenhouse gas emissions.

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)			
				CH_4	N_2O	CO_2	CO_2e
Onroad	Material Delivery	Heavy-Duty Truck	RPD	1.24E-02	1.47E-03	9.13E+02	9.14E+02
Onroad	Employee Commute	Passenger Car	RPD	5.83E-04	1.21E-04	2.02E+01	2.03E+01
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)			
				CH_4	N_2O	CO_2	CO_2e
Onroad	Employee Commute	Passenger Car	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	1.39E-03	1.02E-04	7.15E-01	8.58E-01
Onroad	Employee Commute	Passenger Car	RPV_START	9.59E-05	6.86E-05	2.02E-01	2.29E-01
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD	5.10E-05	8.98E-06	2.93E+00	2.94E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_START	2.70E-05	2.77E-06	1.01E-02	1.31E-02

Table B12. 2023 construction-phase on-road vehicle criteria air pollutant emissions.

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)					
				NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onroad	Material Delivery	Heavy-Duty Truck	RPD	1.64E+01	8.77E+00	5.48E-01	2.18E-02	3.19E-01	2.94E-01
Onroad	Employee Commute	Passenger Car	RPD	6.69E-02	1.94E+00	2.09E-02	1.54E-03	1.48E-03	1.31E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E-01	1.08E-01
Onroad	Employee Commute	Passenger Car	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.42E-02	4.45E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	0.00E+00	0.00E+00	2.45E-02	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	8.72E-02	1.23E-01	1.82E-02	1.73E-05	2.36E-04	2.17E-04
Onroad	Employee Commute	Passenger Car	RPV_START	5.89E-03	1.19E-01	8.66E-03	1.57E-05	2.90E-04	2.56E-04
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	0.00E+00	0.00E+00	2.70E-04	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	0.00E+00	0.00E+00	4.86E-04	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD	6.60E-02	4.31E-02	3.60E-03	1.14E-04	1.53E-03	1.41E-03
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E-03	7.16E-04
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_START	1.99E-03	1.20E-03	5.54E-04	3.96E-07	3.92E-06	3.60E-06

Table B13. 2023 construction-phase on-road vehicle greenhouse gas emissions.

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)			
				CH_4	N_2O	CO_2	CO_2e
Onroad	Material Delivery	Heavy-Duty Truck	RPD	8.31E-02	1.07E-02	6.53E+03	6.54E+03
Onroad	Employee Commute	Passenger Car	RPD	6.52E-03	1.39E-03	2.32E+02	2.33E+02
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	1.02E-02	7.44E-04	5.18E+00	6.22E+00
Onroad	Employee Commute	Passenger Car	RPV_START	1.07E-03	7.77E-04	2.36E+00	2.66E+00
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD	5.57E-04	1.06E-04	3.40E+01	3.40E+01
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)			
				CH_4	N_2O	CO_2	CO_2e
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_START	3.20E-04	3.26E-05	1.18E-01	1.53E-01

Table B14. 2024 construction-phase on-road vehicle criteria air pollutant emissions.

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)					
				NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onroad	Material Delivery	Heavy-Duty Truck	RPD	9.05E+00	4.96E+00	2.89E-01	1.24E-02	1.64E-01	1.51E-01
Onroad	Employee Commute	Passenger Car	RPD	5.23E-02	1.86E+00	1.66E-02	1.50E-03	1.39E-03	1.23E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.88E-01	6.27E-02
Onroad	Employee Commute	Passenger Car	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.42E-02	4.45E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	0.00E+00	0.00E+00	2.37E-02	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	5.13E-02	6.88E-02	1.05E-02	9.98E-06	1.32E-04	1.21E-04
Onroad	Employee Commute	Passenger Car	RPV_START	5.52E-03	1.13E-01	8.20E-03	1.56E-05	2.93E-04	2.59E-04
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	0.00E+00	0.00E+00	2.57E-04	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	0.00E+00	0.00E+00	4.71E-04	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD	6.22E-02	4.20E-02	3.08E-03	1.12E-04	1.31E-03	1.21E-03
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)					
				NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.64E-03	7.21E-04
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_START	1.99E-03	1.13E-03	5.50E-04	3.94E-07	3.72E-06	3.42E-06

Table B15. 2024 construction-phase on-road vehicle greenhouse gas emissions.

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)			
				CH_4	N_2O	CO_2	CO_2e
Onroad	Material Delivery	Heavy-Duty Truck	RPD	4.55E-02	6.19E-03	3.70E+03	3.70E+03
Onroad	Employee Commute	Passenger Car	RPD	5.70E-03	1.30E-03	2.26E+02	2.27E+02
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	5.91E-03	4.30E-04	2.99E+00	3.59E+00
Onroad	Employee Commute	Passenger Car	RPV_START	1.00E-03	7.47E-04	2.35E+00	2.63E+00
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)			
				CH_4	N_2O	CO_2	CO_2e
Fugitive Dust Control	Fugitive Dust Control	Water Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD	5.28E-04	1.06E-04	3.34E+01	3.35E+01
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_START	3.23E-04	3.27E-05	1.18E-01	1.53E-01

Table B16. 2025 construction-phase on-road vehicle criteria air pollutant emissions.

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)					
				NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onroad	Material Delivery	Heavy-Duty Truck	RPD	1.31E+00	7.32E-01	4.00E-02	1.83E-03	2.20E-02	2.02E-02
Onroad	Employee Commute	Passenger Car	RPD	4.04E-02	1.61E+00	1.35E-02	1.34E-03	1.20E-03	1.06E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.36E-02	9.45E-03
Onroad	Employee Commute	Passenger Car	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E-02	4.07E-03
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	0.00E+00	0.00E+00	2.12E-02	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	7.82E-03	1.00E-02	1.57E-03	1.50E-06	1.92E-05	1.77E-05
Onroad	Employee Commute	Passenger Car	RPV_START	4.78E-03	9.87E-02	7.12E-03	1.42E-05	2.73E-04	2.42E-04
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)					
				NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Onroad	Employee Commute	Passenger Car	DIURNAL	0.00E+00	0.00E+00	2.24E-04	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	0.00E+00	0.00E+00	4.20E-04	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD	5.39E-02	3.74E-02	2.41E-03	1.00E-04	9.98E-04	9.19E-04
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.17E-03	6.61E-04
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_START	1.81E-03	9.81E-04	4.98E-04	3.58E-07	3.23E-06	2.97E-06

Table B17. 2025 construction-phase on-road vehicle greenhouse gas emissions.

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)			
				CH_4	N_2O	CO_2	CO_2e
Onroad	Material Delivery	Heavy-Duty Truck	RPD	6.54E-03	9.31E-04	5.46E+02	5.47E+02
Onroad	Employee Commute	Passenger Car	RPD	4.84E-03	1.11E-03	2.02E+02	2.03E+02
Onroad	Material Delivery	Heavy-Duty Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Vehicle	Emission Process	Emissions (tons/yr)			
				CH_4	N_2O	CO_2	CO_2e
Onroad	Material Delivery	Heavy-Duty Truck	RPV_START	8.93E-04	6.47E-05	4.48E-01	5.39E-01
Onroad	Employee Commute	Passenger Car	RPV_START	8.68E-04	6.60E-04	2.14E+00	2.39E+00
Onroad	Material Delivery	Heavy-Duty Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Material Delivery	Heavy-Duty Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onroad	Employee Commute	Passenger Car	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	DIURNAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD	4.62E-04	9.68E-05	3.00E+01	3.01E+01
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPD_WEAR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_EVAP	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fugitive Dust Control	Fugitive Dust Control	Water Truck	RPV_START	2.97E-04	2.98E-05	1.07E-01	1.40E-01

APPENDIX C: DETAILED NON-ROAD EMISSION INVENTORY DATA FOR PROPOSED PROJECT ELEMENTS

Table C1. Construction-phase non-road equipment activity.

Project	Construction Activity	Equipment Type	Fuel	Average Horsepower	Load Factor	Total Hours	Total Horsepower-Hours	Horsepower-Hours - 2022	Horsepower-Hours - 2023	Horsepower-Hours - 2024	Horsepower-Hours - 2025
Nonroad	Construction	Excavator	Nonroad Diesel Fuel	314	0.59	437	137,230	10,641	78,956	41,469	6,164
Nonroad	Construction	Hydraulic Hammer	Nonroad Diesel Fuel	24.8	0.59	328	8,129	630	4,677	2,456	365
Nonroad	Construction	Air Compressor	Nonroad Diesel Fuel	100	0.43	437	43,704	3,389	25,145	13,207	1,963
Nonroad	Construction	Standard Bucket Loader	Nonroad Diesel Fuel	141	0.21	656	92,433	7,167	53,182	27,932	4,152
Nonroad	Construction	Bobcat Skid	Nonroad Diesel Fuel	100	0.21	656	65,556	5,083	37,718	19,810	2,945
Nonroad	Construction	Haul Truck	Nonroad Diesel Fuel	405	0.59	1,311	531,000	41,174	305,513	160,461	23,851
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	1,311	90,467	7,015	52,050	27,338	4,064
Nonroad	Construction	Concrete Saws	Gasoline	13	0.78	874	11,363	881	6,538	3,434	510
Nonroad	Construction	Grader	Nonroad Diesel Fuel	100	0.59	486	48,560	3,765	27,939	14,674	2,181
Nonroad	Construction	Water Truck	Nonroad Diesel Fuel	350	0.59	486	169,959	13,179	97,787	51,359	7,634
Nonroad	Construction	Roller Compactor	Nonroad Diesel Fuel	100	0.59	728	72,839	5,648	41,909	22,011	3,272

Project	Construction Activity	Equipment Type	Fuel	Average Horsepower	Load Factor	Total Hours	Total Horsepower-Hours	Horsepower-Hours - 2022	Horsepower-Hours - 2023	Horsepower-Hours - 2024	Horsepower-Hours - 2025
Nonroad	Construction	Concrete Pumping Truck	Nonroad Diesel Fuel	335	0.59	486	162,675	12,614	93,596	49,158	7,307
Nonroad	Construction	Concrete Paver	Nonroad Diesel Fuel	175	0.59	728	127,469	9,884	73,340	38,519	5,726
Nonroad	Construction	Motorized Trowel	Nonroad Diesel Fuel	50	0.59	486	24,280	1,883	13,970	7,337	1,091
Nonroad	Construction	Asphalt Paver	Nonroad Diesel Fuel	100	0.59	728	72,839	5,648	41,909	22,011	3,272
Nonroad	Construction	Rubber Tire Roller Compactor	Nonroad Diesel Fuel	100	0.59	728	72,839	5,648	41,909	22,011	3,272
Nonroad	Construction	Bobcat	Nonroad Diesel Fuel	100	0.21	1,942	194,239	15,062	111,756	58,696	8,725
Nonroad	Construction	Paint Sprayers	Nonroad Diesel Fuel	25	0.59	486	12,140	941	6,985	3,669	545
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	1,311	90,467	7,015	52,050	27,338	4,064
Nonroad	Construction	Sweeper	Nonroad Diesel Fuel	100	0.43	109	10,926	847	6,286	3,302	491
Nonroad	Construction	Concrete Saws	Gasoline	13	0.78	1,311	17,044	1,322	9,807	5,151	766
Nonroad	Construction	Excavator	Nonroad Diesel Fuel	314	0.59	437	137,230	10,641	78,956	41,469	6,164
Nonroad	Construction	Hydraulic Hammer	Nonroad Diesel Fuel	24.8	0.59	437	10,839	840	6,236	3,275	487

Project	Construction Activity	Equipment Type	Fuel	Average Horsepower	Load Factor	Total Hours	Total Horsepower-Hours	Horsepower-Hours - 2022	Horsepower-Hours - 2023	Horsepower-Hours - 2024	Horsepower-Hours - 2025
Nonroad	Construction	Air Compressor	Nonroad Diesel Fuel	100	0.43	437	43,704	3,389	25,145	13,207	1,963
Nonroad	Construction	Standard Bucket Loader	Nonroad Diesel Fuel	141	0.21	656	92,433	7,167	53,182	27,932	4,152
Nonroad	Construction	Bobcat Skid	Nonroad Diesel Fuel	100	0.21	1,311	131,111	10,167	75,435	39,620	5,889
Nonroad	Construction	Haul Truck	Nonroad Diesel Fuel	405	0.59	1,311	531,000	41,174	305,513	160,461	23,851
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	1,311	90,467	7,015	52,050	27,338	4,064
Nonroad	Construction	Concrete Saws	Gasoline	13	0.78	1,311	17,044	1,322	9,807	5,151	766
Nonroad	Construction	Grader	Nonroad Diesel Fuel	100	0.59	486	48,560	3,765	27,939	14,674	2,181
Nonroad	Construction	Water Truck	Nonroad Diesel Fuel	350	0.59	486	169,959	13,179	97,787	51,359	7,634
Nonroad	Construction	Roller Compactor	Nonroad Diesel Fuel	100	0.59	728	72,839	5,648	41,909	22,011	3,272
Nonroad	Construction	Concrete Pumping Truck	Nonroad Diesel Fuel	335	0.59	486	162,675	12,614	93,596	49,158	7,307
Nonroad	Construction	Concrete Paver	Nonroad Diesel Fuel	175	0.59	728	127,469	9,884	73,340	38,519	5,726
Nonroad	Construction	Motorized Trowel	Nonroad Diesel Fuel	50	0.59	486	24,280	1,883	13,970	7,337	1,091

Project	Construction Activity	Equipment Type	Fuel	Average Horsepower	Load Factor	Total Hours	Total Horsepower-Hours	Horsepower-Hours - 2022	Horsepower-Hours - 2023	Horsepower-Hours - 2024	Horsepower-Hours - 2025
Nonroad	Construction	Asphalt Paver	Nonroad Diesel Fuel	100	0.59	728	72,839	5,648	41,909	22,011	3,272
Nonroad	Construction	Rubber Tire Roller Compactor	Nonroad Diesel Fuel	100	0.59	728	72,839	5,648	41,909	22,011	3,272
Nonroad	Construction	Bobcat	Nonroad Diesel Fuel	100	0.21	1,942	194,239	15,062	111,756	58,696	8,725
Nonroad	Construction	Paint Sprayers	Nonroad Diesel Fuel	25	0.59	486	12,140	941	6,985	3,669	545
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	1,942	134,025	10,392	77,112	40,500	6,020
Nonroad	Construction	Concrete Saws	Gasoline	13	0.78	971	12,626	979	7,264	3,815	567
Nonroad	Construction	Sweeper	Nonroad Diesel Fuel	100	0.43	109	10,926	847	6,286	3,302	491
Nonroad	Construction	Excavator	Nonroad Diesel Fuel	314	0.59	437	137,230	10,641	78,956	41,469	6,164
Nonroad	Construction	Hydraulic Hammer	Nonroad Diesel Fuel	24.8	0.59	437	10,839	840	6,236	3,275	487
Nonroad	Construction	Air Compressor	Nonroad Diesel Fuel	100	0.43	437	43,704	3,389	25,145	13,207	1,963
Nonroad	Construction	Standard Bucket Loader	Nonroad Diesel Fuel	141	0.21	656	92,433	7,167	53,182	27,932	4,152
Nonroad	Construction	Bobcat Skid	Nonroad Diesel Fuel	100	0.21	1,311	131,111	10,167	75,435	39,620	5,889

Project	Construction Activity	Equipment Type	Fuel	Average Horsepower	Load Factor	Total Hours	Total Horsepower-Hours	Horsepower-Hours - 2022	Horsepower-Hours - 2023	Horsepower-Hours - 2024	Horsepower-Hours - 2025
Nonroad	Construction	Haul Truck	Nonroad Diesel Fuel	405	0.59	1,311	531,000	41,174	305,513	160,461	23,851
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	1,311	90,467	7,015	52,050	27,338	4,064
Nonroad	Construction	Concrete Saws	Gasoline	13	0.78	1,311	17,044	1,322	9,807	5,151	766
Nonroad	Construction	Grader	Nonroad Diesel Fuel	100	0.59	728	72,839	5,648	41,909	22,011	3,272
Nonroad	Construction	Water Truck	Nonroad Diesel Fuel	350	0.59	2,477	866,790	67,212	498,711	261,932	38,934
Nonroad	Construction	Roller Compactor	Nonroad Diesel Fuel	100	0.59	2,477	247,654	19,203	142,489	74,838	11,124
Nonroad	Construction	Concrete Pumping Truck	Nonroad Diesel Fuel	335	0.59	2,477	829,641	64,332	477,338	250,707	37,265
Nonroad	Construction	Concrete Paver	Nonroad Diesel Fuel	175	0.59	728	127,469	9,884	73,340	38,519	5,726
Nonroad	Construction	Motorized Trowel	Nonroad Diesel Fuel	50	0.59	1,821	91,049	7,060	52,386	27,514	4,090
Nonroad	Construction	Asphalt Paver	Nonroad Diesel Fuel	100	0.59	728	72,839	5,648	41,909	22,011	3,272
Nonroad	Construction	Rubber Tire Roller Compactor	Nonroad Diesel Fuel	100	0.59	728	72,839	5,648	41,909	22,011	3,272
Nonroad	Construction	Bobcat	Nonroad Diesel Fuel	100	0.21	1,942	194,239	15,062	111,756	58,696	8,725

Project	Construction Activity	Equipment Type	Fuel	Average Horsepower	Load Factor	Total Hours	Total Horsepower-Hours	Horsepower-Hours - 2022	Horsepower-Hours - 2023	Horsepower-Hours - 2024	Horsepower-Hours - 2025
Nonroad	Construction	Paint Sprayers	Nonroad Diesel Fuel	25	0.59	486	12,140	941	6,985	3,669	545
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	4,953	341,763	26,501	196,635	103,276	15,351
Nonroad	Construction	Concrete Saws	Gasoline	13	0.78	1,311	17,044	1,322	9,807	5,151	766
Nonroad	Construction	Sweeper	Nonroad Diesel Fuel	100	0.43	109	10,926	847	6,286	3,302	491
Nonroad	Construction	Excavator	Nonroad Diesel Fuel	314	0.59	1,238	388,817	30,149	223,708	117,495	17,465
Nonroad	Construction	Hydraulic Hammer	Nonroad Diesel Fuel	24.8	0.59	1,238	30,709	2,381	17,669	9,280	1,379
Nonroad	Construction	Air Compressor	Nonroad Diesel Fuel	100	0.43	1,238	123,827	9,602	71,244	37,419	5,562
Nonroad	Construction	Standard Bucket Loader	Nonroad Diesel Fuel	141	0.21	1,238	174,596	13,538	100,455	52,761	7,842
Nonroad	Construction	Bobcat Skid	Nonroad Diesel Fuel	100	0.21	2,477	247,654	19,203	142,489	74,838	11,124
Nonroad	Construction	Haul Truck	Nonroad Diesel Fuel	405	0.59	2,477	1,002,999	77,774	577,080	303,093	45,052
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	2,477	170,881	13,250	98,317	51,638	7,676
Nonroad	Construction	Concrete Saws	Gasoline	13	0.78	1,238	16,098	1,248	9,262	4,864	723

Project	Construction Activity	Equipment Type	Fuel	Average Horsepower	Load Factor	Total Hours	Total Horsepower-Hours	Horsepower-Hours - 2022	Horsepower-Hours - 2023	Horsepower-Hours - 2024	Horsepower-Hours - 2025
Nonroad	Construction	Grader	Nonroad Diesel Fuel	100	0.59	656	65,556	5,083	37,718	19,810	2,945
Nonroad	Construction	Water Truck	Nonroad Diesel Fuel	350	0.59	656	229,444	17,791	132,012	69,335	10,306
Nonroad	Construction	Roller Compactor	Nonroad Diesel Fuel	100	0.59	656	65,556	5,083	37,718	19,810	2,945
Nonroad	Construction	Concrete Pumping Truck	Nonroad Diesel Fuel	335	0.59	656	219,611	17,029	126,354	66,364	9,864
Nonroad	Construction	Concrete Paver	Nonroad Diesel Fuel	175	0.59	656	114,722	8,896	66,006	34,668	5,153
Nonroad	Construction	Motorized Trowel	Nonroad Diesel Fuel	50	0.59	656	32,778	2,542	18,859	9,905	1,472
Nonroad	Construction	Asphalt Paver	Nonroad Diesel Fuel	100	0.59	656	65,556	5,083	37,718	19,810	2,945
Nonroad	Construction	Rubber Tire Roller Compactor	Nonroad Diesel Fuel	100	0.59	656	65,556	5,083	37,718	19,810	2,945
Nonroad	Construction	Bobcat	Nonroad Diesel Fuel	100	0.21	1,311	131,111	10,167	75,435	39,620	5,889
Nonroad	Construction	Paint Sprayers	Nonroad Diesel Fuel	25	0.59	486	12,140	941	6,985	3,669	545
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	1,311	90,467	7,015	52,050	27,338	4,064
Nonroad	Construction	Concrete Saws	Gasoline	13	0.78	1,311	17,044	1,322	9,807	5,151	766

Project	Construction Activity	Equipment Type	Fuel	Average Horsepower	Load Factor	Total Hours	Total Horsepower-Hours	Horsepower-Hours - 2022	Horsepower-Hours - 2023	Horsepower-Hours - 2024	Horsepower-Hours - 2025
Nonroad	Construction	Sweeper	Nonroad Diesel Fuel	100	0.43	109	10,926	847	6,286	3,302	491
Nonroad	Construction	Excavator	Nonroad Diesel Fuel	314	0.59	728	228,716	17,735	131,593	69,115	10,273
Nonroad	Construction	Hydraulic Hammer	Nonroad Diesel Fuel	24.8	0.59	728	18,064	1,401	10,393	5,459	811
Nonroad	Construction	Air Compressor	Nonroad Diesel Fuel	100	0.43	1,238	123,827	9,602	71,244	37,419	5,562
Nonroad	Construction	Standard Bucket Loader	Nonroad Diesel Fuel	141	0.21	728	102,704	7,964	59,091	31,036	4,613
Nonroad	Construction	Bobcat Skid	Nonroad Diesel Fuel	69	0.21	1,311	90,467	7,015	52,050	27,338	4,064
Nonroad	Construction	Haul Truck	Nonroad Diesel Fuel	405	0.59	1,457	590,000	45,749	339,459	178,290	26,501
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	1,457	100,518	7,794	57,834	30,375	4,515
Nonroad	Construction	Concrete Saws	Nonroad Diesel Fuel	13	0.59	728	9,469	734	5,448	2,861	425
Nonroad	Construction	Grader	Nonroad Diesel Fuel	100	0.59	875	87,529	6,787	50,360	26,450	3,932
Nonroad	Construction	Water Truck	Nonroad Diesel Fuel	350	0.59	875	306,351	23,755	176,260	92,575	13,760

Project	Construction Activity	Equipment Type	Fuel	Average Horsepower	Load Factor	Total Hours	Total Horsepower-Hours	Horsepower-Hours - 2022	Horsepower-Hours - 2023	Horsepower-Hours - 2024	Horsepower-Hours - 2025
Nonroad	Construction	Roller Compactor	Nonroad Diesel Fuel	100	0.59	875	87,529	6,787	50,360	26,450	3,932
Nonroad	Construction	Concrete Pumping Truck	Nonroad Diesel Fuel	335	0.59	875	293,221	22,737	168,706	88,608	13,171
Nonroad	Construction	Concrete Paver	Nonroad Diesel Fuel	175	0.59	875	153,175	11,877	88,130	46,288	6,880
Nonroad	Construction	Motorized Trowel	Nonroad Diesel Fuel	50	0.59	875	43,764	3,394	25,180	13,225	1,966
Nonroad	Construction	Asphalt Paver	Nonroad Diesel Fuel	100	0.59	875	87,529	6,787	50,360	26,450	3,932
Nonroad	Construction	Rubber Tire Roller Compactor	Nonroad Diesel Fuel	100	0.59	875	87,529	6,787	50,360	26,450	3,932
Nonroad	Construction	Bobcat	Nonroad Diesel Fuel	100	0.21	1,751	175,058	13,574	100,720	52,900	7,863
Nonroad	Construction	Paint Sprayers	Nonroad Diesel Fuel	25	0.59	425	10,622	824	6,112	3,210	477
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	1,311	90,467	7,015	52,050	27,338	4,064
Nonroad	Construction	Sweeper	Nonroad Diesel Fuel	100	0.43	109	10,926	847	6,286	3,302	491
Nonroad	Construction	Concrete Saws	Gasoline	13	0.78	850	11,047	857	6,356	3,338	496
Nonroad	Construction	Excavator	Nonroad Diesel Fuel	314	0.59	388	121,982	9,459	70,183	36,861	5,479

Project	Construction Activity	Equipment Type	Fuel	Average Horsepower	Load Factor	Total Hours	Total Horsepower-Hours	Horsepower-Hours - 2022	Horsepower-Hours - 2023	Horsepower-Hours - 2024	Horsepower-Hours - 2025
Nonroad	Construction	Hydraulic Hammer	Nonroad Diesel Fuel	24.8	0.59	388	9,634	747	5,543	2,911	433
Nonroad	Construction	Air Compressor	Nonroad Diesel Fuel	100	0.43	437	43,704	3,389	25,145	13,207	1,963
Nonroad	Construction	Standard Bucket Loader	Nonroad Diesel Fuel	141	0.21	388	54,775	4,247	31,515	16,552	2,460
Nonroad	Construction	Bobcat Skid	Nonroad Diesel Fuel	100	0.21	1,311	131,111	10,167	75,435	39,620	5,889
Nonroad	Construction	Haul Truck	Nonroad Diesel Fuel	405	0.59	777	314,666	24,400	181,045	95,088	14,134
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	777	53,610	4,157	30,845	16,200	2,408
Nonroad	Construction	Concrete Saws	Gasoline	13	0.78	388	5,050	392	2,906	1,526	227
Nonroad	Construction	Grader	Nonroad Diesel Fuel	100	0.59	777	77,695	6,025	44,702	23,479	3,490
Nonroad	Construction	Water Truck	Nonroad Diesel Fuel	350	0.59	777	271,934	21,086	156,458	82,175	12,215
Nonroad	Construction	Roller Compactor	Nonroad Diesel Fuel	100	0.59	777	77,695	6,025	44,702	23,479	3,490
Nonroad	Construction	Concrete Pumping Truck	Nonroad Diesel Fuel	335	0.59	777	260,280	20,182	149,753	78,653	11,691
Nonroad	Construction	Concrete Paver	Nonroad Diesel Fuel	175	0.59	777	135,967	10,543	78,229	41,087	6,107

Project	Construction Activity	Equipment Type	Fuel	Average Horsepower	Load Factor	Total Hours	Total Horsepower-Hours	Horsepower-Hours - 2022	Horsepower-Hours - 2023	Horsepower-Hours - 2024	Horsepower-Hours - 2025
Nonroad	Construction	Motorized Trowel	Nonroad Diesel Fuel	50	0.59	777	38,848	3,012	22,351	11,739	1,745
Nonroad	Construction	Asphalt Paver	Nonroad Diesel Fuel	100	0.59	777	77,695	6,025	44,702	23,479	3,490
Nonroad	Construction	Rubber Tire Roller Compactor	Nonroad Diesel Fuel	100	0.59	777	77,695	6,025	44,702	23,479	3,490
Nonroad	Construction	Bobcat	Nonroad Diesel Fuel	100	0.21	1,554	155,391	12,049	89,405	46,957	6,980
Nonroad	Construction	Paint Sprayers	Nonroad Diesel Fuel	25	0.59	388	9,712	753	5,588	2,935	436
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	1,311	90,467	7,015	52,050	27,338	4,064
Nonroad	Construction	Sweeper	Nonroad Diesel Fuel	100	0.43	109	10,926	847	6,286	3,302	491
Nonroad	Construction	Concrete Saws	Gasoline	13	0.78	777	10,100	783	5,811	3,052	454
Nonroad	Construction	Excavator	Nonroad Diesel Fuel	314	0.59	388	121,982	9,459	70,183	36,861	5,479
Nonroad	Construction	Hydraulic Hammer	Nonroad Diesel Fuel	24.8	0.59	388	9,634	747	5,543	2,911	433
Nonroad	Construction	Air Compressor	Nonroad Diesel Fuel	100	0.43	437	43,704	3,389	25,145	13,207	1,963
Nonroad	Construction	Standard Bucket Loader	Nonroad Diesel Fuel	141	0.21	388	54,775	4,247	31,515	16,552	2,460

Project	Construction Activity	Equipment Type	Fuel	Average Horsepower	Load Factor	Total Hours	Total Horsepower-Hours	Horsepower-Hours - 2022	Horsepower-Hours - 2023	Horsepower-Hours - 2024	Horsepower-Hours - 2025
Nonroad	Construction	Bobcat Skid	Nonroad Diesel Fuel	100	0.21	1,311	131,111	10,167	75,435	39,620	5,889
Nonroad	Construction	Haul Truck	Nonroad Diesel Fuel	405	0.59	777	314,666	24,400	181,045	95,088	14,134
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	777	53,610	4,157	30,845	16,200	2,408
Nonroad	Construction	Concrete Saws	Gasoline	13	0.78	388	5,050	392	2,906	1,526	227
Nonroad	Construction	Grader	Nonroad Diesel Fuel	100	0.59	777	77,695	6,025	44,702	23,479	3,490
Nonroad	Construction	Water Truck	Nonroad Diesel Fuel	350	0.59	777	271,934	21,086	156,458	82,175	12,215
Nonroad	Construction	Roller Compactor	Nonroad Diesel Fuel	100	0.59	777	77,695	6,025	44,702	23,479	3,490
Nonroad	Construction	Concrete Pumping Truck	Nonroad Diesel Fuel	335	0.59	777	260,280	20,182	149,753	78,653	11,691
Nonroad	Construction	Concrete Paver	Nonroad Diesel Fuel	175	0.59	777	135,967	10,543	78,229	41,087	6,107
Nonroad	Construction	Motorized Trowel	Nonroad Diesel Fuel	50	0.59	777	38,848	3,012	22,351	11,739	1,745
Nonroad	Construction	Asphalt Paver	Nonroad Diesel Fuel	100	0.59	777	77,695	6,025	44,702	23,479	3,490
Nonroad	Construction	Rubber Tire Roller Compactor	Nonroad Diesel Fuel	100	0.59	777	77,695	6,025	44,702	23,479	3,490

Project	Construction Activity	Equipment Type	Fuel	Average Horsepower	Load Factor	Total Hours	Total Horsepower-Hours	Horsepower-Hours - 2022	Horsepower-Hours - 2023	Horsepower-Hours - 2024	Horsepower-Hours - 2025
Nonroad	Construction	Bobcat	Nonroad Diesel Fuel	100	0.21	1,554	155,391	12,049	89,405	46,957	6,980
Nonroad	Construction	Paint Sprayers	Nonroad Diesel Fuel	25	0.59	388	9,712	753	5,588	2,935	436
Nonroad	Construction	Backhoe	Nonroad Diesel Fuel	69	0.21	1,311	90,467	7,015	52,050	27,338	4,064
Nonroad	Construction	Sweeper	Nonroad Diesel Fuel	100	0.43	109	10,926	847	6,286	3,302	491
Nonroad	Construction	Concrete Saws	Gasoline	13	0.78	777	10,100	783	5,811	3,052	454

Table C2. 2022 construction-phase non-road equipment criteria air pollutant emission factors.

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Excavator	5.69E-01	2.27E-01	3.49E-02	1.49E-03	3.77E-02	3.66E-02
Nonroad	Construction	Hydraulic Hammer	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.88E+00	7.72E-01	9.15E-02	1.71E-03	1.29E-01	1.25E-01
Nonroad	Construction	Standard Bucket Loader	2.25E+00	1.27E+00	3.48E-01	1.92E-03	2.71E-01	2.62E-01
Nonroad	Construction	Bobcat Skid	3.66E+00	3.91E+00	7.41E-01	2.21E-03	5.65E-01	5.48E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Haul Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.25E+00	4.97E-01	3.54E-02	1.63E-03	7.84E-02	7.61E-02
Nonroad	Construction	Water Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Concrete Pumping Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Concrete Paver	6.54E-01	2.46E-01	4.09E-02	1.49E-03	5.89E-02	5.71E-02
Nonroad	Construction	Motorized Trowel	2.90E+00	8.50E-01	1.31E-01	1.74E-03	9.81E-02	9.52E-02
Nonroad	Construction	Asphalt Paver	1.34E+00	6.16E-01	4.85E-02	1.65E-03	9.05E-02	8.78E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Bobcat	3.66E+00	3.91E+00	7.41E-01	2.21E-03	5.65E-01	5.48E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Paint Sprayers	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Sweeper	1.28E+00	3.63E-01	3.71E-02	1.62E-03	6.14E-02	5.96E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Excavator	5.69E-01	2.27E-01	3.49E-02	1.49E-03	3.77E-02	3.66E-02
Nonroad	Construction	Hydraulic Hammer	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.88E+00	7.72E-01	9.15E-02	1.71E-03	1.29E-01	1.25E-01
Nonroad	Construction	Standard Bucket Loader	2.25E+00	1.27E+00	3.48E-01	1.92E-03	2.71E-01	2.62E-01
Nonroad	Construction	Bobcat Skid	3.66E+00	3.91E+00	7.41E-01	2.21E-03	5.65E-01	5.48E-01
Nonroad	Construction	Haul Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.25E+00	4.97E-01	3.54E-02	1.63E-03	7.84E-02	7.61E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Water Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Concrete Pumping Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Concrete Paver	6.54E-01	2.46E-01	4.09E-02	1.49E-03	5.89E-02	5.71E-02
Nonroad	Construction	Motorized Trowel	2.90E+00	8.50E-01	1.31E-01	1.74E-03	9.81E-02	9.52E-02
Nonroad	Construction	Asphalt Paver	1.34E+00	6.16E-01	4.85E-02	1.65E-03	9.05E-02	8.78E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Bobcat	3.66E+00	3.91E+00	7.41E-01	2.21E-03	5.65E-01	5.48E-01
Nonroad	Construction	Paint Sprayers	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Sweeper	1.28E+00	3.63E-01	3.71E-02	1.62E-03	6.14E-02	5.96E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Excavator	5.69E-01	2.27E-01	3.49E-02	1.49E-03	3.77E-02	3.66E-02
Nonroad	Construction	Hydraulic Hammer	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.88E+00	7.72E-01	9.15E-02	1.71E-03	1.29E-01	1.25E-01
Nonroad	Construction	Standard Bucket Loader	2.25E+00	1.27E+00	3.48E-01	1.92E-03	2.71E-01	2.62E-01
Nonroad	Construction	Bobcat Skid	3.66E+00	3.91E+00	7.41E-01	2.21E-03	5.65E-01	5.48E-01
Nonroad	Construction	Haul Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.25E+00	4.97E-01	3.54E-02	1.63E-03	7.84E-02	7.61E-02
Nonroad	Construction	Water Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Concrete Pumping Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Concrete Paver	6.54E-01	2.46E-01	4.09E-02	1.49E-03	5.89E-02	5.71E-02
Nonroad	Construction	Motorized Trowel	2.90E+00	8.50E-01	1.31E-01	1.74E-03	9.81E-02	9.52E-02
Nonroad	Construction	Asphalt Paver	1.34E+00	6.16E-01	4.85E-02	1.65E-03	9.05E-02	8.78E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Bobcat	3.66E+00	3.91E+00	7.41E-01	2.21E-03	5.65E-01	5.48E-01
Nonroad	Construction	Paint Sprayers	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Sweeper	1.28E+00	3.63E-01	3.71E-02	1.62E-03	6.14E-02	5.96E-02
Nonroad	Construction	Excavator	5.69E-01	2.27E-01	3.49E-02	1.49E-03	3.77E-02	3.66E-02
Nonroad	Construction	Hydraulic Hammer	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.88E+00	7.72E-01	9.15E-02	1.71E-03	1.29E-01	1.25E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Standard Bucket Loader	2.25E+00	1.27E+00	3.48E-01	1.92E-03	2.71E-01	2.62E-01
Nonroad	Construction	Bobcat Skid	3.66E+00	3.91E+00	7.41E-01	2.21E-03	5.65E-01	5.48E-01
Nonroad	Construction	Haul Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.25E+00	4.97E-01	3.54E-02	1.63E-03	7.84E-02	7.61E-02
Nonroad	Construction	Water Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Concrete Pumping Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Concrete Paver	6.54E-01	2.46E-01	4.09E-02	1.49E-03	5.89E-02	5.71E-02
Nonroad	Construction	Motorized Trowel	2.90E+00	8.50E-01	1.31E-01	1.74E-03	9.81E-02	9.52E-02
Nonroad	Construction	Asphalt Paver	1.34E+00	6.16E-01	4.85E-02	1.65E-03	9.05E-02	8.78E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Rubber Tire Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Bobcat	3.66E+00	3.91E+00	7.41E-01	2.21E-03	5.65E-01	5.48E-01
Nonroad	Construction	Paint Sprayers	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Sweeper	1.28E+00	3.63E-01	3.71E-02	1.62E-03	6.14E-02	5.96E-02
Nonroad	Construction	Excavator	5.69E-01	2.27E-01	3.49E-02	1.49E-03	3.77E-02	3.66E-02
Nonroad	Construction	Hydraulic Hammer	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.88E+00	7.72E-01	9.15E-02	1.71E-03	1.29E-01	1.25E-01
Nonroad	Construction	Standard Bucket Loader	2.25E+00	1.27E+00	3.48E-01	1.92E-03	2.71E-01	2.62E-01
Nonroad	Construction	Bobcat Skid	4.38E+00	3.77E+00	7.59E-01	2.23E-03	5.36E-01	5.20E-01
Nonroad	Construction	Haul Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Concrete Saws	3.77E+00	1.51E+00	3.55E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Grader	1.25E+00	4.97E-01	3.54E-02	1.63E-03	7.84E-02	7.61E-02
Nonroad	Construction	Water Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Concrete Pumping Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Concrete Paver	6.54E-01	2.46E-01	4.09E-02	1.49E-03	5.89E-02	5.71E-02
Nonroad	Construction	Motorized Trowel	2.90E+00	8.50E-01	1.31E-01	1.74E-03	9.81E-02	9.52E-02
Nonroad	Construction	Asphalt Paver	1.34E+00	6.16E-01	4.85E-02	1.65E-03	9.05E-02	8.78E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Bobcat	3.66E+00	3.91E+00	7.41E-01	2.21E-03	5.65E-01	5.48E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Paint Sprayers	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Sweeper	1.28E+00	3.63E-01	3.71E-02	1.62E-03	6.14E-02	5.96E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Excavator	5.69E-01	2.27E-01	3.49E-02	1.49E-03	3.77E-02	3.66E-02
Nonroad	Construction	Hydraulic Hammer	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.88E+00	7.72E-01	9.15E-02	1.71E-03	1.29E-01	1.25E-01
Nonroad	Construction	Standard Bucket Loader	2.25E+00	1.27E+00	3.48E-01	1.92E-03	2.71E-01	2.62E-01
Nonroad	Construction	Bobcat Skid	3.66E+00	3.91E+00	7.41E-01	2.21E-03	5.65E-01	5.48E-01
Nonroad	Construction	Haul Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.25E+00	4.97E-01	3.54E-02	1.63E-03	7.84E-02	7.61E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Water Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Concrete Pumping Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Concrete Paver	6.54E-01	2.46E-01	4.09E-02	1.49E-03	5.89E-02	5.71E-02
Nonroad	Construction	Motorized Trowel	2.90E+00	8.50E-01	1.31E-01	1.74E-03	9.81E-02	9.52E-02
Nonroad	Construction	Asphalt Paver	1.34E+00	6.16E-01	4.85E-02	1.65E-03	9.05E-02	8.78E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Bobcat	3.66E+00	3.91E+00	7.41E-01	2.21E-03	5.65E-01	5.48E-01
Nonroad	Construction	Paint Sprayers	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Sweeper	1.28E+00	3.63E-01	3.71E-02	1.62E-03	6.14E-02	5.96E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Excavator	5.69E-01	2.27E-01	3.49E-02	1.49E-03	3.77E-02	3.66E-02
Nonroad	Construction	Hydraulic Hammer	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.88E+00	7.72E-01	9.15E-02	1.71E-03	1.29E-01	1.25E-01
Nonroad	Construction	Standard Bucket Loader	2.25E+00	1.27E+00	3.48E-01	1.92E-03	2.71E-01	2.62E-01
Nonroad	Construction	Bobcat Skid	3.66E+00	3.91E+00	7.41E-01	2.21E-03	5.65E-01	5.48E-01
Nonroad	Construction	Haul Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.25E+00	4.97E-01	3.54E-02	1.63E-03	7.84E-02	7.61E-02
Nonroad	Construction	Water Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02
Nonroad	Construction	Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Concrete Pumping Truck	2.83E-01	1.01E-01	1.94E-02	1.44E-03	1.80E-02	1.74E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Concrete Paver	6.54E-01	2.46E-01	4.09E-02	1.49E-03	5.89E-02	5.71E-02
Nonroad	Construction	Motorized Trowel	2.90E+00	8.50E-01	1.31E-01	1.74E-03	9.81E-02	9.52E-02
Nonroad	Construction	Asphalt Paver	1.34E+00	6.16E-01	4.85E-02	1.65E-03	9.05E-02	8.78E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.39E+00	6.28E-01	5.34E-02	1.66E-03	9.13E-02	8.86E-02
Nonroad	Construction	Bobcat	3.66E+00	3.91E+00	7.41E-01	2.21E-03	5.65E-01	5.48E-01
Nonroad	Construction	Paint Sprayers	3.77E+00	1.50E+00	3.54E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Backhoe	3.78E+00	2.77E+00	5.02E-01	2.17E-03	3.50E-01	3.40E-01
Nonroad	Construction	Sweeper	1.28E+00	3.63E-01	3.71E-02	1.62E-03	6.14E-02	5.96E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01

Table C3. 2022 construction-phase non-road equipment greenhouse gas emission factors.

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Excavator	3.09E-03	2.56E-02	5.37E+02	5.44E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Hydraulic Hammer	3.12E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	7.17E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	2.00E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.64E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	3.17E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	3.46E-03	2.56E-02	5.37E+02	5.44E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Motorized Trowel	1.38E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	4.09E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.64E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.12E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Sweeper	3.38E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Excavator	3.09E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.12E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	7.17E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	2.00E-02	2.99E-02	6.26E+02	6.35E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Bobcat Skid	2.64E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	3.17E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	3.46E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.38E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	4.09E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Bobcat	2.64E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.12E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Sweeper	3.38E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Excavator	3.09E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.12E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	7.17E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	2.00E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.64E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Grader	3.17E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	3.46E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.38E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	4.09E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.64E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.12E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Sweeper	3.38E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Excavator	3.09E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.12E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	7.17E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	2.00E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.64E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	3.17E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Concrete Pumping Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	3.46E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.38E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	4.09E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.64E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.12E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Sweeper	3.38E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Excavator	3.09E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.12E-02	2.84E-02	5.95E+02	6.05E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Air Compressor	7.17E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	2.00E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	3.00E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	3.13E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Grader	3.17E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	3.46E-03	2.56E-02	5.37E+02	5.44E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Motorized Trowel	1.38E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	4.09E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.64E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.12E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Sweeper	3.38E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Excavator	3.09E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.12E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	7.17E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	2.00E-02	2.99E-02	6.26E+02	6.35E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Bobcat Skid	2.64E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	3.17E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	3.46E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.38E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	4.09E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Bobcat	2.64E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.12E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Sweeper	3.38E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Excavator	3.09E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.12E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	7.17E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	2.00E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.64E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Grader	3.17E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	1.48E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	3.46E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.38E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	4.09E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	4.45E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.64E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.12E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.99E-02	3.32E-02	6.95E+02	7.06E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Sweeper	3.38E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03

Table C4. 2023 construction-phase non-road equipment criteria air pollutant emission factors.

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Excavator	4.67E-01	1.85E-01	2.99E-02	1.47E-03	3.12E-02	3.03E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.72E+00	6.52E-01	7.60E-02	1.68E-03	1.10E-01	1.07E-01
Nonroad	Construction	Standard Bucket Loader	2.09E+00	1.18E+00	3.22E-01	1.91E-03	2.55E-01	2.47E-01
Nonroad	Construction	Bobcat Skid	3.47E+00	3.64E+00	6.79E-01	2.18E-03	5.23E-01	5.07E-01
Nonroad	Construction	Haul Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.12E+00	3.88E-01	2.70E-02	1.62E-03	6.23E-02	6.04E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Water Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Concrete Pumping Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Concrete Paver	5.47E-01	2.10E-01	3.40E-02	1.47E-03	5.05E-02	4.90E-02
Nonroad	Construction	Motorized Trowel	2.85E+00	7.51E-01	1.18E-01	1.71E-03	8.44E-02	8.19E-02
Nonroad	Construction	Asphalt Paver	1.23E+00	5.11E-01	3.93E-02	1.64E-03	7.67E-02	7.44E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Bobcat	3.47E+00	3.64E+00	6.79E-01	2.18E-03	5.23E-01	5.07E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Sweeper	1.15E+00	2.85E-01	2.86E-02	1.60E-03	4.83E-02	4.68E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Excavator	4.67E-01	1.85E-01	2.99E-02	1.47E-03	3.12E-02	3.03E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.72E+00	6.52E-01	7.60E-02	1.68E-03	1.10E-01	1.07E-01
Nonroad	Construction	Standard Bucket Loader	2.09E+00	1.18E+00	3.22E-01	1.91E-03	2.55E-01	2.47E-01
Nonroad	Construction	Bobcat Skid	3.47E+00	3.64E+00	6.79E-01	2.18E-03	5.23E-01	5.07E-01
Nonroad	Construction	Haul Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.12E+00	3.88E-01	2.70E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Water Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Concrete Pumping Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Concrete Paver	5.47E-01	2.10E-01	3.40E-02	1.47E-03	5.05E-02	4.90E-02
Nonroad	Construction	Motorized Trowel	2.85E+00	7.51E-01	1.18E-01	1.71E-03	8.44E-02	8.19E-02
Nonroad	Construction	Asphalt Paver	1.23E+00	5.11E-01	3.93E-02	1.64E-03	7.67E-02	7.44E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Bobcat	3.47E+00	3.64E+00	6.79E-01	2.18E-03	5.23E-01	5.07E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Sweeper	1.15E+00	2.85E-01	2.86E-02	1.60E-03	4.83E-02	4.68E-02
Nonroad	Construction	Excavator	4.67E-01	1.85E-01	2.99E-02	1.47E-03	3.12E-02	3.03E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.72E+00	6.52E-01	7.60E-02	1.68E-03	1.10E-01	1.07E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Standard Bucket Loader	2.09E+00	1.18E+00	3.22E-01	1.91E-03	2.55E-01	2.47E-01
Nonroad	Construction	Bobcat Skid	3.47E+00	3.64E+00	6.79E-01	2.18E-03	5.23E-01	5.07E-01
Nonroad	Construction	Haul Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.12E+00	3.88E-01	2.70E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Water Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Concrete Pumping Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Concrete Paver	5.47E-01	2.10E-01	3.40E-02	1.47E-03	5.05E-02	4.90E-02
Nonroad	Construction	Motorized Trowel	2.85E+00	7.51E-01	1.18E-01	1.71E-03	8.44E-02	8.19E-02
Nonroad	Construction	Asphalt Paver	1.23E+00	5.11E-01	3.93E-02	1.64E-03	7.67E-02	7.44E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Rubber Tire Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Bobcat	3.47E+00	3.64E+00	6.79E-01	2.18E-03	5.23E-01	5.07E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Sweeper	1.15E+00	2.85E-01	2.86E-02	1.60E-03	4.83E-02	4.68E-02
Nonroad	Construction	Excavator	4.67E-01	1.85E-01	2.99E-02	1.47E-03	3.12E-02	3.03E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.72E+00	6.52E-01	7.60E-02	1.68E-03	1.10E-01	1.07E-01
Nonroad	Construction	Standard Bucket Loader	2.09E+00	1.18E+00	3.22E-01	1.91E-03	2.55E-01	2.47E-01
Nonroad	Construction	Bobcat Skid	3.47E+00	3.64E+00	6.79E-01	2.18E-03	5.23E-01	5.07E-01
Nonroad	Construction	Haul Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.12E+00	3.88E-01	2.70E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Water Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Concrete Pumping Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Concrete Paver	5.47E-01	2.10E-01	3.40E-02	1.47E-03	5.05E-02	4.90E-02
Nonroad	Construction	Motorized Trowel	2.85E+00	7.51E-01	1.18E-01	1.71E-03	8.44E-02	8.19E-02
Nonroad	Construction	Asphalt Paver	1.23E+00	5.11E-01	3.93E-02	1.64E-03	7.67E-02	7.44E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Bobcat	3.47E+00	3.64E+00	6.79E-01	2.18E-03	5.23E-01	5.07E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Sweeper	1.15E+00	2.85E-01	2.86E-02	1.60E-03	4.83E-02	4.68E-02
Nonroad	Construction	Excavator	4.67E-01	1.85E-01	2.99E-02	1.47E-03	3.12E-02	3.03E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.72E+00	6.52E-01	7.60E-02	1.68E-03	1.10E-01	1.07E-01
Nonroad	Construction	Standard Bucket Loader	2.09E+00	1.18E+00	3.22E-01	1.91E-03	2.55E-01	2.47E-01
Nonroad	Construction	Bobcat Skid	4.23E+00	3.52E+00	6.99E-01	2.21E-03	4.94E-01	4.80E-01
Nonroad	Construction	Haul Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Concrete Saws	3.77E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Grader	1.12E+00	3.88E-01	2.70E-02	1.62E-03	6.23E-02	6.04E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Water Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Concrete Pumping Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Concrete Paver	5.47E-01	2.10E-01	3.40E-02	1.47E-03	5.05E-02	4.90E-02
Nonroad	Construction	Motorized Trowel	2.85E+00	7.51E-01	1.18E-01	1.71E-03	8.44E-02	8.19E-02
Nonroad	Construction	Asphalt Paver	1.23E+00	5.11E-01	3.93E-02	1.64E-03	7.67E-02	7.44E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Bobcat	3.47E+00	3.64E+00	6.79E-01	2.18E-03	5.23E-01	5.07E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Sweeper	1.15E+00	2.85E-01	2.86E-02	1.60E-03	4.83E-02	4.68E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Excavator	4.67E-01	1.85E-01	2.99E-02	1.47E-03	3.12E-02	3.03E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.72E+00	6.52E-01	7.60E-02	1.68E-03	1.10E-01	1.07E-01
Nonroad	Construction	Standard Bucket Loader	2.09E+00	1.18E+00	3.22E-01	1.91E-03	2.55E-01	2.47E-01
Nonroad	Construction	Bobcat Skid	3.47E+00	3.64E+00	6.79E-01	2.18E-03	5.23E-01	5.07E-01
Nonroad	Construction	Haul Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.12E+00	3.88E-01	2.70E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Water Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Concrete Pumping Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Concrete Paver	5.47E-01	2.10E-01	3.40E-02	1.47E-03	5.05E-02	4.90E-02
Nonroad	Construction	Motorized Trowel	2.85E+00	7.51E-01	1.18E-01	1.71E-03	8.44E-02	8.19E-02
Nonroad	Construction	Asphalt Paver	1.23E+00	5.11E-01	3.93E-02	1.64E-03	7.67E-02	7.44E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Bobcat	3.47E+00	3.64E+00	6.79E-01	2.18E-03	5.23E-01	5.07E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Sweeper	1.15E+00	2.85E-01	2.86E-02	1.60E-03	4.83E-02	4.68E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Excavator	4.67E-01	1.85E-01	2.99E-02	1.47E-03	3.12E-02	3.03E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Air Compressor	1.72E+00	6.52E-01	7.60E-02	1.68E-03	1.10E-01	1.07E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Standard Bucket Loader	2.09E+00	1.18E+00	3.22E-01	1.91E-03	2.55E-01	2.47E-01
Nonroad	Construction	Bobcat Skid	3.47E+00	3.64E+00	6.79E-01	2.18E-03	5.23E-01	5.07E-01
Nonroad	Construction	Haul Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.12E+00	3.88E-01	2.70E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Water Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Concrete Pumping Truck	2.25E-01	7.31E-02	1.60E-02	1.43E-03	1.31E-02	1.27E-02
Nonroad	Construction	Concrete Paver	5.47E-01	2.10E-01	3.40E-02	1.47E-03	5.05E-02	4.90E-02
Nonroad	Construction	Motorized Trowel	2.85E+00	7.51E-01	1.18E-01	1.71E-03	8.44E-02	8.19E-02
Nonroad	Construction	Asphalt Paver	1.23E+00	5.11E-01	3.93E-02	1.64E-03	7.67E-02	7.44E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Rubber Tire Roller Compactor	1.28E+00	5.05E-01	4.29E-02	1.64E-03	7.41E-02	7.18E-02
Nonroad	Construction	Bobcat	3.47E+00	3.64E+00	6.79E-01	2.18E-03	5.23E-01	5.07E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.53E-01	2.19E-03	1.72E-01	1.67E-01
Nonroad	Construction	Backhoe	3.68E+00	2.60E+00	4.66E-01	2.15E-03	3.25E-01	3.15E-01
Nonroad	Construction	Sweeper	1.15E+00	2.85E-01	2.86E-02	1.60E-03	4.83E-02	4.68E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01

Table C5. 2023 construction-phase non-road equipment greenhouse gas emission factors.

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Excavator	2.51E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	6.18E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.91E-02	2.99E-02	6.26E+02	6.35E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Bobcat Skid	2.55E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	2.35E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.86E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.32E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	3.31E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Bobcat	2.55E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Sweeper	2.54E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Excavator	2.51E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	6.18E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.91E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.55E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Grader	2.35E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.86E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.32E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	3.31E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.55E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Sweeper	2.54E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Excavator	2.51E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	6.18E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.91E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.55E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	2.35E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Concrete Pumping Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.86E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.32E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	3.31E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.55E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Sweeper	2.54E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Excavator	2.51E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.11E-02	2.84E-02	5.95E+02	6.05E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Air Compressor	6.18E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.91E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.55E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	2.35E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.86E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.32E-02	2.84E-02	5.96E+02	6.05E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Asphalt Paver	3.31E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.55E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Sweeper	2.54E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Excavator	2.51E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	6.18E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.91E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.93E-02	3.32E-02	6.94E+02	7.05E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Haul Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Grader	2.35E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.86E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.32E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	3.31E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Bobcat	2.55E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Sweeper	2.54E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Excavator	2.51E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	6.18E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.91E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.55E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Grader	2.35E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.86E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.32E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	3.31E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.55E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Sweeper	2.54E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Excavator	2.51E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	6.18E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.91E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.55E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	2.35E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Concrete Pumping Truck	1.10E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.86E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.32E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	3.31E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	3.58E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.55E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.11E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.90E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Sweeper	2.54E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03

Table C6. 2024 construction-phase non-road equipment criteria air pollutant emission factors.

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Excavator	3.90E-01	1.53E-01	2.61E-02	1.46E-03	2.64E-02	2.56E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.58E+00	5.40E-01	6.29E-02	1.66E-03	9.26E-02	8.98E-02
Nonroad	Construction	Standard Bucket Loader	1.95E+00	1.09E+00	2.97E-01	1.89E-03	2.40E-01	2.33E-01
Nonroad	Construction	Bobcat Skid	3.28E+00	3.40E+00	6.25E-01	2.16E-03	4.84E-01	4.70E-01
Nonroad	Construction	Haul Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.03E+00	2.56E-01	1.92E-02	1.60E-03	4.21E-02	4.08E-02
Nonroad	Construction	Water Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Concrete Pumping Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Concrete Paver	4.47E-01	1.77E-01	2.78E-02	1.46E-03	4.29E-02	4.16E-02
Nonroad	Construction	Motorized Trowel	2.79E+00	6.54E-01	1.05E-01	1.68E-03	7.04E-02	6.83E-02
Nonroad	Construction	Asphalt Paver	1.14E+00	4.18E-01	3.11E-02	1.62E-03	6.43E-02	6.24E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Bobcat	3.28E+00	3.40E+00	6.25E-01	2.16E-03	4.84E-01	4.70E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Sweeper	1.05E+00	2.02E-01	2.08E-02	1.59E-03	3.49E-02	3.38E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Excavator	3.90E-01	1.53E-01	2.61E-02	1.46E-03	2.64E-02	2.56E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.58E+00	5.40E-01	6.29E-02	1.66E-03	9.26E-02	8.98E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Standard Bucket Loader	1.95E+00	1.09E+00	2.97E-01	1.89E-03	2.40E-01	2.33E-01
Nonroad	Construction	Bobcat Skid	3.28E+00	3.40E+00	6.25E-01	2.16E-03	4.84E-01	4.70E-01
Nonroad	Construction	Haul Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.03E+00	2.56E-01	1.92E-02	1.60E-03	4.21E-02	4.08E-02
Nonroad	Construction	Water Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Concrete Pumping Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Concrete Paver	4.47E-01	1.77E-01	2.78E-02	1.46E-03	4.29E-02	4.16E-02
Nonroad	Construction	Motorized Trowel	2.79E+00	6.54E-01	1.05E-01	1.68E-03	7.04E-02	6.83E-02
Nonroad	Construction	Asphalt Paver	1.14E+00	4.18E-01	3.11E-02	1.62E-03	6.43E-02	6.24E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Rubber Tire Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Bobcat	3.28E+00	3.40E+00	6.25E-01	2.16E-03	4.84E-01	4.70E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Sweeper	1.05E+00	2.02E-01	2.08E-02	1.59E-03	3.49E-02	3.38E-02
Nonroad	Construction	Excavator	3.90E-01	1.53E-01	2.61E-02	1.46E-03	2.64E-02	2.56E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.58E+00	5.40E-01	6.29E-02	1.66E-03	9.26E-02	8.98E-02
Nonroad	Construction	Standard Bucket Loader	1.95E+00	1.09E+00	2.97E-01	1.89E-03	2.40E-01	2.33E-01
Nonroad	Construction	Bobcat Skid	3.28E+00	3.40E+00	6.25E-01	2.16E-03	4.84E-01	4.70E-01
Nonroad	Construction	Haul Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.03E+00	2.56E-01	1.92E-02	1.60E-03	4.21E-02	4.08E-02
Nonroad	Construction	Water Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Concrete Pumping Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Concrete Paver	4.47E-01	1.77E-01	2.78E-02	1.46E-03	4.29E-02	4.16E-02
Nonroad	Construction	Motorized Trowel	2.79E+00	6.54E-01	1.05E-01	1.68E-03	7.04E-02	6.83E-02
Nonroad	Construction	Asphalt Paver	1.14E+00	4.18E-01	3.11E-02	1.62E-03	6.43E-02	6.24E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Bobcat	3.28E+00	3.40E+00	6.25E-01	2.16E-03	4.84E-01	4.70E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Sweeper	1.05E+00	2.02E-01	2.08E-02	1.59E-03	3.49E-02	3.38E-02
Nonroad	Construction	Excavator	3.90E-01	1.53E-01	2.61E-02	1.46E-03	2.64E-02	2.56E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.58E+00	5.40E-01	6.29E-02	1.66E-03	9.26E-02	8.98E-02
Nonroad	Construction	Standard Bucket Loader	1.95E+00	1.09E+00	2.97E-01	1.89E-03	2.40E-01	2.33E-01
Nonroad	Construction	Bobcat Skid	3.28E+00	3.40E+00	6.25E-01	2.16E-03	4.84E-01	4.70E-01
Nonroad	Construction	Haul Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.03E+00	2.56E-01	1.92E-02	1.60E-03	4.21E-02	4.08E-02
Nonroad	Construction	Water Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Concrete Pumping Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Concrete Paver	4.47E-01	1.77E-01	2.78E-02	1.46E-03	4.29E-02	4.16E-02
Nonroad	Construction	Motorized Trowel	2.79E+00	6.54E-01	1.05E-01	1.68E-03	7.04E-02	6.83E-02
Nonroad	Construction	Asphalt Paver	1.14E+00	4.18E-01	3.11E-02	1.62E-03	6.43E-02	6.24E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Bobcat	3.28E+00	3.40E+00	6.25E-01	2.16E-03	4.84E-01	4.70E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Sweeper	1.05E+00	2.02E-01	2.08E-02	1.59E-03	3.49E-02	3.38E-02
Nonroad	Construction	Excavator	3.90E-01	1.53E-01	2.61E-02	1.46E-03	2.64E-02	2.56E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.58E+00	5.40E-01	6.29E-02	1.66E-03	9.26E-02	8.98E-02
Nonroad	Construction	Standard Bucket Loader	1.95E+00	1.09E+00	2.97E-01	1.89E-03	2.40E-01	2.33E-01
Nonroad	Construction	Bobcat Skid	4.10E+00	3.28E+00	6.46E-01	2.18E-03	4.57E-01	4.43E-01
Nonroad	Construction	Haul Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Concrete Saws	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Grader	1.03E+00	2.56E-01	1.92E-02	1.60E-03	4.21E-02	4.08E-02
Nonroad	Construction	Water Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Concrete Pumping Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Concrete Paver	4.47E-01	1.77E-01	2.78E-02	1.46E-03	4.29E-02	4.16E-02
Nonroad	Construction	Motorized Trowel	2.79E+00	6.54E-01	1.05E-01	1.68E-03	7.04E-02	6.83E-02
Nonroad	Construction	Asphalt Paver	1.14E+00	4.18E-01	3.11E-02	1.62E-03	6.43E-02	6.24E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Bobcat	3.28E+00	3.40E+00	6.25E-01	2.16E-03	4.84E-01	4.70E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Sweeper	1.05E+00	2.02E-01	2.08E-02	1.59E-03	3.49E-02	3.38E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Excavator	3.90E-01	1.53E-01	2.61E-02	1.46E-03	2.64E-02	2.56E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.58E+00	5.40E-01	6.29E-02	1.66E-03	9.26E-02	8.98E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Standard Bucket Loader	1.95E+00	1.09E+00	2.97E-01	1.89E-03	2.40E-01	2.33E-01
Nonroad	Construction	Bobcat Skid	3.28E+00	3.40E+00	6.25E-01	2.16E-03	4.84E-01	4.70E-01
Nonroad	Construction	Haul Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.03E+00	2.56E-01	1.92E-02	1.60E-03	4.21E-02	4.08E-02
Nonroad	Construction	Water Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Concrete Pumping Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Concrete Paver	4.47E-01	1.77E-01	2.78E-02	1.46E-03	4.29E-02	4.16E-02
Nonroad	Construction	Motorized Trowel	2.79E+00	6.54E-01	1.05E-01	1.68E-03	7.04E-02	6.83E-02
Nonroad	Construction	Asphalt Paver	1.14E+00	4.18E-01	3.11E-02	1.62E-03	6.43E-02	6.24E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Rubber Tire Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Bobcat	3.28E+00	3.40E+00	6.25E-01	2.16E-03	4.84E-01	4.70E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Sweeper	1.05E+00	2.02E-01	2.08E-02	1.59E-03	3.49E-02	3.38E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Excavator	3.90E-01	1.53E-01	2.61E-02	1.46E-03	2.64E-02	2.56E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.58E+00	5.40E-01	6.29E-02	1.66E-03	9.26E-02	8.98E-02
Nonroad	Construction	Standard Bucket Loader	1.95E+00	1.09E+00	2.97E-01	1.89E-03	2.40E-01	2.33E-01
Nonroad	Construction	Bobcat Skid	3.28E+00	3.40E+00	6.25E-01	2.16E-03	4.84E-01	4.70E-01
Nonroad	Construction	Haul Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	1.03E+00	2.56E-01	1.92E-02	1.60E-03	4.21E-02	4.08E-02
Nonroad	Construction	Water Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Concrete Pumping Truck	1.83E-01	5.23E-02	1.34E-02	1.43E-03	9.49E-03	9.20E-03
Nonroad	Construction	Concrete Paver	4.47E-01	1.77E-01	2.78E-02	1.46E-03	4.29E-02	4.16E-02
Nonroad	Construction	Motorized Trowel	2.79E+00	6.54E-01	1.05E-01	1.68E-03	7.04E-02	6.83E-02
Nonroad	Construction	Asphalt Paver	1.14E+00	4.18E-01	3.11E-02	1.62E-03	6.43E-02	6.24E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.19E+00	4.17E-01	3.51E-02	1.62E-03	6.23E-02	6.04E-02
Nonroad	Construction	Bobcat	3.28E+00	3.40E+00	6.25E-01	2.16E-03	4.84E-01	4.70E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.50E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	3.59E+00	2.43E+00	4.33E-01	2.13E-03	3.02E-01	2.93E-01
Nonroad	Construction	Sweeper	1.05E+00	2.02E-01	2.08E-02	1.59E-03	3.49E-02	3.38E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01

Table C7. 2024 construction-phase non-road equipment greenhouse gas emission factors.

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Excavator	2.06E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	5.25E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.82E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.45E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Grader	1.65E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.31E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.25E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	2.61E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.45E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Sweeper	1.82E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Excavator	2.06E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	5.25E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.82E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.45E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	1.65E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Concrete Pumping Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.31E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.25E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	2.61E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.45E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Sweeper	1.82E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Excavator	2.06E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Air Compressor	5.25E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.82E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.45E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	1.65E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.31E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.25E-02	2.84E-02	5.96E+02	6.05E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Asphalt Paver	2.61E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.45E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Sweeper	1.82E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Excavator	2.06E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	5.25E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.82E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.45E-02	3.32E-02	6.94E+02	7.05E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Haul Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	1.65E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.31E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.25E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	2.61E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.45E-02	3.32E-02	6.94E+02	7.05E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Sweeper	1.82E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Excavator	2.06E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	5.25E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.82E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.86E-02	3.32E-02	6.94E+02	7.06E+02
Nonroad	Construction	Haul Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	3.11E-02	2.84E-02	5.95E+02	6.05E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Grader	1.65E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.31E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.25E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	2.61E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.45E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Sweeper	1.82E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Excavator	2.06E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	5.25E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.82E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.45E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	1.65E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Concrete Pumping Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.31E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.25E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	2.61E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.45E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Sweeper	1.82E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Excavator	2.06E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Air Compressor	5.25E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.82E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.45E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	1.65E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	8.21E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	2.31E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.25E-02	2.84E-02	5.96E+02	6.05E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Asphalt Paver	2.61E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	2.91E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.45E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.80E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Sweeper	1.82E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03

Table C8. 2025 construction-phase non-road equipment criteria air pollutant emission factors.

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Excavator	3.29E-01	1.25E-01	2.26E-02	1.45E-03	2.19E-02	2.13E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.45E+00	4.59E-01	5.23E-02	1.64E-03	7.83E-02	7.60E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Standard Bucket Loader	1.76E+00	9.86E-01	2.64E-01	1.87E-03	2.21E-01	2.14E-01
Nonroad	Construction	Bobcat Skid	3.06E+00	3.13E+00	5.64E-01	2.14E-03	4.39E-01	4.26E-01
Nonroad	Construction	Haul Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	9.58E-01	1.64E-01	1.41E-02	1.59E-03	2.76E-02	2.68E-02
Nonroad	Construction	Water Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Concrete Pumping Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Concrete Paver	3.56E-01	1.35E-01	2.08E-02	1.45E-03	3.21E-02	3.11E-02
Nonroad	Construction	Motorized Trowel	2.74E+00	5.75E-01	9.46E-02	1.66E-03	5.95E-02	5.77E-02
Nonroad	Construction	Asphalt Paver	1.06E+00	2.96E-01	2.25E-02	1.61E-03	4.72E-02	4.58E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Rubber Tire Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Bobcat	3.06E+00	3.13E+00	5.64E-01	2.14E-03	4.39E-01	4.26E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Sweeper	9.80E-01	1.44E-01	1.57E-02	1.57E-03	2.53E-02	2.46E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Excavator	3.29E-01	1.25E-01	2.26E-02	1.45E-03	2.19E-02	2.13E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.45E+00	4.59E-01	5.23E-02	1.64E-03	7.83E-02	7.60E-02
Nonroad	Construction	Standard Bucket Loader	1.76E+00	9.86E-01	2.64E-01	1.87E-03	2.21E-01	2.14E-01
Nonroad	Construction	Bobcat Skid	3.06E+00	3.13E+00	5.64E-01	2.14E-03	4.39E-01	4.26E-01
Nonroad	Construction	Haul Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	9.58E-01	1.64E-01	1.41E-02	1.59E-03	2.76E-02	2.68E-02
Nonroad	Construction	Water Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Concrete Pumping Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Concrete Paver	3.56E-01	1.35E-01	2.08E-02	1.45E-03	3.21E-02	3.11E-02
Nonroad	Construction	Motorized Trowel	2.74E+00	5.75E-01	9.46E-02	1.66E-03	5.95E-02	5.77E-02
Nonroad	Construction	Asphalt Paver	1.06E+00	2.96E-01	2.25E-02	1.61E-03	4.72E-02	4.58E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Bobcat	3.06E+00	3.13E+00	5.64E-01	2.14E-03	4.39E-01	4.26E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Sweeper	9.80E-01	1.44E-01	1.57E-02	1.57E-03	2.53E-02	2.46E-02
Nonroad	Construction	Excavator	3.29E-01	1.25E-01	2.26E-02	1.45E-03	2.19E-02	2.13E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.45E+00	4.59E-01	5.23E-02	1.64E-03	7.83E-02	7.60E-02
Nonroad	Construction	Standard Bucket Loader	1.76E+00	9.86E-01	2.64E-01	1.87E-03	2.21E-01	2.14E-01
Nonroad	Construction	Bobcat Skid	3.06E+00	3.13E+00	5.64E-01	2.14E-03	4.39E-01	4.26E-01
Nonroad	Construction	Haul Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	9.58E-01	1.64E-01	1.41E-02	1.59E-03	2.76E-02	2.68E-02
Nonroad	Construction	Water Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Concrete Pumping Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Concrete Paver	3.56E-01	1.35E-01	2.08E-02	1.45E-03	3.21E-02	3.11E-02
Nonroad	Construction	Motorized Trowel	2.74E+00	5.75E-01	9.46E-02	1.66E-03	5.95E-02	5.77E-02
Nonroad	Construction	Asphalt Paver	1.06E+00	2.96E-01	2.25E-02	1.61E-03	4.72E-02	4.58E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Bobcat	3.06E+00	3.13E+00	5.64E-01	2.14E-03	4.39E-01	4.26E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Sweeper	9.80E-01	1.44E-01	1.57E-02	1.57E-03	2.53E-02	2.46E-02
Nonroad	Construction	Excavator	3.29E-01	1.25E-01	2.26E-02	1.45E-03	2.19E-02	2.13E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.45E+00	4.59E-01	5.23E-02	1.64E-03	7.83E-02	7.60E-02
Nonroad	Construction	Standard Bucket Loader	1.76E+00	9.86E-01	2.64E-01	1.87E-03	2.21E-01	2.14E-01
Nonroad	Construction	Bobcat Skid	3.06E+00	3.13E+00	5.64E-01	2.14E-03	4.39E-01	4.26E-01
Nonroad	Construction	Haul Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	9.58E-01	1.64E-01	1.41E-02	1.59E-03	2.76E-02	2.68E-02
Nonroad	Construction	Water Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Concrete Pumping Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Concrete Paver	3.56E-01	1.35E-01	2.08E-02	1.45E-03	3.21E-02	3.11E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Motorized Trowel	2.74E+00	5.75E-01	9.46E-02	1.66E-03	5.95E-02	5.77E-02
Nonroad	Construction	Asphalt Paver	1.06E+00	2.96E-01	2.25E-02	1.61E-03	4.72E-02	4.58E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Bobcat	3.06E+00	3.13E+00	5.64E-01	2.14E-03	4.39E-01	4.26E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Sweeper	9.80E-01	1.44E-01	1.57E-02	1.57E-03	2.53E-02	2.46E-02
Nonroad	Construction	Excavator	3.29E-01	1.25E-01	2.26E-02	1.45E-03	2.19E-02	2.13E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.45E+00	4.59E-01	5.23E-02	1.64E-03	7.83E-02	7.60E-02
Nonroad	Construction	Standard Bucket Loader	1.76E+00	9.86E-01	2.64E-01	1.87E-03	2.21E-01	2.14E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Bobcat Skid	3.95E+00	3.02E+00	5.87E-01	2.16E-03	4.11E-01	3.99E-01
Nonroad	Construction	Haul Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Concrete Saws	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.65E-01
Nonroad	Construction	Grader	9.58E-01	1.64E-01	1.41E-02	1.59E-03	2.76E-02	2.68E-02
Nonroad	Construction	Water Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Concrete Pumping Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Concrete Paver	3.56E-01	1.35E-01	2.08E-02	1.45E-03	3.21E-02	3.11E-02
Nonroad	Construction	Motorized Trowel	2.74E+00	5.75E-01	9.46E-02	1.66E-03	5.95E-02	5.77E-02
Nonroad	Construction	Asphalt Paver	1.06E+00	2.96E-01	2.25E-02	1.61E-03	4.72E-02	4.58E-02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Rubber Tire Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Bobcat	3.06E+00	3.13E+00	5.64E-01	2.14E-03	4.39E-01	4.26E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Sweeper	9.80E-01	1.44E-01	1.57E-02	1.57E-03	2.53E-02	2.46E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Excavator	3.29E-01	1.25E-01	2.26E-02	1.45E-03	2.19E-02	2.13E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.45E+00	4.59E-01	5.23E-02	1.64E-03	7.83E-02	7.60E-02
Nonroad	Construction	Standard Bucket Loader	1.76E+00	9.86E-01	2.64E-01	1.87E-03	2.21E-01	2.14E-01
Nonroad	Construction	Bobcat Skid	3.06E+00	3.13E+00	5.64E-01	2.14E-03	4.39E-01	4.26E-01
Nonroad	Construction	Haul Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	9.58E-01	1.64E-01	1.41E-02	1.59E-03	2.76E-02	2.68E-02
Nonroad	Construction	Water Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Concrete Pumping Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Concrete Paver	3.56E-01	1.35E-01	2.08E-02	1.45E-03	3.21E-02	3.11E-02
Nonroad	Construction	Motorized Trowel	2.74E+00	5.75E-01	9.46E-02	1.66E-03	5.95E-02	5.77E-02
Nonroad	Construction	Asphalt Paver	1.06E+00	2.96E-01	2.25E-02	1.61E-03	4.72E-02	4.58E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Bobcat	3.06E+00	3.13E+00	5.64E-01	2.14E-03	4.39E-01	4.26E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Sweeper	9.80E-01	1.44E-01	1.57E-02	1.57E-03	2.53E-02	2.46E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Excavator	3.29E-01	1.25E-01	2.26E-02	1.45E-03	2.19E-02	2.13E-02
Nonroad	Construction	Hydraulic Hammer	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Air Compressor	1.45E+00	4.59E-01	5.23E-02	1.64E-03	7.83E-02	7.60E-02
Nonroad	Construction	Standard Bucket Loader	1.76E+00	9.86E-01	2.64E-01	1.87E-03	2.21E-01	2.14E-01
Nonroad	Construction	Bobcat Skid	3.06E+00	3.13E+00	5.64E-01	2.14E-03	4.39E-01	4.26E-01
Nonroad	Construction	Haul Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01
Nonroad	Construction	Grader	9.58E-01	1.64E-01	1.41E-02	1.59E-03	2.76E-02	2.68E-02
Nonroad	Construction	Water Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Concrete Pumping Truck	1.55E-01	3.91E-02	1.19E-02	1.42E-03	7.22E-03	7.00E-03
Nonroad	Construction	Concrete Paver	3.56E-01	1.35E-01	2.08E-02	1.45E-03	3.21E-02	3.11E-02
Nonroad	Construction	Motorized Trowel	2.74E+00	5.75E-01	9.46E-02	1.66E-03	5.95E-02	5.77E-02
Nonroad	Construction	Asphalt Paver	1.06E+00	2.96E-01	2.25E-02	1.61E-03	4.72E-02	4.58E-02
Nonroad	Construction	Rubber Tire Roller Compactor	1.11E+00	3.42E-01	2.82E-02	1.61E-03	5.24E-02	5.09E-02
Nonroad	Construction	Bobcat	3.06E+00	3.13E+00	5.64E-01	2.14E-03	4.39E-01	4.26E-01
Nonroad	Construction	Paint Sprayers	3.76E+00	1.49E+00	3.52E-01	2.19E-03	1.71E-01	1.66E-01
Nonroad	Construction	Backhoe	3.48E+00	2.20E+00	3.91E-01	2.10E-03	2.72E-01	2.64E-01
Nonroad	Construction	Sweeper	9.80E-01	1.44E-01	1.57E-02	1.57E-03	2.53E-02	2.46E-02
Nonroad	Construction	Concrete Saws	2.06E+00	2.71E+02	5.30E+00	6.35E-03	1.35E-01	1.25E-01

Table C9. 2025 construction-phase non-road equipment greenhouse gas emission factors.

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Excavator	1.71E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	4.44E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.64E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.35E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	1.19E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Concrete Paver	1.71E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.19E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	1.88E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.35E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Sweeper	1.34E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Excavator	1.71E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	4.44E-03	2.81E-02	5.90E+02	5.98E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Standard Bucket Loader	1.64E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.35E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	1.19E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	1.71E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.19E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	1.88E-03	2.84E-02	5.96E+02	6.04E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Rubber Tire Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.35E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Sweeper	1.34E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Excavator	1.71E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	4.44E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.64E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.35E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	1.19E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	1.71E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.19E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	1.88E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.35E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Sweeper	1.34E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Excavator	1.71E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	4.44E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.64E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.35E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	1.19E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	1.71E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.19E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	1.88E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.35E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Sweeper	1.34E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Excavator	1.71E-03	2.56E-02	5.37E+02	5.44E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	4.44E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.64E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.79E-02	3.32E-02	6.94E+02	7.06E+02
Nonroad	Construction	Haul Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Grader	1.19E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Concrete Paver	1.71E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.19E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	1.88E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.35E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Sweeper	1.34E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Excavator	1.71E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	4.44E-03	2.81E-02	5.90E+02	5.98E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Standard Bucket Loader	1.64E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.35E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	1.19E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	1.71E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.19E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	1.88E-03	2.84E-02	5.96E+02	6.04E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Rubber Tire Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.35E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Sweeper	1.34E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Excavator	1.71E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Hydraulic Hammer	3.10E-02	2.84E-02	5.95E+02	6.05E+02
Nonroad	Construction	Air Compressor	4.44E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Standard Bucket Loader	1.64E-02	2.99E-02	6.26E+02	6.35E+02
Nonroad	Construction	Bobcat Skid	2.35E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Haul Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03
Nonroad	Construction	Grader	1.19E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Water Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Concrete Pumping Truck	6.40E-04	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Concrete Paver	1.71E-03	2.56E-02	5.37E+02	5.44E+02
Nonroad	Construction	Motorized Trowel	1.19E-02	2.84E-02	5.96E+02	6.05E+02
Nonroad	Construction	Asphalt Paver	1.88E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Rubber Tire Roller Compactor	2.33E-03	2.84E-02	5.96E+02	6.04E+02
Nonroad	Construction	Bobcat	2.35E-02	3.32E-02	6.94E+02	7.05E+02
Nonroad	Construction	Paint Sprayers	3.10E-02	2.84E-02	5.95E+02	6.05E+02

Project	Construction Activity	Equipment Type	Emission Factors (g/hp-hr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	2.62E-02	3.32E-02	6.95E+02	7.06E+02
Nonroad	Construction	Sweeper	1.34E-03	2.81E-02	5.90E+02	5.98E+02
Nonroad	Construction	Concrete Saws	7.78E-01	5.07E-02	1.04E+03	1.12E+03

Table C10. 2022 construction-phase non-road equipment criteria air pollutant emissions.

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Excavator	3.94E-03	1.57E-03	2.42E-04	1.03E-05	2.61E-04	2.53E-04
Nonroad	Construction	Hydraulic Hammer	1.54E-03	6.16E-04	1.45E-04	8.97E-07	7.05E-05	6.83E-05
Nonroad	Construction	Air Compressor	3.02E-03	1.24E-03	1.47E-04	2.75E-06	2.08E-04	2.01E-04
Nonroad	Construction	Standard Bucket Loader	3.73E-03	2.11E-03	5.78E-04	3.19E-06	4.49E-04	4.35E-04
Nonroad	Construction	Bobcat Skid	4.31E-03	4.60E-03	8.72E-04	2.60E-06	6.64E-04	6.44E-04
Nonroad	Construction	Haul Truck	7.58E-03	2.71E-03	5.20E-04	3.86E-05	4.82E-04	4.67E-04
Nonroad	Construction	Backhoe	6.13E-03	4.50E-03	8.16E-04	3.52E-06	5.69E-04	5.51E-04
Nonroad	Construction	Concrete Saws	1.56E-03	2.06E-01	4.02E-03	4.81E-06	1.03E-04	9.44E-05

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Grader	3.05E-03	1.22E-03	8.66E-05	4.00E-06	1.92E-04	1.86E-04
Nonroad	Construction	Water Truck	2.42E-03	8.68E-04	1.67E-04	1.24E-05	1.54E-04	1.49E-04
Nonroad	Construction	Roller Compactor	5.12E-03	2.31E-03	1.96E-04	6.08E-06	3.35E-04	3.25E-04
Nonroad	Construction	Concrete Pumping Truck	2.32E-03	8.31E-04	1.59E-04	1.18E-05	1.48E-04	1.43E-04
Nonroad	Construction	Concrete Paver	4.21E-03	1.58E-03	2.63E-04	9.57E-06	3.78E-04	3.67E-04
Nonroad	Construction	Motorized Trowel	3.56E-03	1.04E-03	1.60E-04	2.13E-06	1.20E-04	1.17E-04
Nonroad	Construction	Asphalt Paver	4.91E-03	2.26E-03	1.78E-04	6.08E-06	3.32E-04	3.22E-04
Nonroad	Construction	Rubber Tire Roller Compactor	5.12E-03	2.31E-03	1.96E-04	6.08E-06	3.35E-04	3.25E-04
Nonroad	Construction	Bobcat	1.28E-02	1.36E-02	2.58E-03	7.69E-06	1.97E-03	1.91E-03
Nonroad	Construction	Paint Sprayers	2.31E-03	9.20E-04	2.17E-04	1.34E-06	1.05E-04	1.02E-04
Nonroad	Construction	Backhoe	6.13E-03	4.50E-03	8.16E-04	3.52E-06	5.69E-04	5.51E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Sweeper	5.16E-04	1.46E-04	1.49E-05	6.51E-07	2.47E-05	2.39E-05
Nonroad	Construction	Concrete Saws	2.34E-03	3.08E-01	6.03E-03	7.21E-06	1.54E-04	1.42E-04
Nonroad	Construction	Excavator	3.94E-03	1.57E-03	2.42E-04	1.03E-05	2.61E-04	2.53E-04
Nonroad	Construction	Hydraulic Hammer	2.06E-03	8.22E-04	1.93E-04	1.20E-06	9.39E-05	9.11E-05
Nonroad	Construction	Air Compressor	3.02E-03	1.24E-03	1.47E-04	2.75E-06	2.08E-04	2.01E-04
Nonroad	Construction	Standard Bucket Loader	3.73E-03	2.11E-03	5.78E-04	3.19E-06	4.49E-04	4.35E-04
Nonroad	Construction	Bobcat Skid	8.62E-03	9.20E-03	1.74E-03	5.19E-06	1.33E-03	1.29E-03
Nonroad	Construction	Haul Truck	7.58E-03	2.71E-03	5.20E-04	3.86E-05	4.82E-04	4.67E-04
Nonroad	Construction	Backhoe	6.13E-03	4.50E-03	8.16E-04	3.52E-06	5.69E-04	5.51E-04
Nonroad	Construction	Concrete Saws	2.34E-03	3.08E-01	6.03E-03	7.21E-06	1.54E-04	1.42E-04
Nonroad	Construction	Grader	3.05E-03	1.22E-03	8.66E-05	4.00E-06	1.92E-04	1.86E-04
Nonroad	Construction	Water Truck	2.42E-03	8.68E-04	1.67E-04	1.24E-05	1.54E-04	1.49E-04
Nonroad	Construction	Roller Compactor	5.12E-03	2.31E-03	1.96E-04	6.08E-06	3.35E-04	3.25E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Concrete Pumping Truck	2.32E-03	8.31E-04	1.59E-04	1.18E-05	1.48E-04	1.43E-04
Nonroad	Construction	Concrete Paver	4.21E-03	1.58E-03	2.63E-04	9.57E-06	3.78E-04	3.67E-04
Nonroad	Construction	Motorized Trowel	3.56E-03	1.04E-03	1.60E-04	2.13E-06	1.20E-04	1.17E-04
Nonroad	Construction	Asphalt Paver	4.91E-03	2.26E-03	1.78E-04	6.08E-06	3.32E-04	3.22E-04
Nonroad	Construction	Rubber Tire Roller Compactor	5.12E-03	2.31E-03	1.96E-04	6.08E-06	3.35E-04	3.25E-04
Nonroad	Construction	Bobcat	1.28E-02	1.36E-02	2.58E-03	7.69E-06	1.97E-03	1.91E-03
Nonroad	Construction	Paint Sprayers	2.31E-03	9.20E-04	2.17E-04	1.34E-06	1.05E-04	1.02E-04
Nonroad	Construction	Backhoe	9.09E-03	6.67E-03	1.21E-03	5.21E-06	8.42E-04	8.17E-04
Nonroad	Construction	Concrete Saws	1.73E-03	2.28E-01	4.46E-03	5.34E-06	1.14E-04	1.05E-04
Nonroad	Construction	Sweeper	5.16E-04	1.46E-04	1.49E-05	6.51E-07	2.47E-05	2.39E-05
Nonroad	Construction	Excavator	3.94E-03	1.57E-03	2.42E-04	1.03E-05	2.61E-04	2.53E-04
Nonroad	Construction	Hydraulic Hammer	2.06E-03	8.22E-04	1.93E-04	1.20E-06	9.39E-05	9.11E-05

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Air Compressor	3.02E-03	1.24E-03	1.47E-04	2.75E-06	2.08E-04	2.01E-04
Nonroad	Construction	Standard Bucket Loader	3.73E-03	2.11E-03	5.78E-04	3.19E-06	4.49E-04	4.35E-04
Nonroad	Construction	Bobcat Skid	8.62E-03	9.20E-03	1.74E-03	5.19E-06	1.33E-03	1.29E-03
Nonroad	Construction	Haul Truck	7.58E-03	2.71E-03	5.20E-04	3.86E-05	4.82E-04	4.67E-04
Nonroad	Construction	Backhoe	6.13E-03	4.50E-03	8.16E-04	3.52E-06	5.69E-04	5.51E-04
Nonroad	Construction	Concrete Saws	2.34E-03	3.08E-01	6.03E-03	7.21E-06	1.54E-04	1.42E-04
Nonroad	Construction	Grader	4.58E-03	1.83E-03	1.30E-04	6.00E-06	2.88E-04	2.79E-04
Nonroad	Construction	Water Truck	1.24E-02	4.43E-03	8.49E-04	6.31E-05	7.86E-04	7.62E-04
Nonroad	Construction	Roller Compactor	1.74E-02	7.84E-03	6.67E-04	2.07E-05	1.14E-03	1.11E-03
Nonroad	Construction	Concrete Pumping Truck	1.18E-02	4.24E-03	8.13E-04	6.04E-05	7.52E-04	7.30E-04
Nonroad	Construction	Concrete Paver	4.21E-03	1.58E-03	2.63E-04	9.57E-06	3.78E-04	3.67E-04
Nonroad	Construction	Motorized Trowel	1.33E-02	3.90E-03	6.01E-04	8.00E-06	4.51E-04	4.37E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Asphalt Paver	4.91E-03	2.26E-03	1.78E-04	6.08E-06	3.32E-04	3.22E-04
Nonroad	Construction	Rubber Tire Roller Compactor	5.12E-03	2.31E-03	1.96E-04	6.08E-06	3.35E-04	3.25E-04
Nonroad	Construction	Bobcat	1.28E-02	1.36E-02	2.58E-03	7.69E-06	1.97E-03	1.91E-03
Nonroad	Construction	Paint Sprayers	2.31E-03	9.20E-04	2.17E-04	1.34E-06	1.05E-04	1.02E-04
Nonroad	Construction	Backhoe	2.32E-02	1.70E-02	3.08E-03	1.33E-05	2.15E-03	2.08E-03
Nonroad	Construction	Concrete Saws	2.34E-03	3.08E-01	6.03E-03	7.21E-06	1.54E-04	1.42E-04
Nonroad	Construction	Sweeper	5.16E-04	1.46E-04	1.49E-05	6.51E-07	2.47E-05	2.39E-05
Nonroad	Construction	Excavator	1.12E-02	4.45E-03	6.85E-04	2.92E-05	7.39E-04	7.17E-04
Nonroad	Construction	Hydraulic Hammer	5.83E-03	2.33E-03	5.48E-04	3.39E-06	2.66E-04	2.58E-04
Nonroad	Construction	Air Compressor	8.56E-03	3.51E-03	4.16E-04	7.79E-06	5.88E-04	5.71E-04
Nonroad	Construction	Standard Bucket Loader	7.04E-03	3.98E-03	1.09E-03	6.03E-06	8.48E-04	8.22E-04
Nonroad	Construction	Bobcat Skid	1.63E-02	1.74E-02	3.29E-03	9.80E-06	2.51E-03	2.43E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Haul Truck	1.43E-02	5.12E-03	9.83E-04	7.30E-05	9.10E-04	8.82E-04
Nonroad	Construction	Backhoe	1.16E-02	8.51E-03	1.54E-03	6.65E-06	1.07E-03	1.04E-03
Nonroad	Construction	Concrete Saws	2.21E-03	2.91E-01	5.69E-03	6.81E-06	1.45E-04	1.34E-04
Nonroad	Construction	Grader	4.12E-03	1.64E-03	1.17E-04	5.40E-06	2.59E-04	2.51E-04
Nonroad	Construction	Water Truck	3.27E-03	1.17E-03	2.25E-04	1.67E-05	2.08E-04	2.02E-04
Nonroad	Construction	Roller Compactor	4.61E-03	2.08E-03	1.77E-04	5.47E-06	3.02E-04	2.93E-04
Nonroad	Construction	Concrete Pumping Truck	3.13E-03	1.12E-03	2.15E-04	1.60E-05	1.99E-04	1.93E-04
Nonroad	Construction	Concrete Paver	3.79E-03	1.42E-03	2.36E-04	8.61E-06	3.41E-04	3.30E-04
Nonroad	Construction	Motorized Trowel	4.80E-03	1.41E-03	2.16E-04	2.88E-06	1.62E-04	1.57E-04
Nonroad	Construction	Asphalt Paver	4.42E-03	2.04E-03	1.60E-04	5.47E-06	2.99E-04	2.90E-04
Nonroad	Construction	Rubber Tire Roller Compactor	4.61E-03	2.08E-03	1.77E-04	5.47E-06	3.02E-04	2.93E-04
Nonroad	Construction	Bobcat	8.62E-03	9.20E-03	1.74E-03	5.19E-06	1.33E-03	1.29E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Paint Sprayers	2.31E-03	9.20E-04	2.17E-04	1.34E-06	1.05E-04	1.02E-04
Nonroad	Construction	Backhoe	6.13E-03	4.50E-03	8.16E-04	3.52E-06	5.69E-04	5.51E-04
Nonroad	Construction	Concrete Saws	2.34E-03	3.08E-01	6.03E-03	7.21E-06	1.54E-04	1.42E-04
Nonroad	Construction	Sweeper	5.16E-04	1.46E-04	1.49E-05	6.51E-07	2.47E-05	2.39E-05
Nonroad	Construction	Excavator	6.56E-03	2.62E-03	4.03E-04	1.72E-05	4.35E-04	4.22E-04
Nonroad	Construction	Hydraulic Hammer	3.43E-03	1.37E-03	3.22E-04	1.99E-06	1.57E-04	1.52E-04
Nonroad	Construction	Air Compressor	8.56E-03	3.51E-03	4.16E-04	7.79E-06	5.88E-04	5.71E-04
Nonroad	Construction	Standard Bucket Loader	4.14E-03	2.34E-03	6.42E-04	3.54E-06	4.99E-04	4.84E-04
Nonroad	Construction	Bobcat Skid	7.11E-03	6.13E-03	1.23E-03	3.62E-06	8.71E-04	8.44E-04
Nonroad	Construction	Haul Truck	8.42E-03	3.01E-03	5.78E-04	4.29E-05	5.35E-04	5.19E-04
Nonroad	Construction	Backhoe	6.81E-03	5.01E-03	9.06E-04	3.91E-06	6.32E-04	6.13E-04
Nonroad	Construction	Concrete Saws	1.80E-03	7.20E-04	1.69E-04	1.05E-06	8.24E-05	7.99E-05

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Grader	5.50E-03	2.20E-03	1.56E-04	7.22E-06	3.46E-04	3.36E-04
Nonroad	Construction	Water Truck	4.37E-03	1.56E-03	3.00E-04	2.23E-05	2.78E-04	2.69E-04
Nonroad	Construction	Roller Compactor	6.15E-03	2.77E-03	2.36E-04	7.31E-06	4.03E-04	3.91E-04
Nonroad	Construction	Concrete Pumping Truck	4.18E-03	1.50E-03	2.87E-04	2.13E-05	2.66E-04	2.58E-04
Nonroad	Construction	Concrete Paver	5.05E-03	1.90E-03	3.16E-04	1.15E-05	4.55E-04	4.41E-04
Nonroad	Construction	Motorized Trowel	6.41E-03	1.88E-03	2.89E-04	3.84E-06	2.17E-04	2.10E-04
Nonroad	Construction	Asphalt Paver	5.91E-03	2.72E-03	2.14E-04	7.30E-06	4.00E-04	3.88E-04
Nonroad	Construction	Rubber Tire Roller Compactor	6.15E-03	2.77E-03	2.36E-04	7.31E-06	4.03E-04	3.91E-04
Nonroad	Construction	Bobcat	1.15E-02	1.23E-02	2.33E-03	6.93E-06	1.77E-03	1.72E-03
Nonroad	Construction	Paint Sprayers	2.02E-03	8.05E-04	1.90E-04	1.17E-06	9.21E-05	8.93E-05
Nonroad	Construction	Backhoe	6.13E-03	4.50E-03	8.16E-04	3.52E-06	5.69E-04	5.51E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Sweeper	5.16E-04	1.46E-04	1.49E-05	6.51E-07	2.47E-05	2.39E-05
Nonroad	Construction	Concrete Saws	1.52E-03	2.00E-01	3.91E-03	4.67E-06	9.97E-05	9.18E-05
Nonroad	Construction	Excavator	3.50E-03	1.40E-03	2.15E-04	9.16E-06	2.32E-04	2.25E-04
Nonroad	Construction	Hydraulic Hammer	1.83E-03	7.30E-04	1.72E-04	1.06E-06	8.35E-05	8.10E-05
Nonroad	Construction	Air Compressor	3.02E-03	1.24E-03	1.47E-04	2.75E-06	2.08E-04	2.01E-04
Nonroad	Construction	Standard Bucket Loader	2.21E-03	1.25E-03	3.42E-04	1.89E-06	2.66E-04	2.58E-04
Nonroad	Construction	Bobcat Skid	8.62E-03	9.20E-03	1.74E-03	5.19E-06	1.33E-03	1.29E-03
Nonroad	Construction	Haul Truck	4.49E-03	1.61E-03	3.08E-04	2.29E-05	2.85E-04	2.77E-04
Nonroad	Construction	Backhoe	3.63E-03	2.67E-03	4.83E-04	2.09E-06	3.37E-04	3.27E-04
Nonroad	Construction	Concrete Saws	6.93E-04	9.14E-02	1.79E-03	2.14E-06	4.56E-05	4.19E-05
Nonroad	Construction	Grader	4.89E-03	1.95E-03	1.39E-04	6.40E-06	3.07E-04	2.98E-04
Nonroad	Construction	Water Truck	3.88E-03	1.39E-03	2.66E-04	1.98E-05	2.47E-04	2.39E-04
Nonroad	Construction	Roller Compactor	5.46E-03	2.46E-03	2.09E-04	6.49E-06	3.58E-04	3.47E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Concrete Pumping Truck	3.71E-03	1.33E-03	2.55E-04	1.89E-05	2.36E-04	2.29E-04
Nonroad	Construction	Concrete Paver	4.49E-03	1.69E-03	2.80E-04	1.02E-05	4.04E-04	3.92E-04
Nonroad	Construction	Motorized Trowel	5.69E-03	1.67E-03	2.57E-04	3.41E-06	1.92E-04	1.86E-04
Nonroad	Construction	Asphalt Paver	5.24E-03	2.41E-03	1.90E-04	6.48E-06	3.55E-04	3.44E-04
Nonroad	Construction	Rubber Tire Roller Compactor	5.46E-03	2.46E-03	2.09E-04	6.49E-06	3.58E-04	3.47E-04
Nonroad	Construction	Bobcat	1.02E-02	1.09E-02	2.07E-03	6.15E-06	1.57E-03	1.53E-03
Nonroad	Construction	Paint Sprayers	1.84E-03	7.36E-04	1.73E-04	1.07E-06	8.42E-05	8.17E-05
Nonroad	Construction	Backhoe	6.13E-03	4.50E-03	8.16E-04	3.52E-06	5.69E-04	5.51E-04
Nonroad	Construction	Sweeper	5.16E-04	1.46E-04	1.49E-05	6.51E-07	2.47E-05	2.39E-05
Nonroad	Construction	Concrete Saws	1.39E-03	1.83E-01	3.57E-03	4.27E-06	9.12E-05	8.39E-05
Nonroad	Construction	Excavator	3.50E-03	1.40E-03	2.15E-04	9.16E-06	2.32E-04	2.25E-04
Nonroad	Construction	Hydraulic Hammer	1.83E-03	7.30E-04	1.72E-04	1.06E-06	8.35E-05	8.10E-05

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Air Compressor	3.02E-03	1.24E-03	1.47E-04	2.75E-06	2.08E-04	2.01E-04
Nonroad	Construction	Standard Bucket Loader	2.21E-03	1.25E-03	3.42E-04	1.89E-06	2.66E-04	2.58E-04
Nonroad	Construction	Bobcat Skid	8.62E-03	9.20E-03	1.74E-03	5.19E-06	1.33E-03	1.29E-03
Nonroad	Construction	Haul Truck	4.49E-03	1.61E-03	3.08E-04	2.29E-05	2.85E-04	2.77E-04
Nonroad	Construction	Backhoe	3.63E-03	2.67E-03	4.83E-04	2.09E-06	3.37E-04	3.27E-04
Nonroad	Construction	Concrete Saws	6.93E-04	9.14E-02	1.79E-03	2.14E-06	4.56E-05	4.19E-05
Nonroad	Construction	Grader	4.89E-03	1.95E-03	1.39E-04	6.40E-06	3.07E-04	2.98E-04
Nonroad	Construction	Water Truck	3.88E-03	1.39E-03	2.66E-04	1.98E-05	2.47E-04	2.39E-04
Nonroad	Construction	Roller Compactor	5.46E-03	2.46E-03	2.09E-04	6.49E-06	3.58E-04	3.47E-04
Nonroad	Construction	Concrete Pumping Truck	3.71E-03	1.33E-03	2.55E-04	1.89E-05	2.36E-04	2.29E-04
Nonroad	Construction	Concrete Paver	4.49E-03	1.69E-03	2.80E-04	1.02E-05	4.04E-04	3.92E-04
Nonroad	Construction	Motorized Trowel	5.69E-03	1.67E-03	2.57E-04	3.41E-06	1.92E-04	1.86E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Asphalt Paver	5.24E-03	2.41E-03	1.90E-04	6.48E-06	3.55E-04	3.44E-04
Nonroad	Construction	Rubber Tire Roller Compactor	5.46E-03	2.46E-03	2.09E-04	6.49E-06	3.58E-04	3.47E-04
Nonroad	Construction	Bobcat	1.02E-02	1.09E-02	2.07E-03	6.15E-06	1.57E-03	1.53E-03
Nonroad	Construction	Paint Sprayers	1.84E-03	7.36E-04	1.73E-04	1.07E-06	8.42E-05	8.17E-05
Nonroad	Construction	Backhoe	6.13E-03	4.50E-03	8.16E-04	3.52E-06	5.69E-04	5.51E-04
Nonroad	Construction	Sweeper	5.16E-04	1.46E-04	1.49E-05	6.51E-07	2.47E-05	2.39E-05
Nonroad	Construction	Concrete Saws	1.39E-03	1.83E-01	3.57E-03	4.27E-06	9.12E-05	8.39E-05

Table C11. 2022 construction-phase non-road equipment greenhouse gas emissions.

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Excavator	2.14E-05	1.77E-04	3.71E+00	3.76E+00
Nonroad	Construction	Hydraulic Hammer	1.28E-05	1.16E-05	2.44E-01	2.48E-01
Nonroad	Construction	Air Compressor	1.15E-05	4.52E-05	9.48E-01	9.61E-01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Standard Bucket Loader	3.32E-05	4.95E-05	1.04E+00	1.05E+00
Nonroad	Construction	Bobcat Skid	3.10E-05	3.90E-05	8.16E-01	8.30E-01
Nonroad	Construction	Haul Truck	3.95E-05	6.85E-04	1.44E+01	1.46E+01
Nonroad	Construction	Backhoe	4.86E-05	5.39E-05	1.13E+00	1.15E+00
Nonroad	Construction	Concrete Saws	5.89E-04	3.84E-05	7.91E-01	8.50E-01
Nonroad	Construction	Grader	7.76E-06	6.96E-05	1.46E+00	1.48E+00
Nonroad	Construction	Water Truck	1.26E-05	2.19E-04	4.60E+00	4.66E+00
Nonroad	Construction	Roller Compactor	1.64E-05	1.04E-04	2.19E+00	2.22E+00
Nonroad	Construction	Concrete Pumping Truck	1.21E-05	2.10E-04	4.40E+00	4.46E+00
Nonroad	Construction	Concrete Paver	2.22E-05	1.64E-04	3.45E+00	3.50E+00
Nonroad	Construction	Motorized Trowel	1.69E-05	3.48E-05	7.29E-01	7.40E-01
Nonroad	Construction	Asphalt Paver	1.50E-05	1.04E-04	2.19E+00	2.22E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Rubber Tire Roller Compactor	1.64E-05	1.04E-04	2.19E+00	2.22E+00
Nonroad	Construction	Bobcat	9.20E-05	1.16E-04	2.42E+00	2.46E+00
Nonroad	Construction	Paint Sprayers	1.91E-05	1.74E-05	3.64E-01	3.71E-01
Nonroad	Construction	Backhoe	4.86E-05	5.39E-05	1.13E+00	1.15E+00
Nonroad	Construction	Sweeper	1.36E-06	1.13E-05	2.37E-01	2.40E-01
Nonroad	Construction	Concrete Saws	8.84E-04	5.76E-05	1.19E+00	1.28E+00
Nonroad	Construction	Excavator	2.14E-05	1.77E-04	3.71E+00	3.76E+00
Nonroad	Construction	Hydraulic Hammer	1.70E-05	1.55E-05	3.25E-01	3.31E-01
Nonroad	Construction	Air Compressor	1.15E-05	4.52E-05	9.48E-01	9.61E-01
Nonroad	Construction	Standard Bucket Loader	3.32E-05	4.95E-05	1.04E+00	1.05E+00
Nonroad	Construction	Bobcat Skid	6.21E-05	7.80E-05	1.63E+00	1.66E+00
Nonroad	Construction	Haul Truck	3.95E-05	6.85E-04	1.44E+01	1.46E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	4.86E-05	5.39E-05	1.13E+00	1.15E+00
Nonroad	Construction	Concrete Saws	8.84E-04	5.76E-05	1.19E+00	1.28E+00
Nonroad	Construction	Grader	7.76E-06	6.96E-05	1.46E+00	1.48E+00
Nonroad	Construction	Water Truck	1.26E-05	2.19E-04	4.60E+00	4.66E+00
Nonroad	Construction	Roller Compactor	1.64E-05	1.04E-04	2.19E+00	2.22E+00
Nonroad	Construction	Concrete Pumping Truck	1.21E-05	2.10E-04	4.40E+00	4.46E+00
Nonroad	Construction	Concrete Paver	2.22E-05	1.64E-04	3.45E+00	3.50E+00
Nonroad	Construction	Motorized Trowel	1.69E-05	3.48E-05	7.29E-01	7.40E-01
Nonroad	Construction	Asphalt Paver	1.50E-05	1.04E-04	2.19E+00	2.22E+00
Nonroad	Construction	Rubber Tire Roller Compactor	1.64E-05	1.04E-04	2.19E+00	2.22E+00
Nonroad	Construction	Bobcat	9.20E-05	1.16E-04	2.42E+00	2.46E+00
Nonroad	Construction	Paint Sprayers	1.91E-05	1.74E-05	3.64E-01	3.71E-01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	7.20E-05	7.98E-05	1.67E+00	1.70E+00
Nonroad	Construction	Concrete Saws	6.55E-04	4.27E-05	8.79E-01	9.45E-01
Nonroad	Construction	Sweeper	1.36E-06	1.13E-05	2.37E-01	2.40E-01
Nonroad	Construction	Excavator	2.14E-05	1.77E-04	3.71E+00	3.76E+00
Nonroad	Construction	Hydraulic Hammer	1.70E-05	1.55E-05	3.25E-01	3.31E-01
Nonroad	Construction	Air Compressor	1.15E-05	4.52E-05	9.48E-01	9.61E-01
Nonroad	Construction	Standard Bucket Loader	3.32E-05	4.95E-05	1.04E+00	1.05E+00
Nonroad	Construction	Bobcat Skid	6.21E-05	7.80E-05	1.63E+00	1.66E+00
Nonroad	Construction	Haul Truck	3.95E-05	6.85E-04	1.44E+01	1.46E+01
Nonroad	Construction	Backhoe	4.86E-05	5.39E-05	1.13E+00	1.15E+00
Nonroad	Construction	Concrete Saws	8.84E-04	5.76E-05	1.19E+00	1.28E+00
Nonroad	Construction	Grader	1.16E-05	1.04E-04	2.19E+00	2.22E+00
Nonroad	Construction	Water Truck	6.45E-05	1.12E-03	2.35E+01	2.38E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Roller Compactor	5.56E-05	3.55E-04	7.44E+00	7.55E+00
Nonroad	Construction	Concrete Pumping Truck	6.17E-05	1.07E-03	2.25E+01	2.28E+01
Nonroad	Construction	Concrete Paver	2.22E-05	1.64E-04	3.45E+00	3.50E+00
Nonroad	Construction	Motorized Trowel	6.33E-05	1.30E-04	2.74E+00	2.78E+00
Nonroad	Construction	Asphalt Paver	1.50E-05	1.04E-04	2.19E+00	2.22E+00
Nonroad	Construction	Rubber Tire Roller Compactor	1.64E-05	1.04E-04	2.19E+00	2.22E+00
Nonroad	Construction	Bobcat	9.20E-05	1.16E-04	2.42E+00	2.46E+00
Nonroad	Construction	Paint Sprayers	1.91E-05	1.74E-05	3.64E-01	3.71E-01
Nonroad	Construction	Backhoe	1.84E-04	2.03E-04	4.26E+00	4.33E+00
Nonroad	Construction	Concrete Saws	8.84E-04	5.76E-05	1.19E+00	1.28E+00
Nonroad	Construction	Sweeper	1.36E-06	1.13E-05	2.37E-01	2.40E-01
Nonroad	Construction	Excavator	6.06E-05	5.02E-04	1.05E+01	1.07E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Hydraulic Hammer	4.83E-05	4.40E-05	9.22E-01	9.38E-01
Nonroad	Construction	Air Compressor	3.27E-05	1.28E-04	2.69E+00	2.72E+00
Nonroad	Construction	Standard Bucket Loader	6.28E-05	9.36E-05	1.96E+00	1.99E+00
Nonroad	Construction	Bobcat Skid	1.17E-04	1.47E-04	3.08E+00	3.13E+00
Nonroad	Construction	Haul Truck	7.46E-05	1.29E-03	2.72E+01	2.75E+01
Nonroad	Construction	Backhoe	9.18E-05	1.02E-04	2.13E+00	2.17E+00
Nonroad	Construction	Concrete Saws	8.35E-04	5.44E-05	1.12E+00	1.20E+00
Nonroad	Construction	Grader	1.05E-05	9.39E-05	1.97E+00	2.00E+00
Nonroad	Construction	Water Truck	1.71E-05	2.96E-04	6.21E+00	6.29E+00
Nonroad	Construction	Roller Compactor	1.47E-05	9.39E-05	1.97E+00	2.00E+00
Nonroad	Construction	Concrete Pumping Truck	1.63E-05	2.83E-04	5.94E+00	6.02E+00
Nonroad	Construction	Concrete Paver	2.00E-05	1.48E-04	3.11E+00	3.15E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Motorized Trowel	2.28E-05	4.70E-05	9.85E-01	1.00E+00
Nonroad	Construction	Asphalt Paver	1.35E-05	9.39E-05	1.97E+00	2.00E+00
Nonroad	Construction	Rubber Tire Roller Compactor	1.47E-05	9.39E-05	1.97E+00	2.00E+00
Nonroad	Construction	Bobcat	6.21E-05	7.80E-05	1.63E+00	1.66E+00
Nonroad	Construction	Paint Sprayers	1.91E-05	1.74E-05	3.64E-01	3.71E-01
Nonroad	Construction	Backhoe	4.86E-05	5.39E-05	1.13E+00	1.15E+00
Nonroad	Construction	Concrete Saws	8.84E-04	5.76E-05	1.19E+00	1.28E+00
Nonroad	Construction	Sweeper	1.36E-06	1.13E-05	2.37E-01	2.40E-01
Nonroad	Construction	Excavator	3.56E-05	2.95E-04	6.19E+00	6.27E+00
Nonroad	Construction	Hydraulic Hammer	2.84E-05	2.59E-05	5.42E-01	5.52E-01
Nonroad	Construction	Air Compressor	3.27E-05	1.28E-04	2.69E+00	2.72E+00
Nonroad	Construction	Standard Bucket Loader	3.69E-05	5.50E-05	1.15E+00	1.17E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Bobcat Skid	4.86E-05	5.39E-05	1.13E+00	1.15E+00
Nonroad	Construction	Haul Truck	4.39E-05	7.61E-04	1.60E+01	1.62E+01
Nonroad	Construction	Backhoe	5.40E-05	5.98E-05	1.25E+00	1.27E+00
Nonroad	Construction	Concrete Saws	1.49E-05	1.36E-05	2.84E-01	2.89E-01
Nonroad	Construction	Grader	1.40E-05	1.25E-04	2.63E+00	2.67E+00
Nonroad	Construction	Water Truck	2.28E-05	3.95E-04	8.29E+00	8.40E+00
Nonroad	Construction	Roller Compactor	1.97E-05	1.25E-04	2.63E+00	2.67E+00
Nonroad	Construction	Concrete Pumping Truck	2.18E-05	3.78E-04	7.94E+00	8.04E+00
Nonroad	Construction	Concrete Paver	2.67E-05	1.98E-04	4.15E+00	4.20E+00
Nonroad	Construction	Motorized Trowel	3.04E-05	6.27E-05	1.31E+00	1.33E+00
Nonroad	Construction	Asphalt Paver	1.81E-05	1.25E-04	2.63E+00	2.67E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Rubber Tire Roller Compactor	1.97E-05	1.25E-04	2.63E+00	2.67E+00
Nonroad	Construction	Bobcat	8.29E-05	1.04E-04	2.18E+00	2.22E+00
Nonroad	Construction	Paint Sprayers	1.67E-05	1.52E-05	3.19E-01	3.24E-01
Nonroad	Construction	Backhoe	4.86E-05	5.39E-05	1.13E+00	1.15E+00
Nonroad	Construction	Sweeper	1.36E-06	1.13E-05	2.37E-01	2.40E-01
Nonroad	Construction	Concrete Saws	5.73E-04	3.73E-05	7.69E-01	8.27E-01
Nonroad	Construction	Excavator	1.90E-05	1.57E-04	3.30E+00	3.35E+00
Nonroad	Construction	Hydraulic Hammer	1.52E-05	1.38E-05	2.89E-01	2.94E-01
Nonroad	Construction	Air Compressor	1.15E-05	4.52E-05	9.48E-01	9.61E-01
Nonroad	Construction	Standard Bucket Loader	1.97E-05	2.94E-05	6.15E-01	6.25E-01
Nonroad	Construction	Bobcat Skid	6.21E-05	7.80E-05	1.63E+00	1.66E+00
Nonroad	Construction	Haul Truck	2.34E-05	4.06E-04	8.52E+00	8.63E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	2.88E-05	3.19E-05	6.68E-01	6.79E-01
Nonroad	Construction	Concrete Saws	2.62E-04	1.71E-05	3.52E-01	3.78E-01
Nonroad	Construction	Grader	1.24E-05	1.11E-04	2.34E+00	2.37E+00
Nonroad	Construction	Water Truck	2.02E-05	3.51E-04	7.36E+00	7.46E+00
Nonroad	Construction	Roller Compactor	1.74E-05	1.11E-04	2.34E+00	2.37E+00
Nonroad	Construction	Concrete Pumping Truck	1.94E-05	3.36E-04	7.05E+00	7.14E+00
Nonroad	Construction	Concrete Paver	2.37E-05	1.75E-04	3.68E+00	3.73E+00
Nonroad	Construction	Motorized Trowel	2.70E-05	5.56E-05	1.17E+00	1.18E+00
Nonroad	Construction	Asphalt Paver	1.60E-05	1.11E-04	2.34E+00	2.37E+00
Nonroad	Construction	Rubber Tire Roller Compactor	1.74E-05	1.11E-04	2.34E+00	2.37E+00
Nonroad	Construction	Bobcat	7.36E-05	9.25E-05	1.94E+00	1.97E+00
Nonroad	Construction	Paint Sprayers	1.53E-05	1.39E-05	2.91E-01	2.97E-01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	4.86E-05	5.39E-05	1.13E+00	1.15E+00
Nonroad	Construction	Sweeper	1.36E-06	1.13E-05	2.37E-01	2.40E-01
Nonroad	Construction	Concrete Saws	5.24E-04	3.41E-05	7.03E-01	7.56E-01
Nonroad	Construction	Excavator	1.90E-05	1.57E-04	3.30E+00	3.35E+00
Nonroad	Construction	Hydraulic Hammer	1.52E-05	1.38E-05	2.89E-01	2.94E-01
Nonroad	Construction	Air Compressor	1.15E-05	4.52E-05	9.48E-01	9.61E-01
Nonroad	Construction	Standard Bucket Loader	1.97E-05	2.94E-05	6.15E-01	6.25E-01
Nonroad	Construction	Bobcat Skid	6.21E-05	7.80E-05	1.63E+00	1.66E+00
Nonroad	Construction	Haul Truck	2.34E-05	4.06E-04	8.52E+00	8.63E+00
Nonroad	Construction	Backhoe	2.88E-05	3.19E-05	6.68E-01	6.79E-01
Nonroad	Construction	Concrete Saws	2.62E-04	1.71E-05	3.52E-01	3.78E-01
Nonroad	Construction	Grader	1.24E-05	1.11E-04	2.34E+00	2.37E+00
Nonroad	Construction	Water Truck	2.02E-05	3.51E-04	7.36E+00	7.46E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Roller Compactor	1.74E-05	1.11E-04	2.34E+00	2.37E+00
Nonroad	Construction	Concrete Pumping Truck	1.94E-05	3.36E-04	7.05E+00	7.14E+00
Nonroad	Construction	Concrete Paver	2.37E-05	1.75E-04	3.68E+00	3.73E+00
Nonroad	Construction	Motorized Trowel	2.70E-05	5.56E-05	1.17E+00	1.18E+00
Nonroad	Construction	Asphalt Paver	1.60E-05	1.11E-04	2.34E+00	2.37E+00
Nonroad	Construction	Rubber Tire Roller Compactor	1.74E-05	1.11E-04	2.34E+00	2.37E+00
Nonroad	Construction	Bobcat	7.36E-05	9.25E-05	1.94E+00	1.97E+00
Nonroad	Construction	Paint Sprayers	1.53E-05	1.39E-05	2.91E-01	2.97E-01
Nonroad	Construction	Backhoe	4.86E-05	5.39E-05	1.13E+00	1.15E+00
Nonroad	Construction	Sweeper	1.36E-06	1.13E-05	2.37E-01	2.40E-01
Nonroad	Construction	Concrete Saws	5.24E-04	3.41E-05	7.03E-01	7.56E-01

Table C12. 2023 construction-phase non-road equipment criteria air pollutant emissions.

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Excavator	2.40E-02	9.51E-03	1.54E-03	7.57E-05	1.60E-03	1.56E-03
Nonroad	Construction	Hydraulic Hammer	1.15E-02	4.56E-03	1.07E-03	6.66E-06	5.23E-04	5.07E-04
Nonroad	Construction	Air Compressor	2.05E-02	7.77E-03	9.06E-04	2.01E-05	1.31E-03	1.28E-03
Nonroad	Construction	Standard Bucket Loader	2.58E-02	1.45E-02	3.96E-03	2.35E-05	3.14E-03	3.04E-03
Nonroad	Construction	Bobcat Skid	3.03E-02	3.18E-02	5.93E-03	1.91E-05	4.56E-03	4.43E-03
Nonroad	Construction	Haul Truck	4.48E-02	1.45E-02	3.17E-03	2.85E-04	2.61E-03	2.53E-03
Nonroad	Construction	Backhoe	4.43E-02	3.13E-02	5.62E-03	2.59E-05	3.92E-03	3.80E-03
Nonroad	Construction	Concrete Saws	1.16E-02	1.53E+00	2.98E-02	3.57E-05	7.61E-04	7.00E-04
Nonroad	Construction	Grader	2.04E-02	7.05E-03	4.91E-04	2.94E-05	1.13E-03	1.10E-03
Nonroad	Construction	Water Truck	1.43E-02	4.65E-03	1.02E-03	9.11E-05	8.35E-04	8.10E-04
Nonroad	Construction	Roller Compactor	3.48E-02	1.38E-02	1.17E-03	4.46E-05	2.02E-03	1.96E-03
Nonroad	Construction	Concrete Pumping Truck	1.37E-02	4.45E-03	9.72E-04	8.72E-05	7.99E-04	7.75E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Concrete Paver	2.61E-02	1.00E-02	1.62E-03	7.03E-05	2.41E-03	2.34E-03
Nonroad	Construction	Motorized Trowel	2.59E-02	6.82E-03	1.07E-03	1.56E-05	7.67E-04	7.44E-04
Nonroad	Construction	Asphalt Paver	3.36E-02	1.39E-02	1.07E-03	4.46E-05	2.09E-03	2.03E-03
Nonroad	Construction	Rubber Tire Roller Compactor	3.48E-02	1.38E-02	1.17E-03	4.46E-05	2.02E-03	1.96E-03
Nonroad	Construction	Bobcat	8.97E-02	9.43E-02	1.76E-02	5.65E-05	1.35E-02	1.31E-02
Nonroad	Construction	Paint Sprayers	1.71E-02	6.81E-03	1.60E-03	9.94E-06	7.81E-04	7.57E-04
Nonroad	Construction	Backhoe	4.43E-02	3.13E-02	5.62E-03	2.59E-05	3.92E-03	3.80E-03
Nonroad	Construction	Sweeper	3.42E-03	8.49E-04	8.52E-05	4.78E-06	1.44E-04	1.40E-04
Nonroad	Construction	Concrete Saws	1.73E-02	2.29E+00	4.47E-02	5.35E-05	1.14E-03	1.05E-03
Nonroad	Construction	Excavator	2.40E-02	9.51E-03	1.54E-03	7.57E-05	1.60E-03	1.56E-03
Nonroad	Construction	Hydraulic Hammer	1.53E-02	6.08E-03	1.43E-03	8.88E-06	6.97E-04	6.76E-04
Nonroad	Construction	Air Compressor	2.05E-02	7.77E-03	9.06E-04	2.01E-05	1.31E-03	1.28E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Standard Bucket Loader	2.58E-02	1.45E-02	3.96E-03	2.35E-05	3.14E-03	3.04E-03
Nonroad	Construction	Bobcat Skid	6.05E-02	6.36E-02	1.19E-02	3.81E-05	9.12E-03	8.85E-03
Nonroad	Construction	Haul Truck	4.48E-02	1.45E-02	3.17E-03	2.85E-04	2.61E-03	2.53E-03
Nonroad	Construction	Backhoe	4.43E-02	3.13E-02	5.62E-03	2.59E-05	3.92E-03	3.80E-03
Nonroad	Construction	Concrete Saws	1.73E-02	2.29E+00	4.47E-02	5.35E-05	1.14E-03	1.05E-03
Nonroad	Construction	Grader	2.04E-02	7.05E-03	4.91E-04	2.94E-05	1.13E-03	1.10E-03
Nonroad	Construction	Water Truck	1.43E-02	4.65E-03	1.02E-03	9.11E-05	8.35E-04	8.10E-04
Nonroad	Construction	Roller Compactor	3.48E-02	1.38E-02	1.17E-03	4.46E-05	2.02E-03	1.96E-03
Nonroad	Construction	Concrete Pumping Truck	1.37E-02	4.45E-03	9.72E-04	8.72E-05	7.99E-04	7.75E-04
Nonroad	Construction	Concrete Paver	2.61E-02	1.00E-02	1.62E-03	7.03E-05	2.41E-03	2.34E-03
Nonroad	Construction	Motorized Trowel	2.59E-02	6.82E-03	1.07E-03	1.56E-05	7.67E-04	7.44E-04
Nonroad	Construction	Asphalt Paver	3.36E-02	1.39E-02	1.07E-03	4.46E-05	2.09E-03	2.03E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Rubber Tire Roller Compactor	3.48E-02	1.38E-02	1.17E-03	4.46E-05	2.02E-03	1.96E-03
Nonroad	Construction	Bobcat	8.97E-02	9.43E-02	1.76E-02	5.65E-05	1.35E-02	1.31E-02
Nonroad	Construction	Paint Sprayers	1.71E-02	6.81E-03	1.60E-03	9.94E-06	7.81E-04	7.57E-04
Nonroad	Construction	Backhoe	6.57E-02	4.64E-02	8.32E-03	3.83E-05	5.80E-03	5.63E-03
Nonroad	Construction	Concrete Saws	1.28E-02	1.69E+00	3.31E-02	3.96E-05	8.46E-04	7.78E-04
Nonroad	Construction	Sweeper	3.42E-03	8.49E-04	8.52E-05	4.78E-06	1.44E-04	1.40E-04
Nonroad	Construction	Excavator	2.40E-02	9.51E-03	1.54E-03	7.57E-05	1.60E-03	1.56E-03
Nonroad	Construction	Hydraulic Hammer	1.53E-02	6.08E-03	1.43E-03	8.88E-06	6.97E-04	6.76E-04
Nonroad	Construction	Air Compressor	2.05E-02	7.77E-03	9.06E-04	2.01E-05	1.31E-03	1.28E-03
Nonroad	Construction	Standard Bucket Loader	2.58E-02	1.45E-02	3.96E-03	2.35E-05	3.14E-03	3.04E-03
Nonroad	Construction	Bobcat Skid	6.05E-02	6.36E-02	1.19E-02	3.81E-05	9.12E-03	8.85E-03
Nonroad	Construction	Haul Truck	4.48E-02	1.45E-02	3.17E-03	2.85E-04	2.61E-03	2.53E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	4.43E-02	3.13E-02	5.62E-03	2.59E-05	3.92E-03	3.80E-03
Nonroad	Construction	Concrete Saws	1.73E-02	2.29E+00	4.47E-02	5.35E-05	1.14E-03	1.05E-03
Nonroad	Construction	Grader	3.06E-02	1.06E-02	7.36E-04	4.41E-05	1.70E-03	1.65E-03
Nonroad	Construction	Water Truck	7.31E-02	2.37E-02	5.18E-03	4.65E-04	4.26E-03	4.13E-03
Nonroad	Construction	Roller Compactor	1.18E-01	4.68E-02	3.98E-03	1.52E-04	6.86E-03	6.66E-03
Nonroad	Construction	Concrete Pumping Truck	6.99E-02	2.27E-02	4.96E-03	4.45E-04	4.07E-03	3.95E-03
Nonroad	Construction	Concrete Paver	2.61E-02	1.00E-02	1.62E-03	7.03E-05	2.41E-03	2.34E-03
Nonroad	Construction	Motorized Trowel	9.69E-02	2.56E-02	4.01E-03	5.84E-05	2.88E-03	2.79E-03
Nonroad	Construction	Asphalt Paver	3.36E-02	1.39E-02	1.07E-03	4.46E-05	2.09E-03	2.03E-03
Nonroad	Construction	Rubber Tire Roller Compactor	3.48E-02	1.38E-02	1.17E-03	4.46E-05	2.02E-03	1.96E-03
Nonroad	Construction	Bobcat	8.97E-02	9.43E-02	1.76E-02	5.65E-05	1.35E-02	1.31E-02
Nonroad	Construction	Paint Sprayers	1.71E-02	6.81E-03	1.60E-03	9.94E-06	7.81E-04	7.57E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	1.68E-01	1.18E-01	2.12E-02	9.78E-05	1.48E-02	1.44E-02
Nonroad	Construction	Concrete Saws	1.73E-02	2.29E+00	4.47E-02	5.35E-05	1.14E-03	1.05E-03
Nonroad	Construction	Sweeper	3.42E-03	8.49E-04	8.52E-05	4.78E-06	1.44E-04	1.40E-04
Nonroad	Construction	Excavator	6.79E-02	2.69E-02	4.35E-03	2.14E-04	4.55E-03	4.41E-03
Nonroad	Construction	Hydraulic Hammer	4.33E-02	1.72E-02	4.05E-03	2.51E-05	1.97E-03	1.92E-03
Nonroad	Construction	Air Compressor	5.82E-02	2.20E-02	2.57E-03	5.69E-05	3.73E-03	3.61E-03
Nonroad	Construction	Standard Bucket Loader	4.86E-02	2.74E-02	7.48E-03	4.43E-05	5.92E-03	5.75E-03
Nonroad	Construction	Bobcat Skid	1.14E-01	1.20E-01	2.24E-02	7.20E-05	1.72E-02	1.67E-02
Nonroad	Construction	Haul Truck	8.45E-02	2.74E-02	5.99E-03	5.38E-04	4.93E-03	4.78E-03
Nonroad	Construction	Backhoe	8.38E-02	5.91E-02	1.06E-02	4.89E-05	7.40E-03	7.18E-03
Nonroad	Construction	Concrete Saws	1.64E-02	2.16E+00	4.22E-02	5.05E-05	1.08E-03	9.92E-04
Nonroad	Construction	Grader	2.75E-02	9.52E-03	6.63E-04	3.97E-05	1.53E-03	1.48E-03
Nonroad	Construction	Water Truck	1.93E-02	6.28E-03	1.37E-03	1.23E-04	1.13E-03	1.09E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Roller Compactor	3.13E-02	1.24E-02	1.05E-03	4.02E-05	1.82E-03	1.76E-03
Nonroad	Construction	Concrete Pumping Truck	1.85E-02	6.01E-03	1.31E-03	1.18E-04	1.08E-03	1.05E-03
Nonroad	Construction	Concrete Paver	2.35E-02	9.00E-03	1.46E-03	6.33E-05	2.17E-03	2.10E-03
Nonroad	Construction	Motorized Trowel	3.49E-02	9.21E-03	1.44E-03	2.10E-05	1.04E-03	1.00E-03
Nonroad	Construction	Asphalt Paver	3.03E-02	1.25E-02	9.63E-04	4.02E-05	1.88E-03	1.82E-03
Nonroad	Construction	Rubber Tire Roller Compactor	3.13E-02	1.24E-02	1.05E-03	4.02E-05	1.82E-03	1.76E-03
Nonroad	Construction	Bobcat	6.05E-02	6.36E-02	1.19E-02	3.81E-05	9.12E-03	8.85E-03
Nonroad	Construction	Paint Sprayers	1.71E-02	6.81E-03	1.60E-03	9.94E-06	7.81E-04	7.57E-04
Nonroad	Construction	Backhoe	4.43E-02	3.13E-02	5.62E-03	2.59E-05	3.92E-03	3.80E-03
Nonroad	Construction	Concrete Saws	1.73E-02	2.29E+00	4.47E-02	5.35E-05	1.14E-03	1.05E-03
Nonroad	Construction	Sweeper	3.42E-03	8.49E-04	8.52E-05	4.78E-06	1.44E-04	1.40E-04
Nonroad	Construction	Excavator	4.00E-02	1.58E-02	2.56E-03	1.26E-04	2.67E-03	2.59E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Hydraulic Hammer	2.54E-02	1.01E-02	2.39E-03	1.48E-05	1.16E-03	1.13E-03
Nonroad	Construction	Air Compressor	5.82E-02	2.20E-02	2.57E-03	5.69E-05	3.73E-03	3.61E-03
Nonroad	Construction	Standard Bucket Loader	2.86E-02	1.61E-02	4.40E-03	2.61E-05	3.48E-03	3.38E-03
Nonroad	Construction	Bobcat Skid	5.10E-02	4.24E-02	8.42E-03	2.66E-05	5.96E-03	5.78E-03
Nonroad	Construction	Haul Truck	4.97E-02	1.61E-02	3.53E-03	3.16E-04	2.90E-03	2.81E-03
Nonroad	Construction	Backhoe	4.93E-02	3.48E-02	6.24E-03	2.88E-05	4.35E-03	4.22E-03
Nonroad	Construction	Concrete Saws	1.33E-02	5.32E-03	1.25E-03	7.75E-06	6.10E-04	5.92E-04
Nonroad	Construction	Grader	3.67E-02	1.27E-02	8.85E-04	5.30E-05	2.04E-03	1.98E-03
Nonroad	Construction	Water Truck	2.58E-02	8.38E-03	1.83E-03	1.64E-04	1.50E-03	1.46E-03
Nonroad	Construction	Roller Compactor	4.18E-02	1.65E-02	1.41E-03	5.36E-05	2.43E-03	2.35E-03
Nonroad	Construction	Concrete Pumping Truck	2.47E-02	8.02E-03	1.75E-03	1.57E-04	1.44E-03	1.40E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Concrete Paver	3.13E-02	1.20E-02	1.95E-03	8.45E-05	2.89E-03	2.81E-03
Nonroad	Construction	Motorized Trowel	4.66E-02	1.23E-02	1.93E-03	2.81E-05	1.38E-03	1.34E-03
Nonroad	Construction	Asphalt Paver	4.04E-02	1.67E-02	1.29E-03	5.36E-05	2.51E-03	2.44E-03
Nonroad	Construction	Rubber Tire Roller Compactor	4.18E-02	1.65E-02	1.41E-03	5.36E-05	2.43E-03	2.35E-03
Nonroad	Construction	Bobcat	8.08E-02	8.50E-02	1.58E-02	5.09E-05	1.22E-02	1.18E-02
Nonroad	Construction	Paint Sprayers	1.50E-02	5.96E-03	1.40E-03	8.70E-06	6.83E-04	6.63E-04
Nonroad	Construction	Backhoe	4.43E-02	3.13E-02	5.62E-03	2.59E-05	3.92E-03	3.80E-03
Nonroad	Construction	Sweeper	3.42E-03	8.49E-04	8.52E-05	4.78E-06	1.44E-04	1.40E-04
Nonroad	Construction	Concrete Saws	1.12E-02	1.48E+00	2.90E-02	3.47E-05	7.40E-04	6.81E-04
Nonroad	Construction	Excavator	2.13E-02	8.45E-03	1.37E-03	6.73E-05	1.43E-03	1.38E-03
Nonroad	Construction	Hydraulic Hammer	1.36E-02	5.41E-03	1.27E-03	7.89E-06	6.20E-04	6.01E-04
Nonroad	Construction	Air Compressor	2.05E-02	7.77E-03	9.06E-04	2.01E-05	1.31E-03	1.28E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Standard Bucket Loader	1.53E-02	8.59E-03	2.35E-03	1.39E-05	1.86E-03	1.80E-03
Nonroad	Construction	Bobcat Skid	6.05E-02	6.36E-02	1.19E-02	3.81E-05	9.12E-03	8.85E-03
Nonroad	Construction	Haul Truck	2.65E-02	8.61E-03	1.88E-03	1.69E-04	1.55E-03	1.50E-03
Nonroad	Construction	Backhoe	2.63E-02	1.85E-02	3.33E-03	1.53E-05	2.32E-03	2.25E-03
Nonroad	Construction	Concrete Saws	5.14E-03	6.78E-01	1.32E-02	1.59E-05	3.38E-04	3.11E-04
Nonroad	Construction	Grader	3.26E-02	1.13E-02	7.85E-04	4.71E-05	1.81E-03	1.76E-03
Nonroad	Construction	Water Truck	2.29E-02	7.44E-03	1.63E-03	1.46E-04	1.34E-03	1.30E-03
Nonroad	Construction	Roller Compactor	3.71E-02	1.47E-02	1.25E-03	4.76E-05	2.15E-03	2.09E-03
Nonroad	Construction	Concrete Pumping Truck	2.19E-02	7.12E-03	1.56E-03	1.40E-04	1.28E-03	1.24E-03
Nonroad	Construction	Concrete Paver	2.78E-02	1.07E-02	1.73E-03	7.50E-05	2.57E-03	2.49E-03
Nonroad	Construction	Motorized Trowel	4.14E-02	1.09E-02	1.71E-03	2.49E-05	1.23E-03	1.19E-03
Nonroad	Construction	Asphalt Paver	3.59E-02	1.49E-02	1.14E-03	4.76E-05	2.23E-03	2.16E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Rubber Tire Roller Compactor	3.71E-02	1.47E-02	1.25E-03	4.76E-05	2.15E-03	2.09E-03
Nonroad	Construction	Bobcat	7.17E-02	7.54E-02	1.41E-02	4.52E-05	1.08E-02	1.05E-02
Nonroad	Construction	Paint Sprayers	1.37E-02	5.45E-03	1.28E-03	7.95E-06	6.25E-04	6.06E-04
Nonroad	Construction	Backhoe	4.43E-02	3.13E-02	5.62E-03	2.59E-05	3.92E-03	3.80E-03
Nonroad	Construction	Sweeper	3.42E-03	8.49E-04	8.52E-05	4.78E-06	1.44E-04	1.40E-04
Nonroad	Construction	Concrete Saws	1.03E-02	1.36E+00	2.65E-02	3.17E-05	6.76E-04	6.22E-04
Nonroad	Construction	Excavator	2.13E-02	8.45E-03	1.37E-03	6.73E-05	1.43E-03	1.38E-03
Nonroad	Construction	Hydraulic Hammer	1.36E-02	5.41E-03	1.27E-03	7.89E-06	6.20E-04	6.01E-04
Nonroad	Construction	Air Compressor	2.05E-02	7.77E-03	9.06E-04	2.01E-05	1.31E-03	1.28E-03
Nonroad	Construction	Standard Bucket Loader	1.53E-02	8.59E-03	2.35E-03	1.39E-05	1.86E-03	1.80E-03
Nonroad	Construction	Bobcat Skid	6.05E-02	6.36E-02	1.19E-02	3.81E-05	9.12E-03	8.85E-03
Nonroad	Construction	Haul Truck	2.65E-02	8.61E-03	1.88E-03	1.69E-04	1.55E-03	1.50E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	2.63E-02	1.85E-02	3.33E-03	1.53E-05	2.32E-03	2.25E-03
Nonroad	Construction	Concrete Saws	5.14E-03	6.78E-01	1.32E-02	1.59E-05	3.38E-04	3.11E-04
Nonroad	Construction	Grader	3.26E-02	1.13E-02	7.85E-04	4.71E-05	1.81E-03	1.76E-03
Nonroad	Construction	Water Truck	2.29E-02	7.44E-03	1.63E-03	1.46E-04	1.34E-03	1.30E-03
Nonroad	Construction	Roller Compactor	3.71E-02	1.47E-02	1.25E-03	4.76E-05	2.15E-03	2.09E-03
Nonroad	Construction	Concrete Pumping Truck	2.19E-02	7.12E-03	1.56E-03	1.40E-04	1.28E-03	1.24E-03
Nonroad	Construction	Concrete Paver	2.78E-02	1.07E-02	1.73E-03	7.50E-05	2.57E-03	2.49E-03
Nonroad	Construction	Motorized Trowel	4.14E-02	1.09E-02	1.71E-03	2.49E-05	1.23E-03	1.19E-03
Nonroad	Construction	Asphalt Paver	3.59E-02	1.49E-02	1.14E-03	4.76E-05	2.23E-03	2.16E-03
Nonroad	Construction	Rubber Tire Roller Compactor	3.71E-02	1.47E-02	1.25E-03	4.76E-05	2.15E-03	2.09E-03
Nonroad	Construction	Bobcat	7.17E-02	7.54E-02	1.41E-02	4.52E-05	1.08E-02	1.05E-02
Nonroad	Construction	Paint Sprayers	1.37E-02	5.45E-03	1.28E-03	7.95E-06	6.25E-04	6.06E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	4.43E-02	3.13E-02	5.62E-03	2.59E-05	3.92E-03	3.80E-03
Nonroad	Construction	Sweeper	3.42E-03	8.49E-04	8.52E-05	4.78E-06	1.44E-04	1.40E-04
Nonroad	Construction	Concrete Saws	1.03E-02	1.36E+00	2.65E-02	3.17E-05	6.76E-04	6.22E-04

Table C13. 2023 construction-phase non-road equipment greenhouse gas emissions.

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Excavator	1.29E-04	1.31E-03	2.76E+01	2.79E+01
Nonroad	Construction	Hydraulic Hammer	9.46E-05	8.64E-05	1.81E+00	1.84E+00
Nonroad	Construction	Air Compressor	7.37E-05	3.35E-04	7.03E+00	7.13E+00
Nonroad	Construction	Standard Bucket Loader	2.36E-04	3.68E-04	7.70E+00	7.82E+00
Nonroad	Construction	Bobcat Skid	2.22E-04	2.90E-04	6.06E+00	6.16E+00
Nonroad	Construction	Haul Truck	2.18E-04	5.08E-03	1.07E+02	1.08E+02
Nonroad	Construction	Backhoe	3.49E-04	4.00E-04	8.37E+00	8.51E+00
Nonroad	Construction	Concrete Saws	4.37E-03	2.85E-04	5.87E+00	6.31E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Grader	4.27E-05	5.16E-04	1.08E+01	1.10E+01
Nonroad	Construction	Water Truck	6.98E-05	1.63E-03	3.41E+01	3.46E+01
Nonroad	Construction	Roller Compactor	9.74E-05	7.74E-04	1.62E+01	1.65E+01
Nonroad	Construction	Concrete Pumping Truck	6.69E-05	1.56E-03	3.27E+01	3.31E+01
Nonroad	Construction	Concrete Paver	1.36E-04	1.22E-03	2.56E+01	2.59E+01
Nonroad	Construction	Motorized Trowel	1.20E-04	2.58E-04	5.41E+00	5.49E+00
Nonroad	Construction	Asphalt Paver	9.02E-05	7.74E-04	1.62E+01	1.65E+01
Nonroad	Construction	Rubber Tire Roller Compactor	9.74E-05	7.74E-04	1.62E+01	1.65E+01
Nonroad	Construction	Bobcat	6.59E-04	8.58E-04	1.80E+01	1.82E+01
Nonroad	Construction	Paint Sprayers	1.41E-04	1.29E-04	2.70E+00	2.75E+00
Nonroad	Construction	Backhoe	3.49E-04	4.00E-04	8.37E+00	8.51E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Sweeper	7.56E-06	8.38E-05	1.76E+00	1.78E+00
Nonroad	Construction	Concrete Saws	6.56E-03	4.27E-04	8.80E+00	9.46E+00
Nonroad	Construction	Excavator	1.29E-04	1.31E-03	2.76E+01	2.79E+01
Nonroad	Construction	Hydraulic Hammer	1.26E-04	1.15E-04	2.41E+00	2.46E+00
Nonroad	Construction	Air Compressor	7.37E-05	3.35E-04	7.03E+00	7.13E+00
Nonroad	Construction	Standard Bucket Loader	2.36E-04	3.68E-04	7.70E+00	7.82E+00
Nonroad	Construction	Bobcat Skid	4.45E-04	5.79E-04	1.21E+01	1.23E+01
Nonroad	Construction	Haul Truck	2.18E-04	5.08E-03	1.07E+02	1.08E+02
Nonroad	Construction	Backhoe	3.49E-04	4.00E-04	8.37E+00	8.51E+00
Nonroad	Construction	Concrete Saws	6.56E-03	4.27E-04	8.80E+00	9.46E+00
Nonroad	Construction	Grader	4.27E-05	5.16E-04	1.08E+01	1.10E+01
Nonroad	Construction	Water Truck	6.98E-05	1.63E-03	3.41E+01	3.46E+01
Nonroad	Construction	Roller Compactor	9.74E-05	7.74E-04	1.62E+01	1.65E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Concrete Pumping Truck	6.69E-05	1.56E-03	3.27E+01	3.31E+01
Nonroad	Construction	Concrete Paver	1.36E-04	1.22E-03	2.56E+01	2.59E+01
Nonroad	Construction	Motorized Trowel	1.20E-04	2.58E-04	5.41E+00	5.49E+00
Nonroad	Construction	Asphalt Paver	9.02E-05	7.74E-04	1.62E+01	1.65E+01
Nonroad	Construction	Rubber Tire Roller Compactor	9.74E-05	7.74E-04	1.62E+01	1.65E+01
Nonroad	Construction	Bobcat	6.59E-04	8.58E-04	1.80E+01	1.82E+01
Nonroad	Construction	Paint Sprayers	1.41E-04	1.29E-04	2.70E+00	2.75E+00
Nonroad	Construction	Backhoe	5.18E-04	5.92E-04	1.24E+01	1.26E+01
Nonroad	Construction	Concrete Saws	4.86E-03	3.17E-04	6.52E+00	7.01E+00
Nonroad	Construction	Sweeper	7.56E-06	8.38E-05	1.76E+00	1.78E+00
Nonroad	Construction	Excavator	1.29E-04	1.31E-03	2.76E+01	2.79E+01
Nonroad	Construction	Hydraulic Hammer	1.26E-04	1.15E-04	2.41E+00	2.46E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Air Compressor	7.37E-05	3.35E-04	7.03E+00	7.13E+00
Nonroad	Construction	Standard Bucket Loader	2.36E-04	3.68E-04	7.70E+00	7.82E+00
Nonroad	Construction	Bobcat Skid	4.45E-04	5.79E-04	1.21E+01	1.23E+01
Nonroad	Construction	Haul Truck	2.18E-04	5.08E-03	1.07E+02	1.08E+02
Nonroad	Construction	Backhoe	3.49E-04	4.00E-04	8.37E+00	8.51E+00
Nonroad	Construction	Concrete Saws	6.56E-03	4.27E-04	8.80E+00	9.46E+00
Nonroad	Construction	Grader	6.41E-05	7.74E-04	1.62E+01	1.65E+01
Nonroad	Construction	Water Truck	3.56E-04	8.30E-03	1.74E+02	1.76E+02
Nonroad	Construction	Roller Compactor	3.31E-04	2.63E-03	5.52E+01	5.60E+01
Nonroad	Construction	Concrete Pumping Truck	3.41E-04	7.94E-03	1.67E+02	1.69E+02
Nonroad	Construction	Concrete Paver	1.36E-04	1.22E-03	2.56E+01	2.59E+01
Nonroad	Construction	Motorized Trowel	4.48E-04	9.68E-04	2.03E+01	2.06E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Asphalt Paver	9.02E-05	7.74E-04	1.62E+01	1.65E+01
Nonroad	Construction	Rubber Tire Roller Compactor	9.74E-05	7.74E-04	1.62E+01	1.65E+01
Nonroad	Construction	Bobcat	6.59E-04	8.58E-04	1.80E+01	1.82E+01
Nonroad	Construction	Paint Sprayers	1.41E-04	1.29E-04	2.70E+00	2.75E+00
Nonroad	Construction	Backhoe	1.32E-03	1.51E-03	3.16E+01	3.21E+01
Nonroad	Construction	Concrete Saws	6.56E-03	4.27E-04	8.80E+00	9.46E+00
Nonroad	Construction	Sweeper	7.56E-06	8.38E-05	1.76E+00	1.78E+00
Nonroad	Construction	Excavator	3.65E-04	3.72E-03	7.81E+01	7.91E+01
Nonroad	Construction	Hydraulic Hammer	3.57E-04	3.26E-04	6.84E+00	6.96E+00
Nonroad	Construction	Air Compressor	2.09E-04	9.50E-04	1.99E+01	2.02E+01
Nonroad	Construction	Standard Bucket Loader	4.45E-04	6.94E-04	1.45E+01	1.48E+01
Nonroad	Construction	Bobcat Skid	8.40E-04	1.09E-03	2.29E+01	2.33E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Haul Truck	4.12E-04	9.60E-03	2.01E+02	2.04E+02
Nonroad	Construction	Backhoe	6.60E-04	7.55E-04	1.58E+01	1.61E+01
Nonroad	Construction	Concrete Saws	6.19E-03	4.04E-04	8.32E+00	8.94E+00
Nonroad	Construction	Grader	5.76E-05	6.97E-04	1.46E+01	1.48E+01
Nonroad	Construction	Water Truck	9.43E-05	2.20E-03	4.61E+01	4.67E+01
Nonroad	Construction	Roller Compactor	8.77E-05	6.97E-04	1.46E+01	1.48E+01
Nonroad	Construction	Concrete Pumping Truck	9.03E-05	2.10E-03	4.41E+01	4.47E+01
Nonroad	Construction	Concrete Paver	1.23E-04	1.10E-03	2.30E+01	2.34E+01
Nonroad	Construction	Motorized Trowel	1.61E-04	3.48E-04	7.31E+00	7.42E+00
Nonroad	Construction	Asphalt Paver	8.12E-05	6.97E-04	1.46E+01	1.48E+01
Nonroad	Construction	Rubber Tire Roller Compactor	8.77E-05	6.97E-04	1.46E+01	1.48E+01
Nonroad	Construction	Bobcat	4.45E-04	5.79E-04	1.21E+01	1.23E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Paint Sprayers	1.41E-04	1.29E-04	2.70E+00	2.75E+00
Nonroad	Construction	Backhoe	3.49E-04	4.00E-04	8.37E+00	8.51E+00
Nonroad	Construction	Concrete Saws	6.56E-03	4.27E-04	8.80E+00	9.46E+00
Nonroad	Construction	Sweeper	7.56E-06	8.38E-05	1.76E+00	1.78E+00
Nonroad	Construction	Excavator	2.14E-04	2.19E-03	4.59E+01	4.66E+01
Nonroad	Construction	Hydraulic Hammer	2.10E-04	1.92E-04	4.02E+00	4.09E+00
Nonroad	Construction	Air Compressor	2.09E-04	9.50E-04	1.99E+01	2.02E+01
Nonroad	Construction	Standard Bucket Loader	2.62E-04	4.08E-04	8.56E+00	8.69E+00
Nonroad	Construction	Bobcat Skid	3.53E-04	4.00E-04	8.36E+00	8.50E+00
Nonroad	Construction	Haul Truck	2.42E-04	5.65E-03	1.19E+02	1.20E+02
Nonroad	Construction	Backhoe	3.88E-04	4.44E-04	9.30E+00	9.45E+00
Nonroad	Construction	Concrete Saws	1.10E-04	1.01E-04	2.11E+00	2.15E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Grader	7.70E-05	9.30E-04	1.95E+01	1.98E+01
Nonroad	Construction	Water Truck	1.26E-04	2.93E-03	6.15E+01	6.23E+01
Nonroad	Construction	Roller Compactor	1.17E-04	9.30E-04	1.95E+01	1.98E+01
Nonroad	Construction	Concrete Pumping Truck	1.21E-04	2.81E-03	5.89E+01	5.97E+01
Nonroad	Construction	Concrete Paver	1.64E-04	1.47E-03	3.08E+01	3.12E+01
Nonroad	Construction	Motorized Trowel	2.15E-04	4.65E-04	9.76E+00	9.90E+00
Nonroad	Construction	Asphalt Paver	1.08E-04	9.30E-04	1.95E+01	1.98E+01
Nonroad	Construction	Rubber Tire Roller Compactor	1.17E-04	9.30E-04	1.95E+01	1.98E+01
Nonroad	Construction	Bobcat	5.94E-04	7.73E-04	1.62E+01	1.64E+01
Nonroad	Construction	Paint Sprayers	1.24E-04	1.13E-04	2.37E+00	2.41E+00
Nonroad	Construction	Backhoe	3.49E-04	4.00E-04	8.37E+00	8.51E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Sweeper	7.56E-06	8.38E-05	1.76E+00	1.78E+00
Nonroad	Construction	Concrete Saws	4.25E-03	2.77E-04	5.71E+00	6.13E+00
Nonroad	Construction	Excavator	1.14E-04	1.17E-03	2.45E+01	2.48E+01
Nonroad	Construction	Hydraulic Hammer	1.12E-04	1.02E-04	2.15E+00	2.18E+00
Nonroad	Construction	Air Compressor	7.37E-05	3.35E-04	7.03E+00	7.13E+00
Nonroad	Construction	Standard Bucket Loader	1.40E-04	2.18E-04	4.56E+00	4.64E+00
Nonroad	Construction	Bobcat Skid	4.45E-04	5.79E-04	1.21E+01	1.23E+01
Nonroad	Construction	Haul Truck	1.29E-04	3.01E-03	6.32E+01	6.40E+01
Nonroad	Construction	Backhoe	2.07E-04	2.37E-04	4.96E+00	5.04E+00
Nonroad	Construction	Concrete Saws	1.94E-03	1.27E-04	2.61E+00	2.80E+00
Nonroad	Construction	Grader	6.83E-05	8.26E-04	1.73E+01	1.76E+01
Nonroad	Construction	Water Truck	1.12E-04	2.60E-03	5.46E+01	5.53E+01
Nonroad	Construction	Roller Compactor	1.04E-04	8.26E-04	1.73E+01	1.76E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Concrete Pumping Truck	1.07E-04	2.49E-03	5.23E+01	5.30E+01
Nonroad	Construction	Concrete Paver	1.46E-04	1.30E-03	2.73E+01	2.77E+01
Nonroad	Construction	Motorized Trowel	1.91E-04	4.13E-04	8.66E+00	8.79E+00
Nonroad	Construction	Asphalt Paver	9.63E-05	8.26E-04	1.73E+01	1.76E+01
Nonroad	Construction	Rubber Tire Roller Compactor	1.04E-04	8.26E-04	1.73E+01	1.76E+01
Nonroad	Construction	Bobcat	5.27E-04	6.86E-04	1.44E+01	1.46E+01
Nonroad	Construction	Paint Sprayers	1.13E-04	1.03E-04	2.16E+00	2.20E+00
Nonroad	Construction	Backhoe	3.49E-04	4.00E-04	8.37E+00	8.51E+00
Nonroad	Construction	Sweeper	7.56E-06	8.38E-05	1.76E+00	1.78E+00
Nonroad	Construction	Concrete Saws	3.89E-03	2.53E-04	5.22E+00	5.61E+00
Nonroad	Construction	Excavator	1.14E-04	1.17E-03	2.45E+01	2.48E+01
Nonroad	Construction	Hydraulic Hammer	1.12E-04	1.02E-04	2.15E+00	2.18E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Air Compressor	7.37E-05	3.35E-04	7.03E+00	7.13E+00
Nonroad	Construction	Standard Bucket Loader	1.40E-04	2.18E-04	4.56E+00	4.64E+00
Nonroad	Construction	Bobcat Skid	4.45E-04	5.79E-04	1.21E+01	1.23E+01
Nonroad	Construction	Haul Truck	1.29E-04	3.01E-03	6.32E+01	6.40E+01
Nonroad	Construction	Backhoe	2.07E-04	2.37E-04	4.96E+00	5.04E+00
Nonroad	Construction	Concrete Saws	1.94E-03	1.27E-04	2.61E+00	2.80E+00
Nonroad	Construction	Grader	6.83E-05	8.26E-04	1.73E+01	1.76E+01
Nonroad	Construction	Water Truck	1.12E-04	2.60E-03	5.46E+01	5.53E+01
Nonroad	Construction	Roller Compactor	1.04E-04	8.26E-04	1.73E+01	1.76E+01
Nonroad	Construction	Concrete Pumping Truck	1.07E-04	2.49E-03	5.23E+01	5.30E+01
Nonroad	Construction	Concrete Paver	1.46E-04	1.30E-03	2.73E+01	2.77E+01
Nonroad	Construction	Motorized Trowel	1.91E-04	4.13E-04	8.66E+00	8.79E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Asphalt Paver	9.63E-05	8.26E-04	1.73E+01	1.76E+01
Nonroad	Construction	Rubber Tire Roller Compactor	1.04E-04	8.26E-04	1.73E+01	1.76E+01
Nonroad	Construction	Bobcat	5.27E-04	6.86E-04	1.44E+01	1.46E+01
Nonroad	Construction	Paint Sprayers	1.13E-04	1.03E-04	2.16E+00	2.20E+00
Nonroad	Construction	Backhoe	3.49E-04	4.00E-04	8.37E+00	8.51E+00
Nonroad	Construction	Sweeper	7.56E-06	8.38E-05	1.76E+00	1.78E+00
Nonroad	Construction	Concrete Saws	3.89E-03	2.53E-04	5.22E+00	5.61E+00

Table C14. 2024 construction-phase non-road equipment criteria air pollutant emissions.

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Excavator	1.05E-02	4.13E-03	7.04E-04	3.94E-05	7.11E-04	6.89E-04
Nonroad	Construction	Hydraulic Hammer	6.01E-03	2.39E-03	5.63E-04	3.50E-06	2.74E-04	2.65E-04
Nonroad	Construction	Air Compressor	9.89E-03	3.38E-03	3.93E-04	1.04E-05	5.80E-04	5.62E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Standard Bucket Loader	1.26E-02	7.05E-03	1.92E-03	1.22E-05	1.55E-03	1.50E-03
Nonroad	Construction	Bobcat Skid	1.50E-02	1.56E-02	2.87E-03	9.91E-06	2.22E-03	2.15E-03
Nonroad	Construction	Haul Truck	1.91E-02	5.46E-03	1.40E-03	1.49E-04	9.90E-04	9.60E-04
Nonroad	Construction	Backhoe	2.27E-02	1.54E-02	2.74E-03	1.35E-05	1.91E-03	1.85E-03
Nonroad	Construction	Concrete Saws	6.07E-03	8.01E-01	1.57E-02	1.87E-05	4.00E-04	3.68E-04
Nonroad	Construction	Grader	9.87E-03	2.44E-03	1.83E-04	1.53E-05	4.01E-04	3.89E-04
Nonroad	Construction	Water Truck	6.10E-03	1.75E-03	4.49E-04	4.76E-05	3.17E-04	3.07E-04
Nonroad	Construction	Roller Compactor	1.70E-02	5.97E-03	5.02E-04	2.33E-05	8.92E-04	8.65E-04
Nonroad	Construction	Concrete Pumping Truck	5.84E-03	1.67E-03	4.30E-04	4.56E-05	3.03E-04	2.94E-04
Nonroad	Construction	Concrete Paver	1.12E-02	4.44E-03	6.96E-04	3.66E-05	1.07E-03	1.04E-03
Nonroad	Construction	Motorized Trowel	1.33E-02	3.12E-03	5.00E-04	8.03E-06	3.36E-04	3.26E-04
Nonroad	Construction	Asphalt Paver	1.63E-02	5.98E-03	4.45E-04	2.32E-05	9.21E-04	8.93E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Rubber Tire Roller Compactor	1.70E-02	5.97E-03	5.02E-04	2.33E-05	8.92E-04	8.65E-04
Nonroad	Construction	Bobcat	4.46E-02	4.63E-02	8.49E-03	2.94E-05	6.58E-03	6.38E-03
Nonroad	Construction	Paint Sprayers	8.98E-03	3.57E-03	8.40E-04	5.22E-06	4.09E-04	3.96E-04
Nonroad	Construction	Backhoe	2.27E-02	1.54E-02	2.74E-03	1.35E-05	1.91E-03	1.85E-03
Nonroad	Construction	Sweeper	1.65E-03	3.16E-04	3.26E-05	2.48E-06	5.45E-05	5.29E-05
Nonroad	Construction	Concrete Saws	9.11E-03	1.20E+00	2.35E-02	2.81E-05	6.00E-04	5.52E-04
Nonroad	Construction	Excavator	1.05E-02	4.13E-03	7.04E-04	3.94E-05	7.11E-04	6.89E-04
Nonroad	Construction	Hydraulic Hammer	8.02E-03	3.19E-03	7.50E-04	4.66E-06	3.65E-04	3.54E-04
Nonroad	Construction	Air Compressor	9.89E-03	3.38E-03	3.93E-04	1.04E-05	5.80E-04	5.62E-04
Nonroad	Construction	Standard Bucket Loader	1.26E-02	7.05E-03	1.92E-03	1.22E-05	1.55E-03	1.50E-03
Nonroad	Construction	Bobcat Skid	3.01E-02	3.12E-02	5.73E-03	1.98E-05	4.44E-03	4.31E-03
Nonroad	Construction	Haul Truck	1.91E-02	5.46E-03	1.40E-03	1.49E-04	9.90E-04	9.60E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	2.27E-02	1.54E-02	2.74E-03	1.35E-05	1.91E-03	1.85E-03
Nonroad	Construction	Concrete Saws	9.11E-03	1.20E+00	2.35E-02	2.81E-05	6.00E-04	5.52E-04
Nonroad	Construction	Grader	9.87E-03	2.44E-03	1.83E-04	1.53E-05	4.01E-04	3.89E-04
Nonroad	Construction	Water Truck	6.10E-03	1.75E-03	4.49E-04	4.76E-05	3.17E-04	3.07E-04
Nonroad	Construction	Roller Compactor	1.70E-02	5.97E-03	5.02E-04	2.33E-05	8.92E-04	8.65E-04
Nonroad	Construction	Concrete Pumping Truck	5.84E-03	1.67E-03	4.30E-04	4.56E-05	3.03E-04	2.94E-04
Nonroad	Construction	Concrete Paver	1.12E-02	4.44E-03	6.96E-04	3.66E-05	1.07E-03	1.04E-03
Nonroad	Construction	Motorized Trowel	1.33E-02	3.12E-03	5.00E-04	8.03E-06	3.36E-04	3.26E-04
Nonroad	Construction	Asphalt Paver	1.63E-02	5.98E-03	4.45E-04	2.32E-05	9.21E-04	8.93E-04
Nonroad	Construction	Rubber Tire Roller Compactor	1.70E-02	5.97E-03	5.02E-04	2.33E-05	8.92E-04	8.65E-04
Nonroad	Construction	Bobcat	4.46E-02	4.63E-02	8.49E-03	2.94E-05	6.58E-03	6.38E-03
Nonroad	Construction	Paint Sprayers	8.98E-03	3.57E-03	8.40E-04	5.22E-06	4.09E-04	3.96E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	3.37E-02	2.28E-02	4.06E-03	2.00E-05	2.83E-03	2.75E-03
Nonroad	Construction	Concrete Saws	6.75E-03	8.90E-01	1.74E-02	2.08E-05	4.44E-04	4.09E-04
Nonroad	Construction	Sweeper	1.65E-03	3.16E-04	3.26E-05	2.48E-06	5.45E-05	5.29E-05
Nonroad	Construction	Excavator	1.05E-02	4.13E-03	7.04E-04	3.94E-05	7.11E-04	6.89E-04
Nonroad	Construction	Hydraulic Hammer	8.02E-03	3.19E-03	7.50E-04	4.66E-06	3.65E-04	3.54E-04
Nonroad	Construction	Air Compressor	9.89E-03	3.38E-03	3.93E-04	1.04E-05	5.80E-04	5.62E-04
Nonroad	Construction	Standard Bucket Loader	1.26E-02	7.05E-03	1.92E-03	1.22E-05	1.55E-03	1.50E-03
Nonroad	Construction	Bobcat Skid	3.01E-02	3.12E-02	5.73E-03	1.98E-05	4.44E-03	4.31E-03
Nonroad	Construction	Haul Truck	1.91E-02	5.46E-03	1.40E-03	1.49E-04	9.90E-04	9.60E-04
Nonroad	Construction	Backhoe	2.27E-02	1.54E-02	2.74E-03	1.35E-05	1.91E-03	1.85E-03
Nonroad	Construction	Concrete Saws	9.11E-03	1.20E+00	2.35E-02	2.81E-05	6.00E-04	5.52E-04
Nonroad	Construction	Grader	1.48E-02	3.66E-03	2.75E-04	2.29E-05	6.02E-04	5.84E-04
Nonroad	Construction	Water Truck	3.11E-02	8.91E-03	2.29E-03	2.43E-04	1.62E-03	1.57E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Roller Compactor	5.78E-02	2.03E-02	1.71E-03	7.91E-05	3.03E-03	2.94E-03
Nonroad	Construction	Concrete Pumping Truck	2.98E-02	8.53E-03	2.19E-03	2.32E-04	1.55E-03	1.50E-03
Nonroad	Construction	Concrete Paver	1.12E-02	4.44E-03	6.96E-04	3.66E-05	1.07E-03	1.04E-03
Nonroad	Construction	Motorized Trowel	4.99E-02	1.17E-02	1.88E-03	3.01E-05	1.26E-03	1.22E-03
Nonroad	Construction	Asphalt Paver	1.63E-02	5.98E-03	4.45E-04	2.32E-05	9.21E-04	8.93E-04
Nonroad	Construction	Rubber Tire Roller Compactor	1.70E-02	5.97E-03	5.02E-04	2.33E-05	8.92E-04	8.65E-04
Nonroad	Construction	Bobcat	4.46E-02	4.63E-02	8.49E-03	2.94E-05	6.58E-03	6.38E-03
Nonroad	Construction	Paint Sprayers	8.98E-03	3.57E-03	8.40E-04	5.22E-06	4.09E-04	3.96E-04
Nonroad	Construction	Backhoe	8.58E-02	5.80E-02	1.03E-02	5.09E-05	7.22E-03	7.00E-03
Nonroad	Construction	Concrete Saws	9.11E-03	1.20E+00	2.35E-02	2.81E-05	6.00E-04	5.52E-04
Nonroad	Construction	Sweeper	1.65E-03	3.16E-04	3.26E-05	2.48E-06	5.45E-05	5.29E-05
Nonroad	Construction	Excavator	2.98E-02	1.17E-02	1.99E-03	1.12E-04	2.01E-03	1.95E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Hydraulic Hammer	2.27E-02	9.03E-03	2.13E-03	1.32E-05	1.03E-03	1.00E-03
Nonroad	Construction	Air Compressor	2.80E-02	9.59E-03	1.11E-03	2.94E-05	1.64E-03	1.59E-03
Nonroad	Construction	Standard Bucket Loader	2.38E-02	1.33E-02	3.62E-03	2.31E-05	2.93E-03	2.84E-03
Nonroad	Construction	Bobcat Skid	5.68E-02	5.90E-02	1.08E-02	3.74E-05	8.39E-03	8.14E-03
Nonroad	Construction	Haul Truck	3.60E-02	1.03E-02	2.65E-03	2.81E-04	1.87E-03	1.81E-03
Nonroad	Construction	Backhoe	4.29E-02	2.90E-02	5.17E-03	2.54E-05	3.61E-03	3.50E-03
Nonroad	Construction	Concrete Saws	8.61E-03	1.13E+00	2.22E-02	2.65E-05	5.66E-04	5.21E-04
Nonroad	Construction	Grader	1.33E-02	3.30E-03	2.47E-04	2.06E-05	5.42E-04	5.26E-04
Nonroad	Construction	Water Truck	8.24E-03	2.36E-03	6.06E-04	6.43E-05	4.28E-04	4.15E-04
Nonroad	Construction	Roller Compactor	1.53E-02	5.38E-03	4.52E-04	2.09E-05	8.02E-04	7.78E-04
Nonroad	Construction	Concrete Pumping Truck	7.89E-03	2.26E-03	5.80E-04	6.15E-05	4.09E-04	3.97E-04
Nonroad	Construction	Concrete Paver	1.01E-02	3.99E-03	6.27E-04	3.30E-05	9.67E-04	9.38E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Motorized Trowel	1.80E-02	4.21E-03	6.75E-04	1.08E-05	4.54E-04	4.40E-04
Nonroad	Construction	Asphalt Paver	1.47E-02	5.38E-03	4.01E-04	2.09E-05	8.29E-04	8.04E-04
Nonroad	Construction	Rubber Tire Roller Compactor	1.53E-02	5.38E-03	4.52E-04	2.09E-05	8.02E-04	7.78E-04
Nonroad	Construction	Bobcat	3.01E-02	3.12E-02	5.73E-03	1.98E-05	4.44E-03	4.31E-03
Nonroad	Construction	Paint Sprayers	8.98E-03	3.57E-03	8.40E-04	5.22E-06	4.09E-04	3.96E-04
Nonroad	Construction	Backhoe	2.27E-02	1.54E-02	2.74E-03	1.35E-05	1.91E-03	1.85E-03
Nonroad	Construction	Concrete Saws	9.11E-03	1.20E+00	2.35E-02	2.81E-05	6.00E-04	5.52E-04
Nonroad	Construction	Sweeper	1.65E-03	3.16E-04	3.26E-05	2.48E-06	5.45E-05	5.29E-05
Nonroad	Construction	Excavator	1.75E-02	6.89E-03	1.17E-03	6.57E-05	1.18E-03	1.15E-03
Nonroad	Construction	Hydraulic Hammer	1.34E-02	5.31E-03	1.25E-03	7.77E-06	6.08E-04	5.90E-04
Nonroad	Construction	Air Compressor	2.80E-02	9.59E-03	1.11E-03	2.94E-05	1.64E-03	1.59E-03
Nonroad	Construction	Standard Bucket Loader	1.40E-02	7.84E-03	2.13E-03	1.36E-05	1.72E-03	1.67E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Bobcat Skid	2.60E-02	2.08E-02	4.09E-03	1.38E-05	2.89E-03	2.80E-03
Nonroad	Construction	Haul Truck	2.12E-02	6.07E-03	1.56E-03	1.65E-04	1.10E-03	1.07E-03
Nonroad	Construction	Backhoe	2.52E-02	1.71E-02	3.04E-03	1.50E-05	2.12E-03	2.06E-03
Nonroad	Construction	Concrete Saws	7.01E-03	2.78E-03	6.56E-04	4.07E-06	3.19E-04	3.09E-04
Nonroad	Construction	Grader	1.78E-02	4.40E-03	3.30E-04	2.75E-05	7.23E-04	7.02E-04
Nonroad	Construction	Water Truck	1.10E-02	3.15E-03	8.09E-04	8.58E-05	5.71E-04	5.54E-04
Nonroad	Construction	Roller Compactor	2.04E-02	7.18E-03	6.03E-04	2.79E-05	1.07E-03	1.04E-03
Nonroad	Construction	Concrete Pumping Truck	1.05E-02	3.01E-03	7.74E-04	8.21E-05	5.47E-04	5.30E-04
Nonroad	Construction	Concrete Paver	1.35E-02	5.33E-03	8.37E-04	4.40E-05	1.29E-03	1.25E-03
Nonroad	Construction	Motorized Trowel	2.40E-02	5.63E-03	9.02E-04	1.45E-05	6.06E-04	5.88E-04
Nonroad	Construction	Asphalt Paver	1.96E-02	7.18E-03	5.35E-04	2.79E-05	1.11E-03	1.07E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Rubber Tire Roller Compactor	2.04E-02	7.18E-03	6.03E-04	2.79E-05	1.07E-03	1.04E-03
Nonroad	Construction	Bobcat	4.02E-02	4.17E-02	7.65E-03	2.65E-05	5.93E-03	5.75E-03
Nonroad	Construction	Paint Sprayers	7.86E-03	3.12E-03	7.35E-04	4.57E-06	3.58E-04	3.47E-04
Nonroad	Construction	Backhoe	2.27E-02	1.54E-02	2.74E-03	1.35E-05	1.91E-03	1.85E-03
Nonroad	Construction	Sweeper	1.65E-03	3.16E-04	3.26E-05	2.48E-06	5.45E-05	5.29E-05
Nonroad	Construction	Concrete Saws	5.91E-03	7.79E-01	1.52E-02	1.82E-05	3.89E-04	3.58E-04
Nonroad	Construction	Excavator	9.35E-03	3.67E-03	6.26E-04	3.51E-05	6.32E-04	6.13E-04
Nonroad	Construction	Hydraulic Hammer	7.13E-03	2.83E-03	6.67E-04	4.14E-06	3.24E-04	3.15E-04
Nonroad	Construction	Air Compressor	9.89E-03	3.38E-03	3.93E-04	1.04E-05	5.80E-04	5.62E-04
Nonroad	Construction	Standard Bucket Loader	7.46E-03	4.18E-03	1.14E-03	7.24E-06	9.19E-04	8.92E-04
Nonroad	Construction	Bobcat Skid	3.01E-02	3.12E-02	5.73E-03	1.98E-05	4.44E-03	4.31E-03
Nonroad	Construction	Haul Truck	1.13E-02	3.23E-03	8.31E-04	8.81E-05	5.87E-04	5.69E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	1.35E-02	9.10E-03	1.62E-03	7.98E-06	1.13E-03	1.10E-03
Nonroad	Construction	Concrete Saws	2.70E-03	3.56E-01	6.96E-03	8.33E-06	1.78E-04	1.63E-04
Nonroad	Construction	Grader	1.58E-02	3.91E-03	2.93E-04	2.44E-05	6.42E-04	6.23E-04
Nonroad	Construction	Water Truck	9.77E-03	2.80E-03	7.18E-04	7.62E-05	5.07E-04	4.92E-04
Nonroad	Construction	Roller Compactor	1.81E-02	6.37E-03	5.35E-04	2.48E-05	9.51E-04	9.22E-04
Nonroad	Construction	Concrete Pumping Truck	9.35E-03	2.68E-03	6.87E-04	7.29E-05	4.85E-04	4.71E-04
Nonroad	Construction	Concrete Paver	1.20E-02	4.73E-03	7.43E-04	3.91E-05	1.15E-03	1.11E-03
Nonroad	Construction	Motorized Trowel	2.13E-02	4.99E-03	8.01E-04	1.28E-05	5.38E-04	5.22E-04
Nonroad	Construction	Asphalt Paver	1.74E-02	6.38E-03	4.75E-04	2.48E-05	9.82E-04	9.53E-04
Nonroad	Construction	Rubber Tire Roller Compactor	1.81E-02	6.37E-03	5.35E-04	2.48E-05	9.51E-04	9.22E-04
Nonroad	Construction	Bobcat	3.57E-02	3.70E-02	6.79E-03	2.35E-05	5.27E-03	5.11E-03
Nonroad	Construction	Paint Sprayers	7.18E-03	2.85E-03	6.72E-04	4.18E-06	3.27E-04	3.17E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Backhoe	2.27E-02	1.54E-02	2.74E-03	1.35E-05	1.91E-03	1.85E-03
Nonroad	Construction	Sweeper	1.65E-03	3.16E-04	3.26E-05	2.48E-06	5.45E-05	5.29E-05
Nonroad	Construction	Concrete Saws	5.40E-03	7.12E-01	1.39E-02	1.67E-05	3.55E-04	3.27E-04
Nonroad	Construction	Excavator	9.35E-03	3.67E-03	6.26E-04	3.51E-05	6.32E-04	6.13E-04
Nonroad	Construction	Hydraulic Hammer	7.13E-03	2.83E-03	6.67E-04	4.14E-06	3.24E-04	3.15E-04
Nonroad	Construction	Air Compressor	9.89E-03	3.38E-03	3.93E-04	1.04E-05	5.80E-04	5.62E-04
Nonroad	Construction	Standard Bucket Loader	7.46E-03	4.18E-03	1.14E-03	7.24E-06	9.19E-04	8.92E-04
Nonroad	Construction	Bobcat Skid	3.01E-02	3.12E-02	5.73E-03	1.98E-05	4.44E-03	4.31E-03
Nonroad	Construction	Haul Truck	1.13E-02	3.23E-03	8.31E-04	8.81E-05	5.87E-04	5.69E-04
Nonroad	Construction	Backhoe	1.35E-02	9.10E-03	1.62E-03	7.98E-06	1.13E-03	1.10E-03
Nonroad	Construction	Concrete Saws	2.70E-03	3.56E-01	6.96E-03	8.33E-06	1.78E-04	1.63E-04
Nonroad	Construction	Grader	1.58E-02	3.91E-03	2.93E-04	2.44E-05	6.42E-04	6.23E-04
Nonroad	Construction	Water Truck	9.77E-03	2.80E-03	7.18E-04	7.62E-05	5.07E-04	4.92E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Roller Compactor	1.81E-02	6.37E-03	5.35E-04	2.48E-05	9.51E-04	9.22E-04
Nonroad	Construction	Concrete Pumping Truck	9.35E-03	2.68E-03	6.87E-04	7.29E-05	4.85E-04	4.71E-04
Nonroad	Construction	Concrete Paver	1.20E-02	4.73E-03	7.43E-04	3.91E-05	1.15E-03	1.11E-03
Nonroad	Construction	Motorized Trowel	2.13E-02	4.99E-03	8.01E-04	1.28E-05	5.38E-04	5.22E-04
Nonroad	Construction	Asphalt Paver	1.74E-02	6.38E-03	4.75E-04	2.48E-05	9.82E-04	9.53E-04
Nonroad	Construction	Rubber Tire Roller Compactor	1.81E-02	6.37E-03	5.35E-04	2.48E-05	9.51E-04	9.22E-04
Nonroad	Construction	Bobcat	3.57E-02	3.70E-02	6.79E-03	2.35E-05	5.27E-03	5.11E-03
Nonroad	Construction	Paint Sprayers	7.18E-03	2.85E-03	6.72E-04	4.18E-06	3.27E-04	3.17E-04
Nonroad	Construction	Backhoe	2.27E-02	1.54E-02	2.74E-03	1.35E-05	1.91E-03	1.85E-03
Nonroad	Construction	Sweeper	1.65E-03	3.16E-04	3.26E-05	2.48E-06	5.45E-05	5.29E-05
Nonroad	Construction	Concrete Saws	5.40E-03	7.12E-01	1.39E-02	1.67E-05	3.55E-04	3.27E-04

Table C15. 2024 construction-phase non-road equipment greenhouse gas emissions.

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Excavator	5.56E-05	6.90E-04	1.45E+01	1.47E+01
Nonroad	Construction	Hydraulic Hammer	4.96E-05	4.54E-05	9.51E-01	9.67E-01
Nonroad	Construction	Air Compressor	3.29E-05	1.76E-04	3.69E+00	3.75E+00
Nonroad	Construction	Standard Bucket Loader	1.17E-04	1.93E-04	4.05E+00	4.11E+00
Nonroad	Construction	Bobcat Skid	1.12E-04	1.52E-04	3.18E+00	3.23E+00
Nonroad	Construction	Haul Truck	8.57E-05	2.67E-03	5.60E+01	5.68E+01
Nonroad	Construction	Backhoe	1.77E-04	2.10E-04	4.40E+00	4.47E+00
Nonroad	Construction	Concrete Saws	2.30E-03	1.50E-04	3.08E+00	3.31E+00
Nonroad	Construction	Grader	1.57E-05	2.71E-04	5.69E+00	5.76E+00
Nonroad	Construction	Water Truck	2.74E-05	8.54E-04	1.79E+01	1.82E+01
Nonroad	Construction	Roller Compactor	4.16E-05	4.07E-04	8.53E+00	8.65E+00
Nonroad	Construction	Concrete Pumping Truck	2.62E-05	8.18E-04	1.72E+01	1.74E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Concrete Paver	5.80E-05	6.41E-04	1.34E+01	1.36E+01
Nonroad	Construction	Motorized Trowel	5.96E-05	1.36E-04	2.84E+00	2.89E+00
Nonroad	Construction	Asphalt Paver	3.74E-05	4.07E-04	8.53E+00	8.65E+00
Nonroad	Construction	Rubber Tire Roller Compactor	4.16E-05	4.07E-04	8.53E+00	8.65E+00
Nonroad	Construction	Bobcat	3.33E-04	4.51E-04	9.43E+00	9.58E+00
Nonroad	Construction	Paint Sprayers	7.41E-05	6.78E-05	1.42E+00	1.44E+00
Nonroad	Construction	Backhoe	1.77E-04	2.10E-04	4.40E+00	4.47E+00
Nonroad	Construction	Sweeper	2.84E-06	4.40E-05	9.24E-01	9.36E-01
Nonroad	Construction	Concrete Saws	3.44E-03	2.24E-04	4.62E+00	4.97E+00
Nonroad	Construction	Excavator	5.56E-05	6.90E-04	1.45E+01	1.47E+01
Nonroad	Construction	Hydraulic Hammer	6.61E-05	6.05E-05	1.27E+00	1.29E+00
Nonroad	Construction	Air Compressor	3.29E-05	1.76E-04	3.69E+00	3.75E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Standard Bucket Loader	1.17E-04	1.93E-04	4.05E+00	4.11E+00
Nonroad	Construction	Bobcat Skid	2.25E-04	3.04E-04	6.37E+00	6.47E+00
Nonroad	Construction	Haul Truck	8.57E-05	2.67E-03	5.60E+01	5.68E+01
Nonroad	Construction	Backhoe	1.77E-04	2.10E-04	4.40E+00	4.47E+00
Nonroad	Construction	Concrete Saws	3.44E-03	2.24E-04	4.62E+00	4.97E+00
Nonroad	Construction	Grader	1.57E-05	2.71E-04	5.69E+00	5.76E+00
Nonroad	Construction	Water Truck	2.74E-05	8.54E-04	1.79E+01	1.82E+01
Nonroad	Construction	Roller Compactor	4.16E-05	4.07E-04	8.53E+00	8.65E+00
Nonroad	Construction	Concrete Pumping Truck	2.62E-05	8.18E-04	1.72E+01	1.74E+01
Nonroad	Construction	Concrete Paver	5.80E-05	6.41E-04	1.34E+01	1.36E+01
Nonroad	Construction	Motorized Trowel	5.96E-05	1.36E-04	2.84E+00	2.89E+00
Nonroad	Construction	Asphalt Paver	3.74E-05	4.07E-04	8.53E+00	8.65E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Rubber Tire Roller Compactor	4.16E-05	4.07E-04	8.53E+00	8.65E+00
Nonroad	Construction	Bobcat	3.33E-04	4.51E-04	9.43E+00	9.58E+00
Nonroad	Construction	Paint Sprayers	7.41E-05	6.78E-05	1.42E+00	1.44E+00
Nonroad	Construction	Backhoe	2.62E-04	3.11E-04	6.51E+00	6.62E+00
Nonroad	Construction	Concrete Saws	2.55E-03	1.66E-04	3.43E+00	3.68E+00
Nonroad	Construction	Sweeper	2.84E-06	4.40E-05	9.24E-01	9.36E-01
Nonroad	Construction	Excavator	5.56E-05	6.90E-04	1.45E+01	1.47E+01
Nonroad	Construction	Hydraulic Hammer	6.61E-05	6.05E-05	1.27E+00	1.29E+00
Nonroad	Construction	Air Compressor	3.29E-05	1.76E-04	3.69E+00	3.75E+00
Nonroad	Construction	Standard Bucket Loader	1.17E-04	1.93E-04	4.05E+00	4.11E+00
Nonroad	Construction	Bobcat Skid	2.25E-04	3.04E-04	6.37E+00	6.47E+00
Nonroad	Construction	Haul Truck	8.57E-05	2.67E-03	5.60E+01	5.68E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	1.77E-04	2.10E-04	4.40E+00	4.47E+00
Nonroad	Construction	Concrete Saws	3.44E-03	2.24E-04	4.62E+00	4.97E+00
Nonroad	Construction	Grader	2.36E-05	4.07E-04	8.53E+00	8.65E+00
Nonroad	Construction	Water Truck	1.40E-04	4.36E-03	9.14E+01	9.26E+01
Nonroad	Construction	Roller Compactor	1.41E-04	1.38E-03	2.90E+01	2.94E+01
Nonroad	Construction	Concrete Pumping Truck	1.34E-04	4.17E-03	8.75E+01	8.87E+01
Nonroad	Construction	Concrete Paver	5.80E-05	6.41E-04	1.34E+01	1.36E+01
Nonroad	Construction	Motorized Trowel	2.23E-04	5.08E-04	1.07E+01	1.08E+01
Nonroad	Construction	Asphalt Paver	3.74E-05	4.07E-04	8.53E+00	8.65E+00
Nonroad	Construction	Rubber Tire Roller Compactor	4.16E-05	4.07E-04	8.53E+00	8.65E+00
Nonroad	Construction	Bobcat	3.33E-04	4.51E-04	9.43E+00	9.58E+00
Nonroad	Construction	Paint Sprayers	7.41E-05	6.78E-05	1.42E+00	1.44E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	6.69E-04	7.93E-04	1.66E+01	1.69E+01
Nonroad	Construction	Concrete Saws	3.44E-03	2.24E-04	4.62E+00	4.97E+00
Nonroad	Construction	Sweeper	2.84E-06	4.40E-05	9.24E-01	9.36E-01
Nonroad	Construction	Excavator	1.58E-04	1.95E-03	4.10E+01	4.16E+01
Nonroad	Construction	Hydraulic Hammer	1.87E-04	1.71E-04	3.59E+00	3.65E+00
Nonroad	Construction	Air Compressor	9.31E-05	4.99E-04	1.05E+01	1.06E+01
Nonroad	Construction	Standard Bucket Loader	2.22E-04	3.65E-04	7.64E+00	7.76E+00
Nonroad	Construction	Bobcat Skid	4.24E-04	5.75E-04	1.20E+01	1.22E+01
Nonroad	Construction	Haul Truck	1.62E-04	5.04E-03	1.06E+02	1.07E+02
Nonroad	Construction	Backhoe	3.35E-04	3.96E-04	8.30E+00	8.44E+00
Nonroad	Construction	Concrete Saws	3.25E-03	2.12E-04	4.37E+00	4.69E+00
Nonroad	Construction	Grader	2.12E-05	3.66E-04	7.68E+00	7.78E+00
Nonroad	Construction	Water Truck	3.70E-05	1.15E-03	2.42E+01	2.45E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Roller Compactor	3.74E-05	3.66E-04	7.68E+00	7.78E+00
Nonroad	Construction	Concrete Pumping Truck	3.54E-05	1.10E-03	2.32E+01	2.35E+01
Nonroad	Construction	Concrete Paver	5.22E-05	5.77E-04	1.21E+01	1.23E+01
Nonroad	Construction	Motorized Trowel	8.04E-05	1.83E-04	3.84E+00	3.89E+00
Nonroad	Construction	Asphalt Paver	3.37E-05	3.66E-04	7.68E+00	7.78E+00
Nonroad	Construction	Rubber Tire Roller Compactor	3.74E-05	3.66E-04	7.68E+00	7.78E+00
Nonroad	Construction	Bobcat	2.25E-04	3.04E-04	6.37E+00	6.47E+00
Nonroad	Construction	Paint Sprayers	7.41E-05	6.78E-05	1.42E+00	1.44E+00
Nonroad	Construction	Backhoe	1.77E-04	2.10E-04	4.40E+00	4.47E+00
Nonroad	Construction	Concrete Saws	3.44E-03	2.24E-04	4.62E+00	4.97E+00
Nonroad	Construction	Sweeper	2.84E-06	4.40E-05	9.24E-01	9.36E-01
Nonroad	Construction	Excavator	9.27E-05	1.15E-03	2.41E+01	2.44E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Hydraulic Hammer	1.10E-04	1.01E-04	2.11E+00	2.15E+00
Nonroad	Construction	Air Compressor	9.31E-05	4.99E-04	1.05E+01	1.06E+01
Nonroad	Construction	Standard Bucket Loader	1.30E-04	2.14E-04	4.50E+00	4.56E+00
Nonroad	Construction	Bobcat Skid	1.81E-04	2.10E-04	4.39E+00	4.46E+00
Nonroad	Construction	Haul Truck	9.52E-05	2.97E-03	6.22E+01	6.31E+01
Nonroad	Construction	Backhoe	1.97E-04	2.33E-04	4.89E+00	4.97E+00
Nonroad	Construction	Concrete Saws	5.78E-05	5.29E-05	1.11E+00	1.13E+00
Nonroad	Construction	Grader	2.84E-05	4.89E-04	1.03E+01	1.04E+01
Nonroad	Construction	Water Truck	4.94E-05	1.54E-03	3.23E+01	3.27E+01
Nonroad	Construction	Roller Compactor	5.00E-05	4.89E-04	1.03E+01	1.04E+01
Nonroad	Construction	Concrete Pumping Truck	4.73E-05	1.47E-03	3.09E+01	3.13E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Concrete Paver	6.97E-05	7.70E-04	1.62E+01	1.64E+01
Nonroad	Construction	Motorized Trowel	1.07E-04	2.44E-04	5.12E+00	5.20E+00
Nonroad	Construction	Asphalt Paver	4.49E-05	4.89E-04	1.03E+01	1.04E+01
Nonroad	Construction	Rubber Tire Roller Compactor	5.00E-05	4.89E-04	1.03E+01	1.04E+01
Nonroad	Construction	Bobcat	3.00E-04	4.06E-04	8.50E+00	8.64E+00
Nonroad	Construction	Paint Sprayers	6.48E-05	5.93E-05	1.24E+00	1.26E+00
Nonroad	Construction	Backhoe	1.77E-04	2.10E-04	4.40E+00	4.47E+00
Nonroad	Construction	Sweeper	2.84E-06	4.40E-05	9.24E-01	9.36E-01
Nonroad	Construction	Concrete Saws	2.23E-03	1.45E-04	3.00E+00	3.22E+00
Nonroad	Construction	Excavator	4.94E-05	6.13E-04	1.29E+01	1.30E+01
Nonroad	Construction	Hydraulic Hammer	5.88E-05	5.38E-05	1.13E+00	1.15E+00
Nonroad	Construction	Air Compressor	3.29E-05	1.76E-04	3.69E+00	3.75E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Standard Bucket Loader	6.96E-05	1.14E-04	2.40E+00	2.43E+00
Nonroad	Construction	Bobcat Skid	2.25E-04	3.04E-04	6.37E+00	6.47E+00
Nonroad	Construction	Haul Truck	5.08E-05	1.58E-03	3.32E+01	3.36E+01
Nonroad	Construction	Backhoe	1.05E-04	1.24E-04	2.61E+00	2.65E+00
Nonroad	Construction	Concrete Saws	1.02E-03	6.65E-05	1.37E+00	1.47E+00
Nonroad	Construction	Grader	2.52E-05	4.34E-04	9.10E+00	9.22E+00
Nonroad	Construction	Water Truck	4.39E-05	1.37E-03	2.87E+01	2.91E+01
Nonroad	Construction	Roller Compactor	4.44E-05	4.34E-04	9.10E+00	9.22E+00
Nonroad	Construction	Concrete Pumping Truck	4.20E-05	1.31E-03	2.75E+01	2.78E+01
Nonroad	Construction	Concrete Paver	6.18E-05	6.84E-04	1.43E+01	1.45E+01
Nonroad	Construction	Motorized Trowel	9.53E-05	2.17E-04	4.55E+00	4.62E+00
Nonroad	Construction	Asphalt Paver	3.99E-05	4.34E-04	9.10E+00	9.22E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Rubber Tire Roller Compactor	4.44E-05	4.34E-04	9.10E+00	9.22E+00
Nonroad	Construction	Bobcat	2.66E-04	3.60E-04	7.55E+00	7.67E+00
Nonroad	Construction	Paint Sprayers	5.92E-05	5.42E-05	1.14E+00	1.16E+00
Nonroad	Construction	Backhoe	1.77E-04	2.10E-04	4.40E+00	4.47E+00
Nonroad	Construction	Sweeper	2.84E-06	4.40E-05	9.24E-01	9.36E-01
Nonroad	Construction	Concrete Saws	2.04E-03	1.33E-04	2.74E+00	2.94E+00
Nonroad	Construction	Excavator	4.94E-05	6.13E-04	1.29E+01	1.30E+01
Nonroad	Construction	Hydraulic Hammer	5.88E-05	5.38E-05	1.13E+00	1.15E+00
Nonroad	Construction	Air Compressor	3.29E-05	1.76E-04	3.69E+00	3.75E+00
Nonroad	Construction	Standard Bucket Loader	6.96E-05	1.14E-04	2.40E+00	2.43E+00
Nonroad	Construction	Bobcat Skid	2.25E-04	3.04E-04	6.37E+00	6.47E+00
Nonroad	Construction	Haul Truck	5.08E-05	1.58E-03	3.32E+01	3.36E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	1.05E-04	1.24E-04	2.61E+00	2.65E+00
Nonroad	Construction	Concrete Saws	1.02E-03	6.65E-05	1.37E+00	1.47E+00
Nonroad	Construction	Grader	2.52E-05	4.34E-04	9.10E+00	9.22E+00
Nonroad	Construction	Water Truck	4.39E-05	1.37E-03	2.87E+01	2.91E+01
Nonroad	Construction	Roller Compactor	4.44E-05	4.34E-04	9.10E+00	9.22E+00
Nonroad	Construction	Concrete Pumping Truck	4.20E-05	1.31E-03	2.75E+01	2.78E+01
Nonroad	Construction	Concrete Paver	6.18E-05	6.84E-04	1.43E+01	1.45E+01
Nonroad	Construction	Motorized Trowel	9.53E-05	2.17E-04	4.55E+00	4.62E+00
Nonroad	Construction	Asphalt Paver	3.99E-05	4.34E-04	9.10E+00	9.22E+00
Nonroad	Construction	Rubber Tire Roller Compactor	4.44E-05	4.34E-04	9.10E+00	9.22E+00
Nonroad	Construction	Bobcat	2.66E-04	3.60E-04	7.55E+00	7.67E+00
Nonroad	Construction	Paint Sprayers	5.92E-05	5.42E-05	1.14E+00	1.16E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	1.77E-04	2.10E-04	4.40E+00	4.47E+00
Nonroad	Construction	Sweeper	2.84E-06	4.40E-05	9.24E-01	9.36E-01
Nonroad	Construction	Concrete Saws	2.04E-03	1.33E-04	2.74E+00	2.94E+00

Table C16. 2025 construction-phase non-road equipment criteria air pollutant emissions.

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Excavator	1.32E-03	5.03E-04	9.08E-05	5.82E-06	8.80E-05	8.53E-05
Nonroad	Construction	Hydraulic Hammer	8.94E-04	3.55E-04	8.36E-05	5.20E-07	4.06E-05	3.94E-05
Nonroad	Construction	Air Compressor	1.35E-03	4.27E-04	4.87E-05	1.53E-06	7.29E-05	7.07E-05
Nonroad	Construction	Standard Bucket Loader	1.70E-03	9.48E-04	2.53E-04	1.79E-06	2.12E-04	2.06E-04
Nonroad	Construction	Bobcat Skid	2.09E-03	2.14E-03	3.85E-04	1.46E-06	2.99E-04	2.90E-04
Nonroad	Construction	Haul Truck	2.40E-03	6.07E-04	1.84E-04	2.20E-05	1.12E-04	1.09E-04
Nonroad	Construction	Backhoe	3.27E-03	2.07E-03	3.68E-04	1.98E-06	2.56E-04	2.48E-04
Nonroad	Construction	Concrete Saws	9.03E-04	1.19E-01	2.33E-03	2.79E-06	5.94E-05	5.47E-05

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Grader	1.36E-03	2.33E-04	2.00E-05	2.25E-06	3.92E-05	3.80E-05
Nonroad	Construction	Water Truck	7.68E-04	1.94E-04	5.89E-05	7.05E-06	3.58E-05	3.48E-05
Nonroad	Construction	Roller Compactor	2.36E-03	7.28E-04	6.00E-05	3.43E-06	1.12E-04	1.08E-04
Nonroad	Construction	Concrete Pumping Truck	7.35E-04	1.86E-04	5.64E-05	6.75E-06	3.43E-05	3.33E-05
Nonroad	Construction	Concrete Paver	1.32E-03	5.04E-04	7.74E-05	5.38E-06	1.19E-04	1.16E-04
Nonroad	Construction	Motorized Trowel	1.95E-03	4.08E-04	6.71E-05	1.18E-06	4.22E-05	4.09E-05
Nonroad	Construction	Asphalt Paver	2.25E-03	6.30E-04	4.79E-05	3.42E-06	1.00E-04	9.75E-05
Nonroad	Construction	Rubber Tire Roller Compactor	2.36E-03	7.28E-04	6.00E-05	3.43E-06	1.12E-04	1.08E-04
Nonroad	Construction	Bobcat	6.19E-03	6.33E-03	1.14E-03	4.31E-06	8.86E-04	8.59E-04
Nonroad	Construction	Paint Sprayers	1.33E-03	5.30E-04	1.25E-04	7.76E-07	6.07E-05	5.88E-05
Nonroad	Construction	Backhoe	3.27E-03	2.07E-03	3.68E-04	1.98E-06	2.56E-04	2.48E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Sweeper	2.28E-04	3.35E-05	3.64E-06	3.66E-07	5.89E-06	5.72E-06
Nonroad	Construction	Concrete Saws	1.35E-03	1.79E-01	3.49E-03	4.18E-06	8.92E-05	8.20E-05
Nonroad	Construction	Excavator	1.32E-03	5.03E-04	9.08E-05	5.82E-06	8.80E-05	8.53E-05
Nonroad	Construction	Hydraulic Hammer	1.19E-03	4.73E-04	1.11E-04	6.93E-07	5.42E-05	5.25E-05
Nonroad	Construction	Air Compressor	1.35E-03	4.27E-04	4.87E-05	1.53E-06	7.29E-05	7.07E-05
Nonroad	Construction	Standard Bucket Loader	1.70E-03	9.48E-04	2.53E-04	1.79E-06	2.12E-04	2.06E-04
Nonroad	Construction	Bobcat Skid	4.18E-03	4.27E-03	7.69E-04	2.91E-06	5.98E-04	5.80E-04
Nonroad	Construction	Haul Truck	2.40E-03	6.07E-04	1.84E-04	2.20E-05	1.12E-04	1.09E-04
Nonroad	Construction	Backhoe	3.27E-03	2.07E-03	3.68E-04	1.98E-06	2.56E-04	2.48E-04
Nonroad	Construction	Concrete Saws	1.35E-03	1.79E-01	3.49E-03	4.18E-06	8.92E-05	8.20E-05
Nonroad	Construction	Grader	1.36E-03	2.33E-04	2.00E-05	2.25E-06	3.92E-05	3.80E-05
Nonroad	Construction	Water Truck	7.68E-04	1.94E-04	5.89E-05	7.05E-06	3.58E-05	3.48E-05
Nonroad	Construction	Roller Compactor	2.36E-03	7.28E-04	6.00E-05	3.43E-06	1.12E-04	1.08E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Concrete Pumping Truck	7.35E-04	1.86E-04	5.64E-05	6.75E-06	3.43E-05	3.33E-05
Nonroad	Construction	Concrete Paver	1.32E-03	5.04E-04	7.74E-05	5.38E-06	1.19E-04	1.16E-04
Nonroad	Construction	Motorized Trowel	1.95E-03	4.08E-04	6.71E-05	1.18E-06	4.22E-05	4.09E-05
Nonroad	Construction	Asphalt Paver	2.25E-03	6.30E-04	4.79E-05	3.42E-06	1.00E-04	9.75E-05
Nonroad	Construction	Rubber Tire Roller Compactor	2.36E-03	7.28E-04	6.00E-05	3.43E-06	1.12E-04	1.08E-04
Nonroad	Construction	Bobcat	6.19E-03	6.33E-03	1.14E-03	4.31E-06	8.86E-04	8.59E-04
Nonroad	Construction	Paint Sprayers	1.33E-03	5.30E-04	1.25E-04	7.76E-07	6.07E-05	5.88E-05
Nonroad	Construction	Backhoe	4.85E-03	3.06E-03	5.45E-04	2.93E-06	3.80E-04	3.68E-04
Nonroad	Construction	Concrete Saws	1.00E-03	1.32E-01	2.59E-03	3.09E-06	6.60E-05	6.08E-05
Nonroad	Construction	Sweeper	2.28E-04	3.35E-05	3.64E-06	3.66E-07	5.89E-06	5.72E-06
Nonroad	Construction	Excavator	1.32E-03	5.03E-04	9.08E-05	5.82E-06	8.80E-05	8.53E-05
Nonroad	Construction	Hydraulic Hammer	1.19E-03	4.73E-04	1.11E-04	6.93E-07	5.42E-05	5.25E-05

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Air Compressor	1.35E-03	4.27E-04	4.87E-05	1.53E-06	7.29E-05	7.07E-05
Nonroad	Construction	Standard Bucket Loader	1.70E-03	9.48E-04	2.53E-04	1.79E-06	2.12E-04	2.06E-04
Nonroad	Construction	Bobcat Skid	4.18E-03	4.27E-03	7.69E-04	2.91E-06	5.98E-04	5.80E-04
Nonroad	Construction	Haul Truck	2.40E-03	6.07E-04	1.84E-04	2.20E-05	1.12E-04	1.09E-04
Nonroad	Construction	Backhoe	3.27E-03	2.07E-03	3.68E-04	1.98E-06	2.56E-04	2.48E-04
Nonroad	Construction	Concrete Saws	1.35E-03	1.79E-01	3.49E-03	4.18E-06	8.92E-05	8.20E-05
Nonroad	Construction	Grader	2.04E-03	3.49E-04	3.00E-05	3.37E-06	5.88E-05	5.70E-05
Nonroad	Construction	Water Truck	3.91E-03	9.91E-04	3.00E-04	3.60E-05	1.83E-04	1.77E-04
Nonroad	Construction	Roller Compactor	8.03E-03	2.48E-03	2.04E-04	1.17E-05	3.79E-04	3.68E-04
Nonroad	Construction	Concrete Pumping Truck	3.75E-03	9.48E-04	2.87E-04	3.44E-05	1.75E-04	1.70E-04
Nonroad	Construction	Concrete Paver	1.32E-03	5.04E-04	7.74E-05	5.38E-06	1.19E-04	1.16E-04
Nonroad	Construction	Motorized Trowel	7.30E-03	1.53E-03	2.51E-04	4.41E-06	1.58E-04	1.53E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Asphalt Paver	2.25E-03	6.30E-04	4.79E-05	3.42E-06	1.00E-04	9.75E-05
Nonroad	Construction	Rubber Tire Roller Compactor	2.36E-03	7.28E-04	6.00E-05	3.43E-06	1.12E-04	1.08E-04
Nonroad	Construction	Bobcat	6.19E-03	6.33E-03	1.14E-03	4.31E-06	8.86E-04	8.59E-04
Nonroad	Construction	Paint Sprayers	1.33E-03	5.30E-04	1.25E-04	7.76E-07	6.07E-05	5.88E-05
Nonroad	Construction	Backhoe	1.24E-02	7.81E-03	1.39E-03	7.48E-06	9.68E-04	9.39E-04
Nonroad	Construction	Concrete Saws	1.35E-03	1.79E-01	3.49E-03	4.18E-06	8.92E-05	8.20E-05
Nonroad	Construction	Sweeper	2.28E-04	3.35E-05	3.64E-06	3.66E-07	5.89E-06	5.72E-06
Nonroad	Construction	Excavator	3.73E-03	1.42E-03	2.57E-04	1.65E-05	2.49E-04	2.42E-04
Nonroad	Construction	Hydraulic Hammer	3.38E-03	1.34E-03	3.16E-04	1.96E-06	1.53E-04	1.49E-04
Nonroad	Construction	Air Compressor	3.82E-03	1.21E-03	1.38E-04	4.33E-06	2.06E-04	2.00E-04
Nonroad	Construction	Standard Bucket Loader	3.20E-03	1.79E-03	4.79E-04	3.39E-06	4.01E-04	3.89E-04
Nonroad	Construction	Bobcat Skid	7.89E-03	8.07E-03	1.45E-03	5.50E-06	1.13E-03	1.10E-03

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Haul Truck	4.53E-03	1.15E-03	3.48E-04	4.16E-05	2.11E-04	2.05E-04
Nonroad	Construction	Backhoe	6.18E-03	3.90E-03	6.94E-04	3.74E-06	4.84E-04	4.69E-04
Nonroad	Construction	Concrete Saws	1.28E-03	1.69E-01	3.30E-03	3.95E-06	8.42E-05	7.75E-05
Nonroad	Construction	Grader	1.83E-03	3.14E-04	2.70E-05	3.04E-06	5.29E-05	5.13E-05
Nonroad	Construction	Water Truck	1.04E-03	2.62E-04	7.95E-05	9.52E-06	4.84E-05	4.69E-05
Nonroad	Construction	Roller Compactor	2.13E-03	6.56E-04	5.40E-05	3.09E-06	1.00E-04	9.74E-05
Nonroad	Construction	Concrete Pumping Truck	9.92E-04	2.51E-04	7.61E-05	9.11E-06	4.63E-05	4.49E-05
Nonroad	Construction	Concrete Paver	1.19E-03	4.54E-04	6.97E-05	4.84E-06	1.07E-04	1.04E-04
Nonroad	Construction	Motorized Trowel	2.63E-03	5.51E-04	9.05E-05	1.59E-06	5.70E-05	5.52E-05
Nonroad	Construction	Asphalt Paver	2.02E-03	5.67E-04	4.31E-05	3.08E-06	9.04E-05	8.77E-05
Nonroad	Construction	Rubber Tire Roller Compactor	2.13E-03	6.56E-04	5.40E-05	3.09E-06	1.00E-04	9.74E-05
Nonroad	Construction	Bobcat	4.18E-03	4.27E-03	7.69E-04	2.91E-06	5.98E-04	5.80E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Paint Sprayers	1.33E-03	5.30E-04	1.25E-04	7.76E-07	6.07E-05	5.88E-05
Nonroad	Construction	Backhoe	3.27E-03	2.07E-03	3.68E-04	1.98E-06	2.56E-04	2.48E-04
Nonroad	Construction	Concrete Saws	1.35E-03	1.79E-01	3.49E-03	4.18E-06	8.92E-05	8.20E-05
Nonroad	Construction	Sweeper	2.28E-04	3.35E-05	3.64E-06	3.66E-07	5.89E-06	5.72E-06
Nonroad	Construction	Excavator	2.20E-03	8.38E-04	1.51E-04	9.70E-06	1.47E-04	1.42E-04
Nonroad	Construction	Hydraulic Hammer	1.99E-03	7.88E-04	1.86E-04	1.15E-06	9.03E-05	8.76E-05
Nonroad	Construction	Air Compressor	3.82E-03	1.21E-03	1.38E-04	4.33E-06	2.06E-04	2.00E-04
Nonroad	Construction	Standard Bucket Loader	1.88E-03	1.05E-03	2.82E-04	1.99E-06	2.36E-04	2.29E-04
Nonroad	Construction	Bobcat Skid	3.71E-03	2.84E-03	5.52E-04	2.03E-06	3.86E-04	3.75E-04
Nonroad	Construction	Haul Truck	2.66E-03	6.74E-04	2.04E-04	2.45E-05	1.24E-04	1.21E-04
Nonroad	Construction	Backhoe	3.63E-03	2.30E-03	4.08E-04	2.20E-06	2.85E-04	2.76E-04
Nonroad	Construction	Concrete Saws	1.04E-03	4.13E-04	9.74E-05	6.05E-07	4.72E-05	4.58E-05

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Grader	2.45E-03	4.20E-04	3.61E-05	4.06E-06	7.06E-05	6.85E-05
Nonroad	Construction	Water Truck	1.38E-03	3.50E-04	1.06E-04	1.27E-05	6.46E-05	6.26E-05
Nonroad	Construction	Roller Compactor	2.84E-03	8.75E-04	7.21E-05	4.12E-06	1.34E-04	1.30E-04
Nonroad	Construction	Concrete Pumping Truck	1.32E-03	3.35E-04	1.02E-04	1.22E-05	6.18E-05	6.00E-05
Nonroad	Construction	Concrete Paver	1.59E-03	6.06E-04	9.31E-05	6.47E-06	1.44E-04	1.39E-04
Nonroad	Construction	Motorized Trowel	3.51E-03	7.35E-04	1.21E-04	2.12E-06	7.60E-05	7.38E-05
Nonroad	Construction	Asphalt Paver	2.70E-03	7.57E-04	5.76E-05	4.11E-06	1.21E-04	1.17E-04
Nonroad	Construction	Rubber Tire Roller Compactor	2.84E-03	8.75E-04	7.21E-05	4.12E-06	1.34E-04	1.30E-04
Nonroad	Construction	Bobcat	5.58E-03	5.70E-03	1.03E-03	3.89E-06	7.98E-04	7.75E-04
Nonroad	Construction	Paint Sprayers	1.17E-03	4.63E-04	1.09E-04	6.79E-07	5.31E-05	5.15E-05
Nonroad	Construction	Backhoe	3.27E-03	2.07E-03	3.68E-04	1.98E-06	2.56E-04	2.48E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Sweeper	2.28E-04	3.35E-05	3.64E-06	3.66E-07	5.89E-06	5.72E-06
Nonroad	Construction	Concrete Saws	8.78E-04	1.16E-01	2.26E-03	2.71E-06	5.78E-05	5.32E-05
Nonroad	Construction	Excavator	1.17E-03	4.47E-04	8.07E-05	5.18E-06	7.82E-05	7.59E-05
Nonroad	Construction	Hydraulic Hammer	1.06E-03	4.20E-04	9.91E-05	6.16E-07	4.81E-05	4.67E-05
Nonroad	Construction	Air Compressor	1.35E-03	4.27E-04	4.87E-05	1.53E-06	7.29E-05	7.07E-05
Nonroad	Construction	Standard Bucket Loader	1.01E-03	5.61E-04	1.50E-04	1.06E-06	1.26E-04	1.22E-04
Nonroad	Construction	Bobcat Skid	4.18E-03	4.27E-03	7.69E-04	2.91E-06	5.98E-04	5.80E-04
Nonroad	Construction	Haul Truck	1.42E-03	3.60E-04	1.09E-04	1.31E-05	6.63E-05	6.43E-05
Nonroad	Construction	Backhoe	1.94E-03	1.22E-03	2.18E-04	1.17E-06	1.52E-04	1.47E-04
Nonroad	Construction	Concrete Saws	4.01E-04	5.29E-02	1.03E-03	1.24E-06	2.64E-05	2.43E-05
Nonroad	Construction	Grader	2.17E-03	3.72E-04	3.21E-05	3.60E-06	6.27E-05	6.08E-05
Nonroad	Construction	Water Truck	1.23E-03	3.11E-04	9.42E-05	1.13E-05	5.73E-05	5.56E-05
Nonroad	Construction	Roller Compactor	2.52E-03	7.77E-04	6.40E-05	3.66E-06	1.19E-04	1.15E-04

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Concrete Pumping Truck	1.18E-03	2.98E-04	9.02E-05	1.08E-05	5.49E-05	5.32E-05
Nonroad	Construction	Concrete Paver	1.41E-03	5.38E-04	8.26E-05	5.74E-06	1.27E-04	1.24E-04
Nonroad	Construction	Motorized Trowel	3.11E-03	6.52E-04	1.07E-04	1.88E-06	6.75E-05	6.55E-05
Nonroad	Construction	Asphalt Paver	2.40E-03	6.72E-04	5.11E-05	3.64E-06	1.07E-04	1.04E-04
Nonroad	Construction	Rubber Tire Roller Compactor	2.52E-03	7.77E-04	6.40E-05	3.66E-06	1.19E-04	1.15E-04
Nonroad	Construction	Bobcat	4.95E-03	5.06E-03	9.12E-04	3.45E-06	7.09E-04	6.88E-04
Nonroad	Construction	Paint Sprayers	1.07E-03	4.24E-04	9.99E-05	6.21E-07	4.85E-05	4.71E-05
Nonroad	Construction	Backhoe	3.27E-03	2.07E-03	3.68E-04	1.98E-06	2.56E-04	2.48E-04
Nonroad	Construction	Sweeper	2.28E-04	3.35E-05	3.64E-06	3.66E-07	5.89E-06	5.72E-06
Nonroad	Construction	Concrete Saws	8.03E-04	1.06E-01	2.07E-03	2.48E-06	5.28E-05	4.86E-05
Nonroad	Construction	Excavator	1.17E-03	4.47E-04	8.07E-05	5.18E-06	7.82E-05	7.59E-05
Nonroad	Construction	Hydraulic Hammer	1.06E-03	4.20E-04	9.91E-05	6.16E-07	4.81E-05	4.67E-05

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Air Compressor	1.35E-03	4.27E-04	4.87E-05	1.53E-06	7.29E-05	7.07E-05
Nonroad	Construction	Standard Bucket Loader	1.01E-03	5.61E-04	1.50E-04	1.06E-06	1.26E-04	1.22E-04
Nonroad	Construction	Bobcat Skid	4.18E-03	4.27E-03	7.69E-04	2.91E-06	5.98E-04	5.80E-04
Nonroad	Construction	Haul Truck	1.42E-03	3.60E-04	1.09E-04	1.31E-05	6.63E-05	6.43E-05
Nonroad	Construction	Backhoe	1.94E-03	1.22E-03	2.18E-04	1.17E-06	1.52E-04	1.47E-04
Nonroad	Construction	Concrete Saws	4.01E-04	5.29E-02	1.03E-03	1.24E-06	2.64E-05	2.43E-05
Nonroad	Construction	Grader	2.17E-03	3.72E-04	3.21E-05	3.60E-06	6.27E-05	6.08E-05
Nonroad	Construction	Water Truck	1.23E-03	3.11E-04	9.42E-05	1.13E-05	5.73E-05	5.56E-05
Nonroad	Construction	Roller Compactor	2.52E-03	7.77E-04	6.40E-05	3.66E-06	1.19E-04	1.15E-04
Nonroad	Construction	Concrete Pumping Truck	1.18E-03	2.98E-04	9.02E-05	1.08E-05	5.49E-05	5.32E-05
Nonroad	Construction	Concrete Paver	1.41E-03	5.38E-04	8.26E-05	5.74E-06	1.27E-04	1.24E-04
Nonroad	Construction	Motorized Trowel	3.11E-03	6.52E-04	1.07E-04	1.88E-06	6.75E-05	6.55E-05

Project	Construction Activity	Equipment Type	Emissions (tons/yr)					
			NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Nonroad	Construction	Asphalt Paver	2.40E-03	6.72E-04	5.11E-05	3.64E-06	1.07E-04	1.04E-04
Nonroad	Construction	Rubber Tire Roller Compactor	2.52E-03	7.77E-04	6.40E-05	3.66E-06	1.19E-04	1.15E-04
Nonroad	Construction	Bobcat	4.95E-03	5.06E-03	9.12E-04	3.45E-06	7.09E-04	6.88E-04
Nonroad	Construction	Paint Sprayers	1.07E-03	4.24E-04	9.99E-05	6.21E-07	4.85E-05	4.71E-05
Nonroad	Construction	Backhoe	3.27E-03	2.07E-03	3.68E-04	1.98E-06	2.56E-04	2.48E-04
Nonroad	Construction	Sweeper	2.28E-04	3.35E-05	3.64E-06	3.66E-07	5.89E-06	5.72E-06
Nonroad	Construction	Concrete Saws	8.03E-04	1.06E-01	2.07E-03	2.48E-06	5.28E-05	4.86E-05

Table C17. 2025 construction-phase non-road equipment greenhouse gas emissions.

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Excavator	6.85E-06	1.03E-04	2.15E+00	2.18E+00
Nonroad	Construction	Hydraulic Hammer	7.37E-06	6.75E-06	1.41E-01	1.44E-01
Nonroad	Construction	Air Compressor	4.14E-06	2.62E-05	5.49E-01	5.57E-01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Standard Bucket Loader	1.57E-05	2.87E-05	6.01E-01	6.11E-01
Nonroad	Construction	Bobcat Skid	1.60E-05	2.26E-05	4.73E-01	4.81E-01
Nonroad	Construction	Haul Truck	9.93E-06	3.97E-04	8.33E+00	8.44E+00
Nonroad	Construction	Backhoe	2.47E-05	3.12E-05	6.54E-01	6.64E-01
Nonroad	Construction	Concrete Saws	3.41E-04	2.22E-05	4.58E-01	4.92E-01
Nonroad	Construction	Grader	1.69E-06	4.03E-05	8.46E-01	8.57E-01
Nonroad	Construction	Water Truck	3.18E-06	1.27E-04	2.67E+00	2.70E+00
Nonroad	Construction	Roller Compactor	4.95E-06	6.04E-05	1.27E+00	1.29E+00
Nonroad	Construction	Concrete Pumping Truck	3.04E-06	1.22E-04	2.55E+00	2.58E+00
Nonroad	Construction	Concrete Paver	6.35E-06	9.52E-05	2.00E+00	2.03E+00
Nonroad	Construction	Motorized Trowel	8.45E-06	2.01E-05	4.23E-01	4.29E-01
Nonroad	Construction	Asphalt Paver	4.00E-06	6.04E-05	1.27E+00	1.29E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Rubber Tire Roller Compactor	4.95E-06	6.04E-05	1.27E+00	1.29E+00
Nonroad	Construction	Bobcat	4.74E-05	6.70E-05	1.40E+00	1.42E+00
Nonroad	Construction	Paint Sprayers	1.10E-05	1.01E-05	2.11E-01	2.15E-01
Nonroad	Construction	Backhoe	2.47E-05	3.12E-05	6.54E-01	6.64E-01
Nonroad	Construction	Sweeper	3.11E-07	6.54E-06	1.37E-01	1.39E-01
Nonroad	Construction	Concrete Saws	5.12E-04	3.34E-05	6.87E-01	7.39E-01
Nonroad	Construction	Excavator	6.85E-06	1.03E-04	2.15E+00	2.18E+00
Nonroad	Construction	Hydraulic Hammer	9.82E-06	8.99E-06	1.88E-01	1.92E-01
Nonroad	Construction	Air Compressor	4.14E-06	2.62E-05	5.49E-01	5.57E-01
Nonroad	Construction	Standard Bucket Loader	1.57E-05	2.87E-05	6.01E-01	6.11E-01
Nonroad	Construction	Bobcat Skid	3.20E-05	4.52E-05	9.47E-01	9.62E-01
Nonroad	Construction	Haul Truck	9.93E-06	3.97E-04	8.33E+00	8.44E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	2.47E-05	3.12E-05	6.54E-01	6.64E-01
Nonroad	Construction	Concrete Saws	5.12E-04	3.34E-05	6.87E-01	7.39E-01
Nonroad	Construction	Grader	1.69E-06	4.03E-05	8.46E-01	8.57E-01
Nonroad	Construction	Water Truck	3.18E-06	1.27E-04	2.67E+00	2.70E+00
Nonroad	Construction	Roller Compactor	4.95E-06	6.04E-05	1.27E+00	1.29E+00
Nonroad	Construction	Concrete Pumping Truck	3.04E-06	1.22E-04	2.55E+00	2.58E+00
Nonroad	Construction	Concrete Paver	6.35E-06	9.52E-05	2.00E+00	2.03E+00
Nonroad	Construction	Motorized Trowel	8.45E-06	2.01E-05	4.23E-01	4.29E-01
Nonroad	Construction	Asphalt Paver	4.00E-06	6.04E-05	1.27E+00	1.29E+00
Nonroad	Construction	Rubber Tire Roller Compactor	4.95E-06	6.04E-05	1.27E+00	1.29E+00
Nonroad	Construction	Bobcat	4.74E-05	6.70E-05	1.40E+00	1.42E+00
Nonroad	Construction	Paint Sprayers	1.10E-05	1.01E-05	2.11E-01	2.15E-01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	3.66E-05	4.62E-05	9.68E-01	9.84E-01
Nonroad	Construction	Concrete Saws	3.79E-04	2.47E-05	5.09E-01	5.47E-01
Nonroad	Construction	Sweeper	3.11E-07	6.54E-06	1.37E-01	1.39E-01
Nonroad	Construction	Excavator	6.85E-06	1.03E-04	2.15E+00	2.18E+00
Nonroad	Construction	Hydraulic Hammer	9.82E-06	8.99E-06	1.88E-01	1.92E-01
Nonroad	Construction	Air Compressor	4.14E-06	2.62E-05	5.49E-01	5.57E-01
Nonroad	Construction	Standard Bucket Loader	1.57E-05	2.87E-05	6.01E-01	6.11E-01
Nonroad	Construction	Bobcat Skid	3.20E-05	4.52E-05	9.47E-01	9.62E-01
Nonroad	Construction	Haul Truck	9.93E-06	3.97E-04	8.33E+00	8.44E+00
Nonroad	Construction	Backhoe	2.47E-05	3.12E-05	6.54E-01	6.64E-01
Nonroad	Construction	Concrete Saws	5.12E-04	3.34E-05	6.87E-01	7.39E-01
Nonroad	Construction	Grader	2.53E-06	6.04E-05	1.27E+00	1.29E+00
Nonroad	Construction	Water Truck	1.62E-05	6.48E-04	1.36E+01	1.38E+01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Roller Compactor	1.68E-05	2.06E-04	4.31E+00	4.37E+00
Nonroad	Construction	Concrete Pumping Truck	1.55E-05	6.20E-04	1.30E+01	1.32E+01
Nonroad	Construction	Concrete Paver	6.35E-06	9.52E-05	2.00E+00	2.03E+00
Nonroad	Construction	Motorized Trowel	3.17E-05	7.56E-05	1.58E+00	1.61E+00
Nonroad	Construction	Asphalt Paver	4.00E-06	6.04E-05	1.27E+00	1.29E+00
Nonroad	Construction	Rubber Tire Roller Compactor	4.95E-06	6.04E-05	1.27E+00	1.29E+00
Nonroad	Construction	Bobcat	4.74E-05	6.70E-05	1.40E+00	1.42E+00
Nonroad	Construction	Paint Sprayers	1.10E-05	1.01E-05	2.11E-01	2.15E-01
Nonroad	Construction	Backhoe	9.33E-05	1.18E-04	2.47E+00	2.51E+00
Nonroad	Construction	Concrete Saws	5.12E-04	3.34E-05	6.87E-01	7.39E-01
Nonroad	Construction	Sweeper	3.11E-07	6.54E-06	1.37E-01	1.39E-01
Nonroad	Construction	Excavator	1.94E-05	2.91E-04	6.10E+00	6.18E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Hydraulic Hammer	2.78E-05	2.55E-05	5.34E-01	5.43E-01
Nonroad	Construction	Air Compressor	1.17E-05	7.42E-05	1.56E+00	1.58E+00
Nonroad	Construction	Standard Bucket Loader	2.97E-05	5.42E-05	1.14E+00	1.15E+00
Nonroad	Construction	Bobcat Skid	6.04E-05	8.54E-05	1.79E+00	1.82E+00
Nonroad	Construction	Haul Truck	1.87E-05	7.49E-04	1.57E+01	1.59E+01
Nonroad	Construction	Backhoe	4.66E-05	5.89E-05	1.23E+00	1.25E+00
Nonroad	Construction	Concrete Saws	4.84E-04	3.15E-05	6.49E-01	6.98E-01
Nonroad	Construction	Grader	2.28E-06	5.44E-05	1.14E+00	1.16E+00
Nonroad	Construction	Water Truck	4.29E-06	1.71E-04	3.60E+00	3.65E+00
Nonroad	Construction	Roller Compactor	4.45E-06	5.44E-05	1.14E+00	1.16E+00
Nonroad	Construction	Concrete Pumping Truck	4.10E-06	1.64E-04	3.44E+00	3.49E+00
Nonroad	Construction	Concrete Paver	5.72E-06	8.57E-05	1.80E+00	1.82E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Motorized Trowel	1.14E-05	2.72E-05	5.71E-01	5.79E-01
Nonroad	Construction	Asphalt Paver	3.60E-06	5.44E-05	1.14E+00	1.16E+00
Nonroad	Construction	Rubber Tire Roller Compactor	4.45E-06	5.44E-05	1.14E+00	1.16E+00
Nonroad	Construction	Bobcat	3.20E-05	4.52E-05	9.47E-01	9.62E-01
Nonroad	Construction	Paint Sprayers	1.10E-05	1.01E-05	2.11E-01	2.15E-01
Nonroad	Construction	Backhoe	2.47E-05	3.12E-05	6.54E-01	6.64E-01
Nonroad	Construction	Concrete Saws	5.12E-04	3.34E-05	6.87E-01	7.39E-01
Nonroad	Construction	Sweeper	3.11E-07	6.54E-06	1.37E-01	1.39E-01
Nonroad	Construction	Excavator	1.14E-05	1.71E-04	3.59E+00	3.63E+00
Nonroad	Construction	Hydraulic Hammer	1.64E-05	1.50E-05	3.14E-01	3.20E-01
Nonroad	Construction	Air Compressor	1.17E-05	7.42E-05	1.56E+00	1.58E+00
Nonroad	Construction	Standard Bucket Loader	1.75E-05	3.19E-05	6.68E-01	6.78E-01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Bobcat Skid	2.62E-05	3.12E-05	6.53E-01	6.64E-01
Nonroad	Construction	Haul Truck	1.10E-05	4.41E-04	9.25E+00	9.37E+00
Nonroad	Construction	Backhoe	2.74E-05	3.47E-05	7.26E-01	7.38E-01
Nonroad	Construction	Concrete Saws	8.58E-06	7.86E-06	1.65E-01	1.67E-01
Nonroad	Construction	Grader	3.04E-06	7.26E-05	1.52E+00	1.54E+00
Nonroad	Construction	Water Truck	5.73E-06	2.29E-04	4.80E+00	4.87E+00
Nonroad	Construction	Roller Compactor	5.95E-06	7.26E-05	1.52E+00	1.54E+00
Nonroad	Construction	Concrete Pumping Truck	5.48E-06	2.19E-04	4.60E+00	4.66E+00
Nonroad	Construction	Concrete Paver	7.63E-06	1.14E-04	2.40E+00	2.43E+00
Nonroad	Construction	Motorized Trowel	1.52E-05	3.63E-05	7.62E-01	7.73E-01
Nonroad	Construction	Asphalt Paver	4.81E-06	7.26E-05	1.52E+00	1.54E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Rubber Tire Roller Compactor	5.95E-06	7.26E-05	1.52E+00	1.54E+00
Nonroad	Construction	Bobcat	4.27E-05	6.04E-05	1.26E+00	1.28E+00
Nonroad	Construction	Paint Sprayers	9.63E-06	8.81E-06	1.85E-01	1.88E-01
Nonroad	Construction	Backhoe	2.47E-05	3.12E-05	6.54E-01	6.64E-01
Nonroad	Construction	Sweeper	3.11E-07	6.54E-06	1.37E-01	1.39E-01
Nonroad	Construction	Concrete Saws	3.32E-04	2.16E-05	4.45E-01	4.79E-01
Nonroad	Construction	Excavator	6.09E-06	9.11E-05	1.91E+00	1.94E+00
Nonroad	Construction	Hydraulic Hammer	8.73E-06	7.99E-06	1.67E-01	1.70E-01
Nonroad	Construction	Air Compressor	4.14E-06	2.62E-05	5.49E-01	5.57E-01
Nonroad	Construction	Standard Bucket Loader	9.33E-06	1.70E-05	3.56E-01	3.62E-01
Nonroad	Construction	Bobcat Skid	3.20E-05	4.52E-05	9.47E-01	9.62E-01
Nonroad	Construction	Haul Truck	5.88E-06	2.35E-04	4.93E+00	5.00E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	1.46E-05	1.85E-05	3.87E-01	3.94E-01
Nonroad	Construction	Concrete Saws	1.52E-04	9.88E-06	2.04E-01	2.19E-01
Nonroad	Construction	Grader	2.70E-06	6.45E-05	1.35E+00	1.37E+00
Nonroad	Construction	Water Truck	5.08E-06	2.03E-04	4.26E+00	4.32E+00
Nonroad	Construction	Roller Compactor	5.28E-06	6.45E-05	1.35E+00	1.37E+00
Nonroad	Construction	Concrete Pumping Truck	4.87E-06	1.94E-04	4.08E+00	4.13E+00
Nonroad	Construction	Concrete Paver	6.77E-06	1.02E-04	2.13E+00	2.16E+00
Nonroad	Construction	Motorized Trowel	1.35E-05	3.22E-05	6.76E-01	6.86E-01
Nonroad	Construction	Asphalt Paver	4.27E-06	6.45E-05	1.35E+00	1.37E+00
Nonroad	Construction	Rubber Tire Roller Compactor	5.28E-06	6.45E-05	1.35E+00	1.37E+00
Nonroad	Construction	Bobcat	3.79E-05	5.36E-05	1.12E+00	1.14E+00
Nonroad	Construction	Paint Sprayers	8.80E-06	8.06E-06	1.69E-01	1.72E-01

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Backhoe	2.47E-05	3.12E-05	6.54E-01	6.64E-01
Nonroad	Construction	Sweeper	3.11E-07	6.54E-06	1.37E-01	1.39E-01
Nonroad	Construction	Concrete Saws	3.03E-04	1.98E-05	4.07E-01	4.38E-01
Nonroad	Construction	Excavator	6.09E-06	9.11E-05	1.91E+00	1.94E+00
Nonroad	Construction	Hydraulic Hammer	8.73E-06	7.99E-06	1.67E-01	1.70E-01
Nonroad	Construction	Air Compressor	4.14E-06	2.62E-05	5.49E-01	5.57E-01
Nonroad	Construction	Standard Bucket Loader	9.33E-06	1.70E-05	3.56E-01	3.62E-01
Nonroad	Construction	Bobcat Skid	3.20E-05	4.52E-05	9.47E-01	9.62E-01
Nonroad	Construction	Haul Truck	5.88E-06	2.35E-04	4.93E+00	5.00E+00
Nonroad	Construction	Backhoe	1.46E-05	1.85E-05	3.87E-01	3.94E-01
Nonroad	Construction	Concrete Saws	1.52E-04	9.88E-06	2.04E-01	2.19E-01
Nonroad	Construction	Grader	2.70E-06	6.45E-05	1.35E+00	1.37E+00
Nonroad	Construction	Water Truck	5.08E-06	2.03E-04	4.26E+00	4.32E+00

Project	Construction Activity	Equipment Type	Emissions (tons/yr)			
			CH_4	N_2O	CO_2	CO_2e
Nonroad	Construction	Roller Compactor	5.28E-06	6.45E-05	1.35E+00	1.37E+00
Nonroad	Construction	Concrete Pumping Truck	4.87E-06	1.94E-04	4.08E+00	4.13E+00
Nonroad	Construction	Concrete Paver	6.77E-06	1.02E-04	2.13E+00	2.16E+00
Nonroad	Construction	Motorized Trowel	1.35E-05	3.22E-05	6.76E-01	6.86E-01
Nonroad	Construction	Asphalt Paver	4.27E-06	6.45E-05	1.35E+00	1.37E+00
Nonroad	Construction	Rubber Tire Roller Compactor	5.28E-06	6.45E-05	1.35E+00	1.37E+00
Nonroad	Construction	Bobcat	3.79E-05	5.36E-05	1.12E+00	1.14E+00
Nonroad	Construction	Paint Sprayers	8.80E-06	8.06E-06	1.69E-01	1.72E-01
Nonroad	Construction	Backhoe	2.47E-05	3.12E-05	6.54E-01	6.64E-01
Nonroad	Construction	Sweeper	3.11E-07	6.54E-06	1.37E-01	1.39E-01
Nonroad	Construction	Concrete Saws	3.03E-04	1.98E-05	4.07E-01	4.38E-01

APPENDIX D: DETAILED FUGITIVES EMISSION INVENTORY DATA FOR PROPOSED PROJECT ELEMENTS

Table D1. Construction-phase fugitives inputs

Project Type	Construction Activity	Calculation	Input	Units
Building - 10000 sqft- 1 story	Concrete Mixing/Batching	V = Volume of asphalt = 0.111 x L x W x 1.25 / 3	647	yd3
Building - 10000 sqft- 1 story	Concrete Mixing/Batching	PM10 = 0.037 x V	0.012	tons
Building - 10000 sqft- 1 story	Material Movement (Paved Roads)	sL = Road surface silt loading	0.1	g/m3
Building - 10000 sqft- 1 story	Material Movement (Paved Roads)	Wt. = Mean vehicle weight	32	tons
Building - 10000 sqft- 1 story	Material Movement (Paved Roads)	VMT = Vehicle miles traveled	3607	miles
Building - 10000 sqft- 1 story	Material Movement (Paved Roads)	PM10 = 0.0022 x (sL^0.91) x (Wt^1.02) x VMT	0.02	tons
Building - 10000 sqft- 1 story	Material Movement (Unpaved Roads)	s = Surface material silt content	0.043	fraction
Building - 10000 sqft- 1 story	Material Movement (Unpaved Roads)	Wt. = Mean vehicle weight	32	tons
Building - 10000 sqft- 1 story	Material Movement (Unpaved Roads)	VMT = Vehicle miles traveled	3607	miles
Building - 10000 sqft- 1 story	Material Movement (Unpaved Roads)	PM10 = 1.5 x [(s/12)^0.9] x [(Wt./3)^0.45] x VMT	0.049	tons
Demolition - Asphalt	Soil Handling	u = Wind speed	5	mph
Demolition - Asphalt	Soil Handling	m = Moisture content	0.25	fraction
Demolition - Asphalt	Soil Handling	T = Mass of aggregate storage pile = L x W x 0.5 x 110 / 2000	7379	tons
Demolition - Asphalt	Soil Handling	PM10 = T x 0.35 x 0.0032 x [(u/5)^1.3] / [(m/2)^1.4]	0.076	tons
Demolition - Asphalt	Unstabilized Land and Wind Erosion	A = Area affected = L x W / 43560.0	6.16	acres
Demolition - Asphalt	Unstabilized Land and Wind Erosion	TPConv = TSP/PM10 conversion	0.5	fraction
Demolition - Asphalt	Unstabilized Land and Wind Erosion	CE = Control efficiency	0.63	fraction
Demolition - Asphalt	Unstabilized Land and Wind Erosion	t = year (e.g. 0.65 year)	1	years
Demolition - Asphalt	Unstabilized Land and Wind Erosion	PM10 = 0.38 x A x TPConv x (1-CE) x t	0.433	tons
Demolition - Asphalt	Material Movement (Unpaved Roads)	s = Surface material silt content	0.043	fraction
Demolition - Asphalt	Material Movement (Unpaved Roads)	Wt. = Mean vehicle weight	32	tons
Demolition - Asphalt	Material Movement (Unpaved Roads)	VMT = Vehicle miles traveled	4205	miles

Project Type	Construction Activity	Calculation	Input	Units
Demolition - Asphalt	Material Movement (Unpaved Roads)	PM10 = 1.5 x [(s/12)^0.9] x [(Wt./3)^0.45] x VMT	0.058	tons
Demolition - Asphalt	Material Movement (Paved Roads)	sL = Road surface silt loading	0.1	g/m3
Demolition - Asphalt	Material Movement (Paved Roads)	Wt. = Mean vehicle weight	32	tons
Demolition - Asphalt	Material Movement (Paved Roads)	VMT = Vehicle miles traveled	3870	miles
Demolition - Asphalt	Material Movement (Paved Roads)	PM10 = 0.0022 x (sL^0.91) x (Wt^1.02) x VMT	0.018	tons
Demolition - Concrete	Soil Handling	u = Wind speed	5	mph
Demolition - Concrete	Soil Handling	m = Moisture content	0.25	fraction
Demolition - Concrete	Soil Handling	T = Mass of aggregate storage pile = L x W x 0.5 x 110 / 2000	20386	tons
Demolition - Concrete	Soil Handling	PM10 = T x 0.35 x 0.0032 x [(u/5)^1.3] / [(m/2)^1.4]	0.21	tons
Demolition - Concrete	Unstabilized Land and Wind Erosion	A = Area affected = L x W / 43560.0	17.0	acres
Demolition - Concrete	Unstabilized Land and Wind Erosion	TPConv = TSP/PM10 conversion	0.5	fraction
Demolition - Concrete	Unstabilized Land and Wind Erosion	CE = Control efficiency	0.63	fraction
Demolition - Concrete	Unstabilized Land and Wind Erosion	t = year (e.g. 0.65 year)	1	years
Demolition - Concrete	Unstabilized Land and Wind Erosion	PM10 = 0.38 x A x TPConv x (1-CE) x t	1.20	tons
Demolition - Concrete	Material Movement (Unpaved Roads)	s = Surface material silt content	0.043	fraction
Demolition - Concrete	Material Movement (Unpaved Roads)	Wt. = Mean vehicle weight	32	tons
Demolition - Concrete	Material Movement (Unpaved Roads)	VMT = Vehicle miles traveled	5105.5	miles
Demolition - Concrete	Material Movement (Unpaved Roads)	PM10 = 1.5 x [(s/12)^0.9] x [(Wt./3)^0.45] x VMT	0.070	tons
Demolition - Concrete	Material Movement (Paved Roads)	sL = Road surface silt loading	0.1	g/m3
Demolition - Concrete	Material Movement (Paved Roads)	Wt. = Mean vehicle weight	32	tons
Demolition - Concrete	Material Movement (Paved Roads)	VMT = Vehicle miles traveled	3870	miles
Demolition - Concrete	Material Movement (Paved Roads)	PM10 = 0.0022 x (sL^0.91) x (Wt^1.02) x VMT	0.018	tons
Drainage System	Material Movement (Unpaved Roads)	s = Surface material silt content	0.043	fraction

Project Type	Construction Activity	Calculation	Input	Units
Drainage System	Material Movement (Unpaved Roads)	Wt. = Mean vehicle weight	32	tons
Drainage System	Material Movement (Unpaved Roads)	VMT = Vehicle miles traveled	976	miles
Drainage System	Material Movement (Unpaved Roads)	PM10 = 1.5 x [(s/12)^0.9] x [(Wt./3)^0.45] x VMT	0.013	tons
Drainage System	Material Movement (Paved Roads)	sL = Road surface silt loading	0.1	g/m3
Drainage System	Material Movement (Paved Roads)	Wt. = Mean vehicle weight	32	tons
Drainage System	Material Movement (Paved Roads)	VMT = Vehicle miles traveled	0	miles
Drainage System	Material Movement (Paved Roads)	PM10 = 0.0022 x (sL^0.91) x (Wt^1.02) x VMT	0	tons
Drainage System	Unstabilized Land and Wind Erosion	A = Area affected = L x W / 43560.0	80	acres
Drainage System	Unstabilized Land and Wind Erosion	TPConv = TSP/PM10 conversion	0.5	fraction
Drainage System	Unstabilized Land and Wind Erosion	CE = Control efficiency	0.63	fraction
Drainage System	Unstabilized Land and Wind Erosion	t = year (e.g. 0.65 year)	1	years
Drainage System	Unstabilized Land and Wind Erosion	PM10 = 0.38 x A x TPConv x (1-CE) x t	5.65	tons
Drainage System	Soil Handling	u = Wind speed	5	mph
Drainage System	Soil Handling	m = Moisture content	0.25	fraction
Drainage System	Soil Handling	T = Mass of aggregate storage pile = L x W x 0.5 x 110 / 2000	96165	tons
Drainage System	Soil Handling	PM10 = T x 0.35 x 0.0032 x [(u/5)^1.3] / [(m/2)^1.4]	0.990	tons
Fencing	Soil Handling	u = Wind speed	5	mph
Fencing	Soil Handling	m = Moisture content	0.25	fraction
Fencing	Soil Handling	T = Mass of aggregate storage pile = L x W x 0.5 x 110 / 2000	200.8	tons
Fencing	Soil Handling	PM10 = T x 0.35 x 0.0032 x [(u/5)^1.3] / [(m/2)^1.4]	0.002	tons
Fencing	Unstabilized Land and Wind Erosion	A = Area affected = L x W / 43560.0	0.17	acres
Fencing	Unstabilized Land and Wind Erosion	TPConv = TSP/PM10 conversion	0.5	fraction
Fencing	Unstabilized Land and Wind Erosion	CE = Control efficiency	0.63	fraction

Project Type	Construction Activity	Calculation	Input	Units
Fencing	Unstabilized Land and Wind Erosion	t = year (e.g. 0.65 year)	1	years
Fencing	Unstabilized Land and Wind Erosion	PM10 = 0.38 x A x TPConv x (1-CE) x t	0.012	tons
Fencing	Material Movement (Unpaved Roads)	s = Surface material silt content	0.043	fraction
Fencing	Material Movement (Unpaved Roads)	Wt. = Mean vehicle weight	32	tons
Fencing	Material Movement (Unpaved Roads)	VMT = Vehicle miles traveled	1295	miles
Fencing	Material Movement (Unpaved Roads)	PM10 = 1.5 x [(s/12)^0.9] x [(Wt./3)^0.45] x VMT	0.018	tons
Fencing	Material Movement (Paved Roads)	sL = Road surface silt loading	0.1	g/m3
Fencing	Material Movement (Paved Roads)	Wt. = Mean vehicle weight	32	tons
Fencing	Material Movement (Paved Roads)	VMT = Vehicle miles traveled	1290	miles
Fencing	Material Movement (Paved Roads)	PM10 = 0.0022 x (sL^0.91) x (Wt^1.02) x VMT	0.006	tons
Site Work - 10000 sqft	Material Movement (Unpaved Roads)	s = Surface material silt content	0.043	fraction
Site Work - 10000 sqft	Material Movement (Unpaved Roads)	Wt. = Mean vehicle weight	32	tons
Site Work - 10000 sqft	Material Movement (Unpaved Roads)	VMT = Vehicle miles traveled	2605	miles
Site Work - 10000 sqft	Material Movement (Unpaved Roads)	PM10 = 1.5 x [(s/12)^0.9] x [(Wt./3)^0.45] x VMT	0.036	tons
Site Work - 10000 sqft	Material Movement (Paved Roads)	sL = Road surface silt loading	0.1	g/m3
Site Work - 10000 sqft	Material Movement (Paved Roads)	Wt. = Mean vehicle weight	32	tons
Site Work - 10000 sqft	Material Movement (Paved Roads)	VMT = Vehicle miles traveled	2580	miles
Site Work - 10000 sqft	Material Movement (Paved Roads)	PM10 = 0.0022 x (sL^0.91) x (Wt^1.02) x VMT	0.012	tons
Site Work - 10000 sqft	Soil Handling	u = Wind speed	5	mph
Site Work - 10000 sqft	Soil Handling	m = Moisture content	0.25	fraction
Site Work - 10000 sqft	Soil Handling	T = Mass of aggregate storage pile = L x W x 0.5 x 110 / 2000	275	tons
Site Work - 10000 sqft	Soil Handling	PM10 = T x 0.35 x 0.0032 x [(u/5)^1.3] / [(m/2)^1.4]	0.003	tons
Site Work - 10000 sqft	Unstabilized Land and Wind Erosion	A = Area affected = L x W / 43560.0	0.23	acres

Project Type	Construction Activity	Calculation	Input	Units
Site Work - 10000 sqft	Unstabilized Land and Wind Erosion	TPConv = TSP/PM10 conversion	0.5	fraction
Site Work - 10000 sqft	Unstabilized Land and Wind Erosion	CE = Control efficiency	0.630	fraction
Site Work - 10000 sqft	Unstabilized Land and Wind Erosion	t = year (e.g. 0.65 year)	1	years
Site Work - 10000 sqft	Unstabilized Land and Wind Erosion	PM10 = 0.38 x A x TPConv x (1-CE) x t	0.016	tons
Taxiway Exit	Asphalt Drying	A = Area of land affected = L x W x 0.0929	83842	m2
Taxiway Exit	Asphalt Drying	Emission Factor	0.053	ton/acre
Taxiway Exit	Asphalt Drying	Conversion Factor m2 per acre	4047	m2/acre
Taxiway Exit	Asphalt Drying	VOC = EF x A / 4046.86	1.10	tons
Taxiway Exit	Material Movement (Unpaved Roads)	s = Surface material silt content	0.043	fraction
Taxiway Exit	Material Movement (Unpaved Roads)	Wt. = Mean vehicle weight	32	tons
Taxiway Exit	Material Movement (Unpaved Roads)	VMT = Vehicle miles traveled	26832	miles
Taxiway Exit	Material Movement (Unpaved Roads)	PM10 = 1.5 x [(s/12)^0.9] x [(Wt./3)^0.45] x VMT	0.37	tons
Taxiway Exit	Material Movement (Paved Roads)	sL = Road surface silt loading	0.1	g/m3
Taxiway Exit	Material Movement (Paved Roads)	Wt. = Mean vehicle weight	32	tons
Taxiway Exit	Material Movement (Paved Roads)	VMT = Vehicle miles traveled	24510	miles
Taxiway Exit	Material Movement (Paved Roads)	PM10 = 0.0022 x (sL^0.91) x (Wt^1.02) x VMT	0.114	tons
Taxiway Exit	Unstabilized Land and Wind Erosion	A = Area affected = L x W / 43560.0	20.7	acres
Taxiway Exit	Unstabilized Land and Wind Erosion	TPConv = TSP/PM10 conversion	0.5	fraction
Taxiway Exit	Unstabilized Land and Wind Erosion	CE = Control efficiency	0.63	fraction
Taxiway Exit	Unstabilized Land and Wind Erosion	t = year (e.g. 0.65 year)	1	years
Taxiway Exit	Unstabilized Land and Wind Erosion	PM10 = 0.38 x A x TPConv x (1-CE) x t	1.46	tons
Taxiway Exit	Soil Handling	u = Wind speed	5	mph
Taxiway Exit	Soil Handling	m = Moisture content	0.25	fraction
Taxiway Exit	Soil Handling	T = Mass of aggregate storage pile = L x W x 0.5 x 110 / 2000	7.80E-09	tons
Taxiway Exit	Soil Handling	PM10 = T x 0.35 x 0.0032 x [(u/5)^1.3] / [(m/2)^1.4]	511	lbs

Project Type	Construction Activity	Calculation	Input	Units
Terminal Apron	Asphalt Drying	A = Area of land affected = L x W x 0.0929	2028	m2
Terminal Apron	Asphalt Drying	Emission Factor	0.053	ton/acre
Terminal Apron	Asphalt Drying	Conversion Factor m2 per acre	4047	m2/acre
Terminal Apron	Asphalt Drying	VOC = EF x A / 4046.86	0.027	tons
Terminal Apron	Material Movement (Unpaved Roads)	s = Surface material silt content	0.043	fraction
Terminal Apron	Material Movement (Unpaved Roads)	Wt. = Mean vehicle weight	32	tons
Terminal Apron	Material Movement (Unpaved Roads)	VMT = Vehicle miles traveled	5246	miles
Terminal Apron	Material Movement (Unpaved Roads)	PM10 = 1.5 x [(s/12)^0.9] x [(Wt./3)^0.45] x VMT	0.072	tons
Terminal Apron	Material Movement (Paved Roads)	sL = Road surface silt loading	0.1	g/m3
Terminal Apron	Material Movement (Paved Roads)	Wt. = Mean vehicle weight	32	tons
Terminal Apron	Material Movement (Paved Roads)	VMT = Vehicle miles traveled	5160	miles
Terminal Apron	Material Movement (Paved Roads)	PM10 = 0.0022 x (sL^0.91) x (Wt^1.02) x VMT	0.024	tons
Terminal Apron	Concrete Mixing/Batching	V = Volume of asphalt = 0.111 x L x W x 1.25 / 3	1009.6	yd3
Terminal Apron	Concrete Mixing/Batching	PM10 = 0.037 x V	0.019	tons
Terminal Apron	Unstabilized Land and Wind Erosion	A = Area affected = L x W / 43560.0	0.5	acres
Terminal Apron	Unstabilized Land and Wind Erosion	TPConv = TSP/PM10 conversion	0.5	fraction
Terminal Apron	Unstabilized Land and Wind Erosion	CE = Control efficiency	0.63	fraction
Terminal Apron	Unstabilized Land and Wind Erosion	t = year (e.g. 0.65 year)	1	years
Terminal Apron	Unstabilized Land and Wind Erosion	PM10 = 0.38 x A x TPConv x (1-CE) x t	0.035	tons
Terminal Apron	Soil Handling	u = Wind speed	5	mph
Terminal Apron	Soil Handling	m = Moisture content	0.25	fraction
Terminal Apron	Soil Handling	T = Mass of aggregate storage pile = L x W x 0.5 x 110 / 2000	600	tons
Terminal Apron	Soil Handling	PM10 = T x 0.35 x 0.0032 x [(u/5)^1.3] / [(m/2)^1.4]	0.006	tons

* Conservatively set control efficiency to zero. Watering will be performed once every 2 hours when winds are greater than 5mph, therefore actual control efficiency will be greater than zero.

Table D2. 2022 construction-phase fugitives criteria air pollutant emissions.

Project Type	Construction Activity	Emissions (tons/yr)					
		NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Building - 10000 sqft- 1 story	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.79E-04	8.69E-05
Building - 10000 sqft- 1 story	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.11E-04	2.03E-04
Building - 10000 sqft- 1 story	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.39E-03	2.39E-04
Demolition - Asphalt	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-03	3.74E-04
Demolition - Asphalt	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-02	2.14E-03
Demolition - Asphalt	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-03	1.89E-04
Demolition - Asphalt	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-04	1.48E-04
Demolition - Concrete	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.90E-03	1.03E-03
Demolition - Concrete	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E-02	5.89E-03
Demolition - Concrete	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-03	2.30E-04
Demolition - Concrete	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-04	1.48E-04
Drainage System	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.78E-04	3.78E-05
Drainage System	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-01	2.40E-02
Drainage System	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E-02	4.20E-03
Fencing	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-03	1.17E-04
Site Work - 10000 sqft	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.94E-04	9.84E-05
Site Work - 10000 sqft	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.30E-05	1.40E-05
Site Work - 10000 sqft	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-04	7.97E-05

Project Type	Construction Activity	Emissions (tons/yr)					
		NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Taxiway Exit	Asphalt Drying	0.00E+00	0.00E+00	3.61E-02	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-02	1.21E-03
Taxiway Exit	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.74E-03	9.35E-04
Taxiway Exit	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.78E-02	7.18E-03
Taxiway Exit	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-10	3.85E-11
Terminal Apron	Asphalt Drying	0.00E+00	0.00E+00	8.73E-04	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-03	2.36E-04
Terminal Apron	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.87E-04	1.97E-04
Terminal Apron	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.14E-04	9.21E-05
Terminal Apron	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-03	1.74E-04
Terminal Apron	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-04	3.05E-05

Table D3. 2022 construction-phase fugitives greenhouse gas emissions.

Project Type	Construction Activity	Emissions (tons/yr)			
		CH_4	N_2O	CO_2	CO_2e
Building - 10000 sqft- 1 story	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Building - 10000 sqft- 1 story	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Building - 10000 sqft- 1 story	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Emissions (tons/yr)			
		CH_4	N_2O	CO_2	CO_2e
Demolition - Concrete	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Asphalt Drying	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Asphalt Drying	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Emissions (tons/yr)			
		CH_4	N_2O	CO_2	CO_2e
Terminal Apron	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table D4. 2023 construction-phase fugitives criteria air pollutant emissions.

Project Type	Construction Activity	Emissions (tons/yr)					
		NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Building - 10000 sqft- 1 story	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.82E-03	1.02E-03
Building - 10000 sqft- 1 story	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.55E-03	2.39E-03
Building - 10000 sqft- 1 story	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-02	2.82E-03
Demolition - Asphalt	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.94E-02	4.41E-03
Demolition - Asphalt	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-01	2.51E-02
Demolition - Asphalt	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.23E-02	2.23E-03
Demolition - Asphalt	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.95E-03	1.74E-03
Demolition - Concrete	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.12E-02	1.22E-02
Demolition - Concrete	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.63E-01	6.94E-02
Demolition - Concrete	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E-02	2.71E-03
Demolition - Concrete	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.95E-03	1.74E-03
Drainage System	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.45E-03	4.45E-04
Drainage System	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E+00	2.82E-01
Drainage System	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.30E-01	4.94E-02
Fencing	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.07E-03	3.10E-04

Project Type	Construction Activity	Emissions (tons/yr)					
		NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Fencing	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-02	1.77E-03
Fencing	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-02	1.77E-03
Fencing	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.99E-03	1.50E-03
Site Work - 10000 sqft	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-02	1.38E-03
Site Work - 10000 sqft	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.63E-03	1.16E-03
Site Work - 10000 sqft	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-03	1.64E-04
Site Work - 10000 sqft	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.26E-03	9.39E-04
Taxiway Exit	Asphalt Drying	0.00E+00	0.00E+00	4.25E-01	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-01	1.42E-02
Taxiway Exit	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.40E-02	1.10E-02
Taxiway Exit	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.63E-01	8.45E-02
Taxiway Exit	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.02E-09	4.53E-10
Terminal Apron	Asphalt Drying	0.00E+00	0.00E+00	1.03E-02	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.78E-02	2.78E-03
Terminal Apron	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.27E-03	2.32E-03
Terminal Apron	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.23E-03	1.08E-03
Terminal Apron	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-02	2.04E-03
Terminal Apron	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.39E-03	3.59E-04

Table D5. 2023 construction-phase fugitives greenhouse gas emissions.

Project Type	Construction Activity	Emissions (tons/yr)			
		CH_4	N_2O	CO_2	CO_2e
Building - 10000 sqft- 1 story	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Building - 10000 sqft- 1 story	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Building - 10000 sqft- 1 story	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Emissions (tons/yr)			
		CH_4	N_2O	CO_2	CO_2e
Taxiway Exit	Asphalt Drying	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Asphalt Drying	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table D6. 2024 construction-phase fugitives criteria air pollutant emissions.

Project Type	Construction Activity	Emissions (tons/yr)					
		NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Building - 10000 sqft- 1 story	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.56E-03	6.84E-04
Building - 10000 sqft- 1 story	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.38E-03	1.60E-03
Building - 10000 sqft- 1 story	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-02	1.88E-03
Demolition - Asphalt	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.95E-02	4.42E-03
Demolition - Asphalt	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-01	2.52E-02
Demolition - Asphalt	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-02	2.24E-03
Demolition - Asphalt	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.97E-03	1.74E-03
Demolition - Concrete	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.14E-02	1.22E-02

Project Type	Construction Activity	Emissions (tons/yr)					
		NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Demolition - Concrete	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.64E-01	6.96E-02
Demolition - Concrete	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E-02	2.71E-03
Demolition - Concrete	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.97E-03	1.74E-03
Drainage System	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.46E-03	4.46E-04
Drainage System	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E+00	2.83E-01
Drainage System	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.31E-01	4.96E-02
Fencing	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-02	1.38E-03
Site Work - 10000 sqft	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.65E-03	1.16E-03
Site Work - 10000 sqft	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-03	1.65E-04
Site Work - 10000 sqft	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.28E-03	9.41E-04
Taxiway Exit	Asphalt Drying	0.00E+00	0.00E+00	4.26E-01	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	1.43E-02
Taxiway Exit	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-02	1.10E-02
Taxiway Exit	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.65E-01	8.47E-02
Taxiway Exit	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.03E-09	4.54E-10
Terminal Apron	Asphalt Drying	0.00E+00	0.00E+00	1.03E-02	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-02	2.79E-03

Project Type	Construction Activity	Emissions (tons/yr)					
		NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Terminal Apron	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.30E-03	2.32E-03
Terminal Apron	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.25E-03	1.09E-03
Terminal Apron	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-02	2.05E-03
Terminal Apron	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-03	3.60E-04

Table D7. 2024 construction-phase fugitives greenhouse gas emissions.

Project Type	Construction Activity	Emissions (tons/yr)			
		CH_4	N_2O	CO_2	CO_2e
Building - 10000 sqft- 1 story	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Building - 10000 sqft- 1 story	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Building - 10000 sqft- 1 story	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Emissions (tons/yr)			
		CH_4	N_2O	CO_2	CO_2e
Fencing	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Asphalt Drying	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Asphalt Drying	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table D8. 2025 construction-phase fugitives criteria air pollutant emissions.

Project Type	Construction Activity	Emissions (tons/yr)					
		NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Building - 10000 sqft- 1 story	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Building - 10000 sqft- 1 story	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Building - 10000 sqft- 1 story	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-02	2.19E-03
Demolition - Asphalt	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.31E-02	1.25E-02
Demolition - Asphalt	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-02	1.11E-03
Demolition - Asphalt	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.45E-03	8.62E-04
Demolition - Concrete	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.03E-02	6.04E-03
Demolition - Concrete	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-01	3.44E-02
Demolition - Concrete	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-02	1.34E-03
Demolition - Concrete	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.45E-03	8.62E-04
Drainage System	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.07E-03	4.07E-04
Drainage System	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E+00	2.58E-01
Drainage System	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.02E-01	4.52E-02
Fencing	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.85E-03	6.85E-04
Site Work - 10000 sqft	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-03	5.75E-04
Site Work - 10000 sqft	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.43E-04	8.15E-05
Site Work - 10000 sqft	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-03	4.66E-04

Project Type	Construction Activity	Emissions (tons/yr)					
		NOx	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Taxiway Exit	Asphalt Drying	0.00E+00	0.00E+00	2.11E-01	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.05E-02	7.05E-03
Taxiway Exit	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.18E-02	5.46E-03
Taxiway Exit	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-01	4.19E-02
Taxiway Exit	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-09	2.25E-10
Terminal Apron	Asphalt Drying	0.00E+00	0.00E+00	5.10E-03	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-02	1.38E-03
Terminal Apron	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.60E-03	1.15E-03
Terminal Apron	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.58E-03	5.38E-04
Terminal Apron	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.76E-03	1.01E-03
Terminal Apron	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-03	1.78E-04

Table D9. 2025 construction-phase fugitives greenhouse gas emissions.

Project Type	Construction Activity	Emissions (tons/yr)			
		CH_4	N_2O	CO_2	CO_2e
Building - 10000 sqft- 1 story	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Building - 10000 sqft- 1 story	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Building - 10000 sqft- 1 story	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Asphalt	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Emissions (tons/yr)			
		CH_4	N_2O	CO_2	CO_2e
Demolition - Concrete	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Demolition - Concrete	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Drainage System	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fencing	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Site Work - 10000 sqft	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Asphalt Drying	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Taxiway Exit	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Asphalt Drying	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Asphalt Storage and Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Material Movement (Unpaved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Project Type	Construction Activity	Emissions (tons/yr)			
		CH_4	N_2O	CO_2	CO_2e
Terminal Apron	Material Movement (Paved Roads)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Concrete Mixing/Batching	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Unstabilized Land and Wind Erosion	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Terminal Apron	Soil Handling	0.00E+00	0.00E+00	0.00E+00	0.00E+00

APPENDIX E – AGENCY SCOPING LETTERS AND RESPONSES

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

March 1, 2022

Sandra Lancaster
Environmental Program Manager
DFW International Airport
PO Box 619428
DFW Airport, TX 75261

Via: **E-mail**

Re: **TCEQ NEPA Request #2022-019. Central Terminal Area Redevelopment. Dallas and Tarrant Counties.**

Dear Ms. Lancaster,

The Texas Commission on Environmental Quality (TCEQ) has reviewed the above-referenced project and offers the following comments:

In accordance with the general conformity regulations in 40 CFR Part 93, these planned actions were reviewed for air quality impact. The actions will occur in the Dallas and Tarrant County, which is designated nonattainment for the ozone National Ambient Air Quality Standards (NAAQS) with a classification of serious for the 2008 eight-hour ozone NAAQS and a classification of marginal for the 2015 eight-hour ozone NAAQS. General conformity requirements apply for federal actions in Dallas and Tarrant County according to the higher, serious classification. In addition, the area is expected to be reclassified to severe for the 2008 eight-hour ozone NAAQS and to moderate for the 2015 eight-hour ozone NAAQS.

Volatile organic compounds (VOC) and nitrogen oxides (NOX) are precursor pollutants that lead to the formation of ozone. A general conformity demonstration may be required when the total projected direct and indirect VOC or NOX emissions from an applicable action are equal to or exceed the de minimis emissions level, which is 50 tons per year (tpy) for ozone NAAQS serious nonattainment areas and 25 tpy for severe areas. Based on the information provided to the TCEQ, a general conformity demonstration may be required for one or more of the proposed actions. Please consult with the Air Quality Division of the TCEQ as you evaluate these actions for general conformity applicability.

The Office of Water does not anticipate significant long term environmental impacts from this project as long as construction and waste disposal activities associated with it are completed in accordance with applicable local, state, and federal environmental permits, statutes, and regulations. We recommend that the applicant take necessary steps to ensure that best management practices are used to control runoff from construction sites to prevent detrimental impact to surface and ground water.

The management of industrial and hazardous waste at the site including waste treatment, processing, storage and/or disposal is subject to state and federal regulations. Construction and Demolition waste must be sent for recycling or disposal at a facility authorized by the

TCEQ. Special waste authorization may be required for the disposal of asbestos containing material.

Thank you for the opportunity to review this project. If you have any questions, please contact the agency NEPA coordinator at (512) 239-2619 or NEPA@tceq.texas.gov

Sincerely,

Ryan Vise,
Division Director
External Relations

11 February 2022

Texas Commission on Environmental Quality
Sam Short, Deputy Director
Air Permits Division
PO Box 13087 MC 206
Austin, Texas 78711-3087

RE: Project Review for the Central Terminal Area Redevelopments, Dallas Fort Worth International Airport, Cities of Euless, Irving, and Grapevine, Dallas and Tarrant Counties, Texas

Dear Mr. Short,

The Dallas Fort Worth International Airport (DFW) is developing four separate single and complete actions associated with the Central Terminal Area Redevelopment. These three actions include: (1) Central Terminal Area, which includes Terminal C Renovations, Terminal C Garage Updates, Terminal C-Pier, and the Terminal A-Pier; (2) Airfield Efficiency Improvements including the replacement of the Northeast Lighting Vault; (3) Services Delivery System (SDS) Supplemental Electric Central Utility Plant (CUP) and Associated New Pump House and Boiler House; and (4) Project Integration and Organization/Design-Build (PIO/DB) Building. The first three projects are in close physical proximity; however, due to construction schedules, the Federal Aviation Administration (FAA) has determined that the four actions will be reviewed independently under separate Environmental Assessments (EA) and Categorical Exclusions (CATEX) in accordance with the National Environmental Policy Act (NEPA) of 1969, the President's Council on Environmental Quality (CEQ) regulations to implement NEPA (40 Code of Federal Regulations [CFR] Parts 1500 to 1508), and the FAA regulations implementing NEPA (44 CFR Part 10). FAA is required to consider potential environmental impacts before funding or approving actions and projects. As part of this process, DFW requests your preliminary review for compliance with all federal and state laws and regulations including the Endangered Species Act (ESA), U.S. Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act (MBTA).

DFW respectfully requests that you provide comments or written concurrence within 30 days from the date of this letter. **Attachment A** contains all figures and **Attachment B** contains the delineation report. All comments or written concurrence with the findings can be sent to ***Ms. Sandra Lancaster, DFW Environmental Program Manager*** at

3003 South Service Road, EAD Annex, Building A
PO Box 619428
DFW Airport, Texas 75261
(o) 972-973-5573
slancaster@dfwairport.com

PROPOSED ACTIONS

DFW is respectfully requesting your review and comment on four separate actions that will be undergoing NEPA review. The first three projects are occurring on developed areas of DFW associated with Terminals A and C along with the adjacent Airfield. The PIO/DB Building will be constructed on a disturbed area within the Southwest Consolidated Campus. **Attachment A**, **Figures 1**, **2A**, and **2B** provide an aerial overview of the discrete project locations and a topographic overview on the historic and recent U.S. Geological Survey (USGS) quadrangle maps. **Attachment A, Figure 3** illustrates the soil map units within the project area, **Figure 4** illustrates the Federal Emergency Management Agency (FEMA) mapped floodplains, and **Figure 5** illustrates the delineated aquatic resources under the pre-2015 definitions. **Sites 2**, **3**, and **4** on the attached figures are the main project area components for Terminal C activities and **Site 1** encompasses the Terminal A activities. **Sites 8** through **10** are the construction staging, fabrication yards, and employee parking for the during of construction for the Central Terminal Area. **Site 6** is the Terminal C Garage laydown area. **Site 7** is the Airfield Improvement construction staging area. **Site 5** is the SDS Supplemental Electric CUP laydown area. The PIO/DB Building is located within **Sites 12** and **13**.

Central Terminal Area

The Proposed Action within the Central Terminal Area is associated with the need to increase gate capacity to meet current demand and projected increased demand for air travel from and to DFW; and to improve passenger experience within Terminal C by modernizing flow, increasing concession areas, and providing new boarding facilities. FAA has determined that due to the potential air quality effects, this proposed action will be analyzed as an EA. Specific elements associated with this proposed action include:

- Construction of a new two-level pier structure to Terminal A, including 10 new gates, which will provide a net increase of 5 gates totaling 130,000 square feet of new construction;
- Construction of a new two-level pier structure to Terminal C, including 9 new gates, which will provide a net increase of 4 gates totaling 115,000 square feet of new construction;
- Renovations within Terminal C, which include relocation of the South Baggage Hall, addition to the South, Center, and North Ticketing Halls, Renovation of the Ticketing Halls, System Upgrades, and a new Loading Dock; and
- Replacement and Renovation of the Terminal C Parking Garages and Associated Roadways.

Airfield Efficiency Improvements

The Proposed Action within the Airfield will include infill in several infield areas to allow the efficient transition of aircraft between the DFW taxiway system and the East Ramp Area. Currently, transition of aircraft between the DFW taxiway system and the East Ramp Area is inefficient and requires unnecessary fuel burn. Changes made as part of the Proposed Action will enhance airfield efficiency and safety by allowing for more efficient aircraft movements to and from the East Ramp Area while reducing long term fuel burn by aircraft. FAA has determined that an EA will be required due to the presence of hazardous materials within the Northeast Lighting Vault, which is being replaced as part of this Proposed Action. The Proposed Action consists of airside improvements to improve operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to/from the existing terminal area. Specific elements associated with this Proposed Action include:

- Creation or relocation of Aircraft Entry/Exit Positions along Taxiways G, K, and Z;
- Replacement and relocation of existing ancillary facilities (i.e., Northeast Lighting Vault, Terminal A South Triturator, etc.);
- Infill of four infield areas with concrete apron pavement;
- Underground utility work related to the above-mentioned improvements (e.g., electric, sanitary sewer, stormwater management system, potable water, and communications infrastructure); and

- Relocation of JY Taxiway connection to improve aircraft operations and optimize overall terminal area apron.

SDS, Supplemental Electric CUP, and Associated New Pump House and Boiler House

This Proposed Action is due to the age of the existing boiler house at the existing CUP, which has exceeded its useful life. The existing CUP and boiler house do not provide system resiliency or allow for effective use of renewable energy sources. Under this Proposed Action, aging infrastructure will be replaced and improved to provide more efficient use within Terminal C and provide overall system redundancy to the DFW. FAA has determined that an EA will be required due to the presence of hazardous materials within the existing infrastructure, which is being replaced as part of this Proposed Action. This Proposed Action includes the following utility improvements to Terminal C:

- Construction of a new Terminal C Boiler House and South Pump Room (approximately 5,500 square feet) to supply hot and chilled water;
- Construction of a new Terminal C North Pump Room (approximately 1,800 square feet);
- New gas service yard and new electrical service for new Terminal C Garage, Boiler House, and Pump Rooms; and
- Construction of a new Electric Brute Force CUP.

PIO Building

This Proposed Action would include the design, construction, and delivery of a PIO-DB to accommodate DFW project management, Central Terminal Area Development general contractors, designers, and subcontractors responsible for the delivery of the overall project. This will be a temporary facility that will be operational from September 2022 through September 2023. It will be a 1-story approximately 40,000 square foot fully furnished facility with 250 surface parking spaces occupying 10 acres. Currently, DFW does not have the building space or locations near the construction staging areas to office the staff necessary to oversee and manage the planning and construction scopes. By consolidating all project staff in one building it will provide efficiency in coordination and management of project activities. FAA determined that since this building will be constructed in a currently disturbed area designated for these uses that a CATEX would be the appropriate level of analysis.

AFFECTED RESOURCES OF THE PROPOSED ACTION

Resource area analyses will be undertaken during the NEPA processes. Anticipated potential effects that will likely be mitigated include air quality and noise associated with the Central Terminal Area Improvements and hazardous materials and wastes that are located within the Airfield Improvements project areas and within the SDS, Supplemental Electric CUP project areas. Socioeconomic conditions are not likely to be adversely affected based on the anticipated increased air traffic volume associated with the Central Terminal Area Improvements. DFW is currently in coordination with the Texas Historical Commission (THC) under the National Historic Preservation Act (NHPA) of 1966, as amended, specifically, Section 106, to address archeological and above-ground historic resources associated with the Central Terminal Area Improvements. The PIO/DB Building and the SDS, Supplemental Electric CUP activities have received THC concurrence of “no adverse effects” to archeological or historic resources.

Integrated Environmental Solutions, LLC (IES), under contract to DFW, performed a site visit and desktop analysis of the specific project locations associated with each of the proposed actions 21 September 2021 to provide a delineation of waters of the United States and to perform a protected species habitat assessment. Biological resources and water resources within the proposed project areas are limited to non-jurisdictional features associated with stormwater management and control and common urban and urban edge landscapes providing little to no habitat value. As such, the proposed projects are not expected to have any impacts on any federally or state-listed threatened or endangered species.

Waters of the United States

The September 2021 delineation identified three non-jurisdictional features associated with past construction activities at DFW Airport. A drainage ditch associated with DFW's current underground stormwater management system was identified within the proposed footprint of the new Boiler House to support the SDS, Supplemental Electric CUP. A detention pond and associated wetland drainage were located within an existing construction staging area to the east of Runway 17C/35C and Runway 17L/35R. These features were man-made as part of a stormwater control system that did not replace or connect two waters of the United States and they have no more than a speculative connection to a Traditional Navigable Water (TNW); therefore, they would not be regulated under Clean Water Act (CWA) Section 404.

Vegetation Communities

The project areas consist of four distinct vegetation communities: **urban matrix**, **frequently maintained grassland**, **infrequently maintained grassland**, and **shrub-scrub upland**. The **urban matrix** was found throughout a majority of the Central Terminal Areas and was comprised of concrete lots, roads, buildings, and active construction areas. The project area for the SDS, Supplemental Electric CUP, and the Boiler House and Pump House contained the **frequently maintained grassland** vegetation community, dominated by mowed Bermudagrass (*Cynodon dactylon*). The **infrequently maintained grassland** was observed in the PIO/DB Building project area and was comprised of Maximilian sunflower (*Helianthus maximiliani*), meadow dropseed (*Sporobolus compositus*), Johnsongrass (*Sorghum halepense*), white heath aster (*Symphyotrichum ericoides*), King Ranch bluestem (*Bothriochloa ischaemum*), sumpweed (*Iva annua*), Canada goldenrod (*Solidago canadensis*), prairie broomweed (*Amphiachyris dracunculoides*), Bermudagrass, and annual sunflower (*Helianthus annuus*). The **shrub-scrub upland** vegetation community was also observed on the western side of the PIO/DB Building project area, dominated by honey mesquite (*Prosopis glandulosa*), sugarberry (*Celtis laevigata*), giant ragweed (*Ambrosia trifida*), Johnsongrass, Bermudagrass, and annual sunflower.

Federally Protected Species

According to the U.S. Fish and Wildlife Service (USFWS), four species are listed as federally protected (i.e., threatened or endangered) with the potential to occur within Dallas and Tarrant Counties; these include: Golden-cheeked Warbler (*Dendroica chrysoparia*), Piping Plover (*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), and Whooping Crane (*Grus americana*). Two of these species are conditionally listed as threatened on the basis that the proposed project is for wind energy production: Red Knot and Piping Plover. No federally listed critical habitat for these species is located within the vicinity of the project areas.

The Golden-cheeked Warbler, Red Knot, Piping Plover, and Whooping Crane are listed federally as threatened and endangered species for Dallas and Tarrant Counties. These projects will not be related to wind energy; therefore, the Red Knot and Piping Plover will not be affected.

- The Golden-cheeked Warbler requires a habitat that includes forested areas dominated by Ashe juniper (*Juniperus ashei*) in mixed stands with various oaks (*Quercus* spp.). This unique vegetation community is not present within the survey area.
- Whooping Cranes utilize estuaries, prairie marshes, moist grasslands, croplands, and will use large shallow wetland areas associated with lakes for roosting and feeding. Although the survey area did contain wetlands, the size and urban location would not be a suitable habitat for Whooping Cranes.
- The monarch butterfly is currently a federal candidate species and has no formal protection. None of the vegetation communities would offer feeding ideal habitat for this species. It could be occasionally observed as stopover habitat along community edges.

In summary, the habitats present within the survey area were not suitable for any of the federally listed threatened or endangered species; nor were the habitats suitable for nesting, feeding, or stopover migration habitat for these species.

Due to a lack of perennial flowing water, there would be no habitat for any mollusk species or for the alligator snapping turtle. The Texas horned lizard is unlikely to occupy any of the vegetation communities within the project area due to dense understory cover and the high urban interface. The black bear is no longer considered extant in the greater Dallas Fort Worth metropolitan area.

Migratory Birds

Affects to migratory birds from the proposed actions are expected to be minimal based on the highly urban nature of the majority of the project areas, the proposed use of LED high efficiency lighting, and DFW's ongoing program to monitor for migratory bird nests prior to any construction activities.

Thank you for your timely review of the enclosed information. If you have any questions, please contact me at 972-973-5573 or via e-mail at slancaster@dfwairport.com

Sincerely,

Dallas Fort Worth International Airport

Sandra Lancaster
Environmental Program Manager

Attachment A
Attachment B

IES File ref: 03.006.096

ATTACHMENT A

Figures

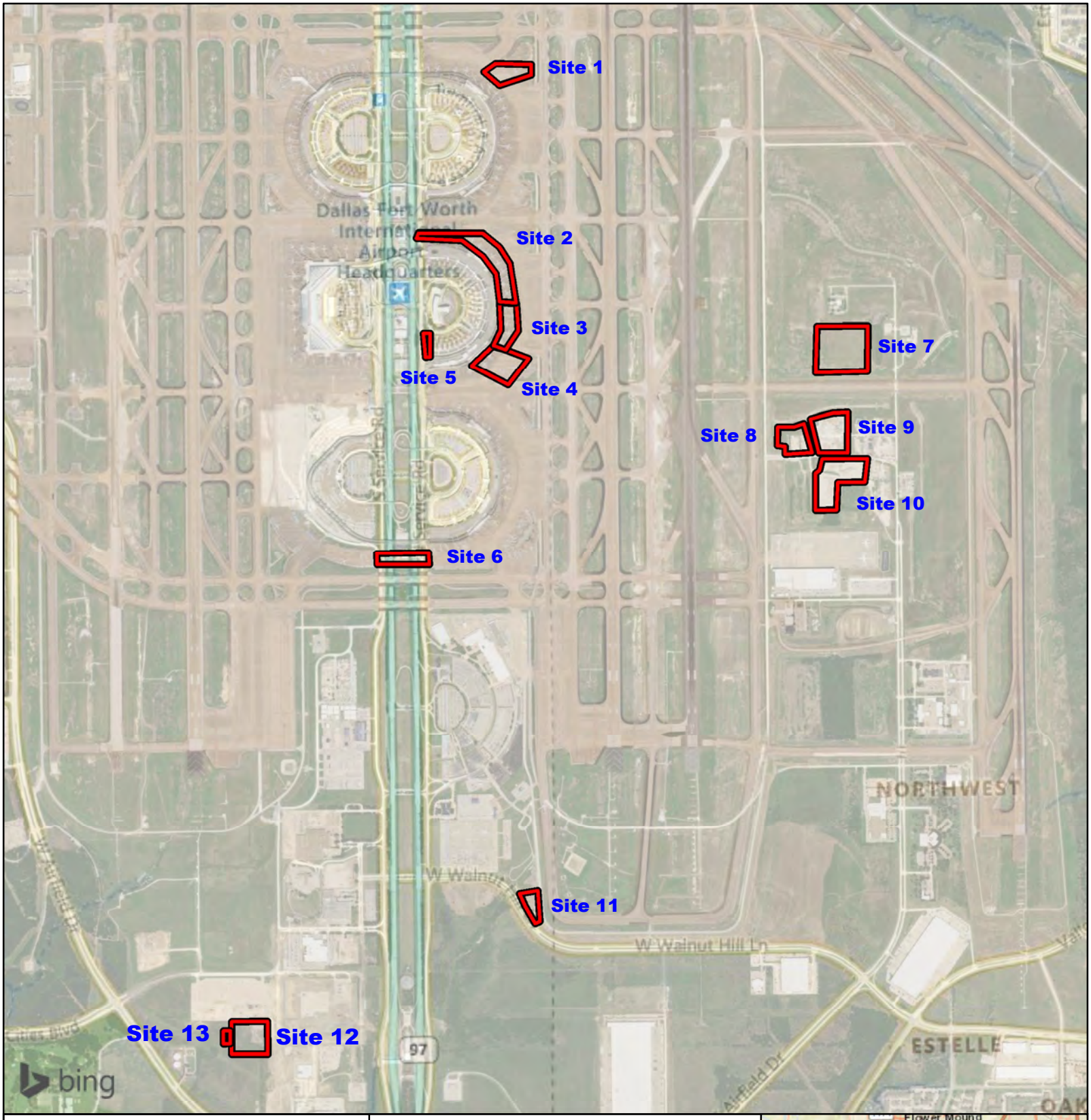

Figure 1.
General Location Map

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
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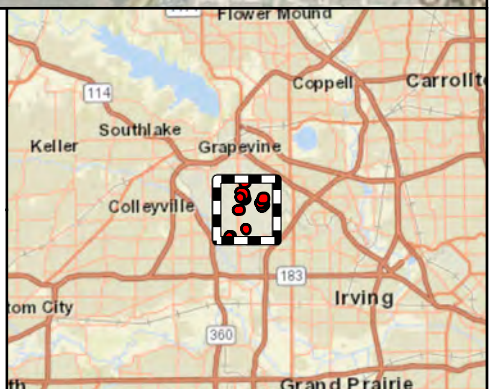
File Ref. 03.006.094
Date: 9/28/2021

Survey Area



Area of Detail

Scale: 1 inch equals 10 miles

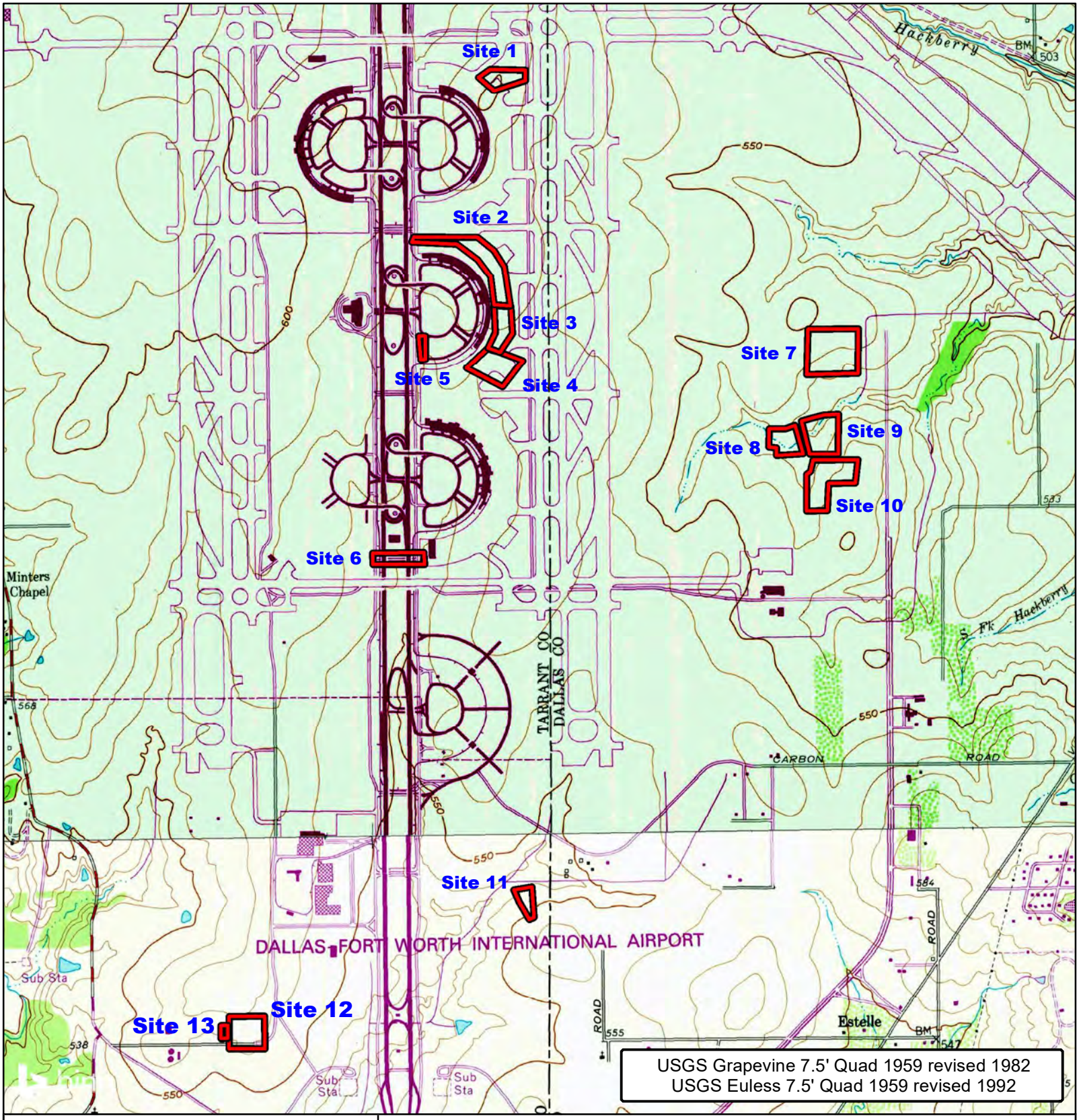


Figure 2A.
Topographic Setting

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

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File Ref. 03.006.094
Date: 9/28/2021

Survey Area

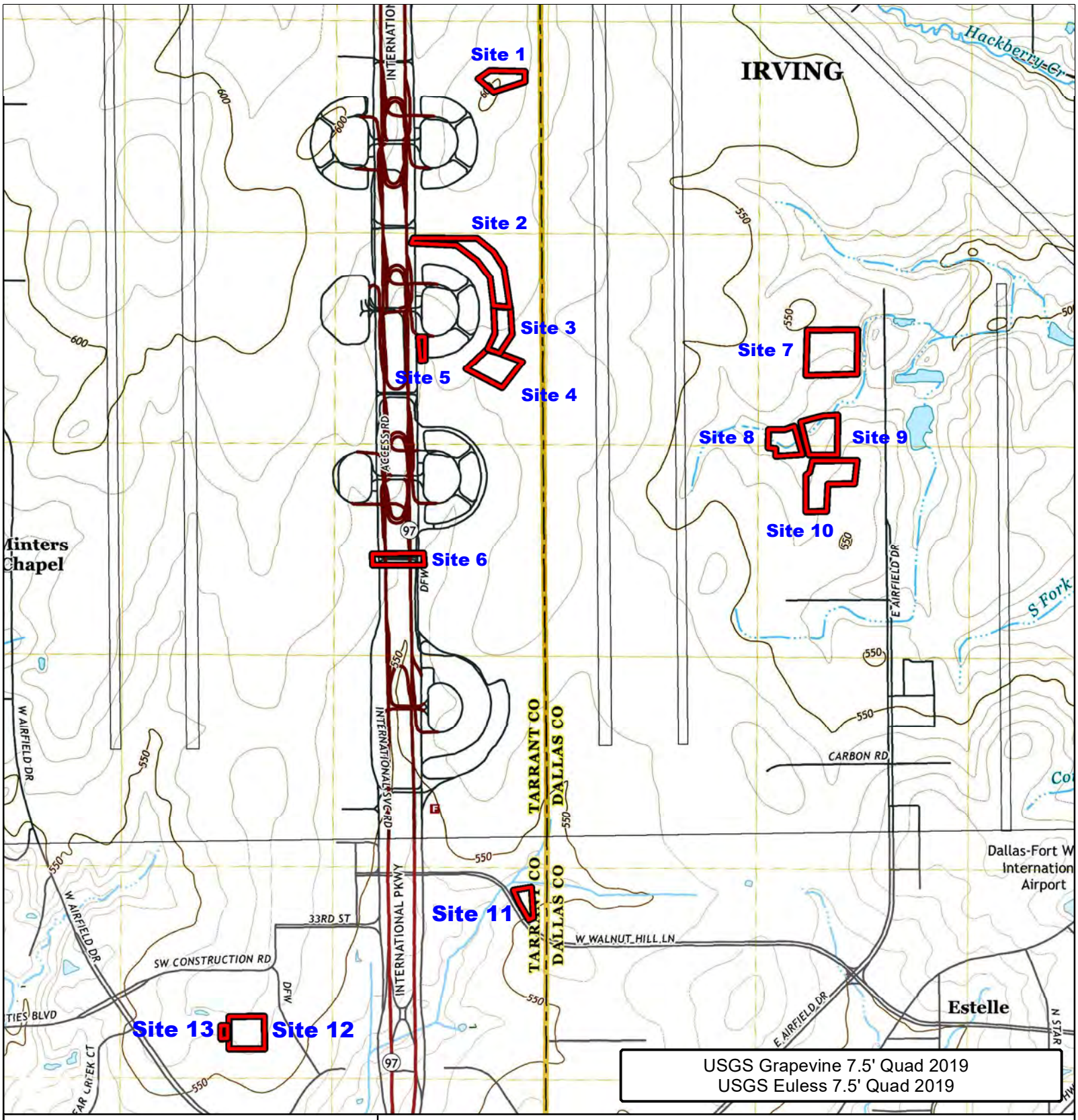

Figure 2B.
Topographic Setting

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

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File Ref. 03.006.094
Date: 9/28/2021

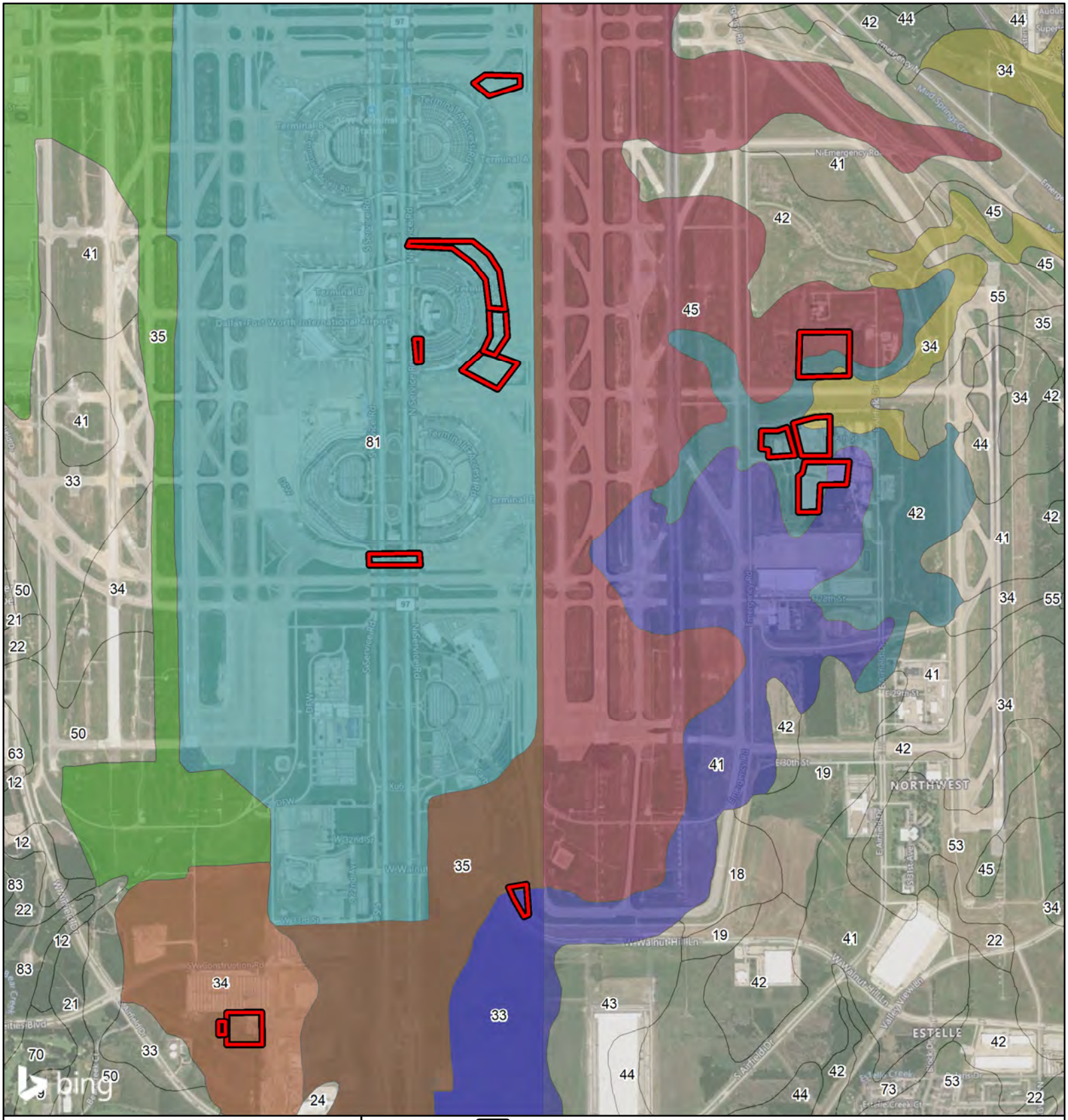

Figure 3.
Soils Map

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
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File Ref. 03.006.094
Date: 9/29/2021

Survey Area
Soil map units outside survey area

Soil Map Units - Dallas County

- 34- Ferris-Heiden complex, 5 to 12 percent slopes
- 41- Heiden clay, 1 to 3 percent slopes
- 42- Heiden clay, 2 to 5 percent slopes, eroded
- 45- Houston Black-Urban land complex, 0 to 4 percent slopes

Soil Map Units - Tarrant County

- 33 - Heiden clay, 1 to 3 percent slopes
- 34 - Houston Black clay, 1 to 3 percent slopes
- 35 - Houston Black-Urban land complex, 1 to 4 percent slopes
- 81 - Urban land

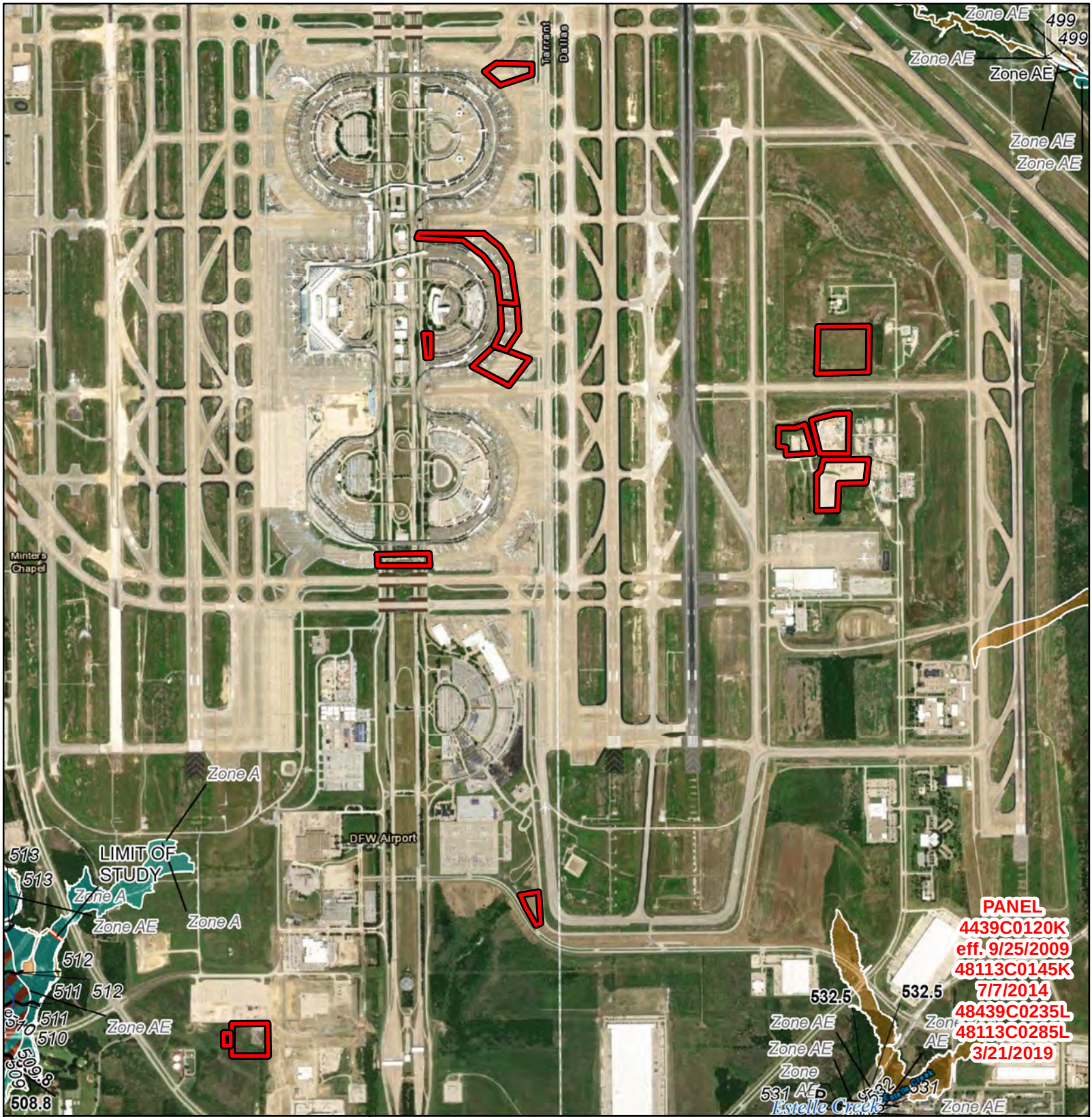

Figure 4.
Federal Emergency Management Agency
Flood Insurance Rate Map

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
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File Ref. 03.006.094
Date: 9/29/2021

Survey Area

FEMA FIRM Zone Descriptions

- Zone X - Areas determined to be outside the 0.2% annual chance floodplain
- Zone X - Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood
- Zone A - Special Flood Hazard Areas subject to inundation by the 1% annual chance flood; No base flood elevations determined
- Zone AE - Special Flood Hazard Areas subject to inundation by the 1% annual chance flood; Base flood elevations determined
- Zone AE - Floodway areas in Zone AE

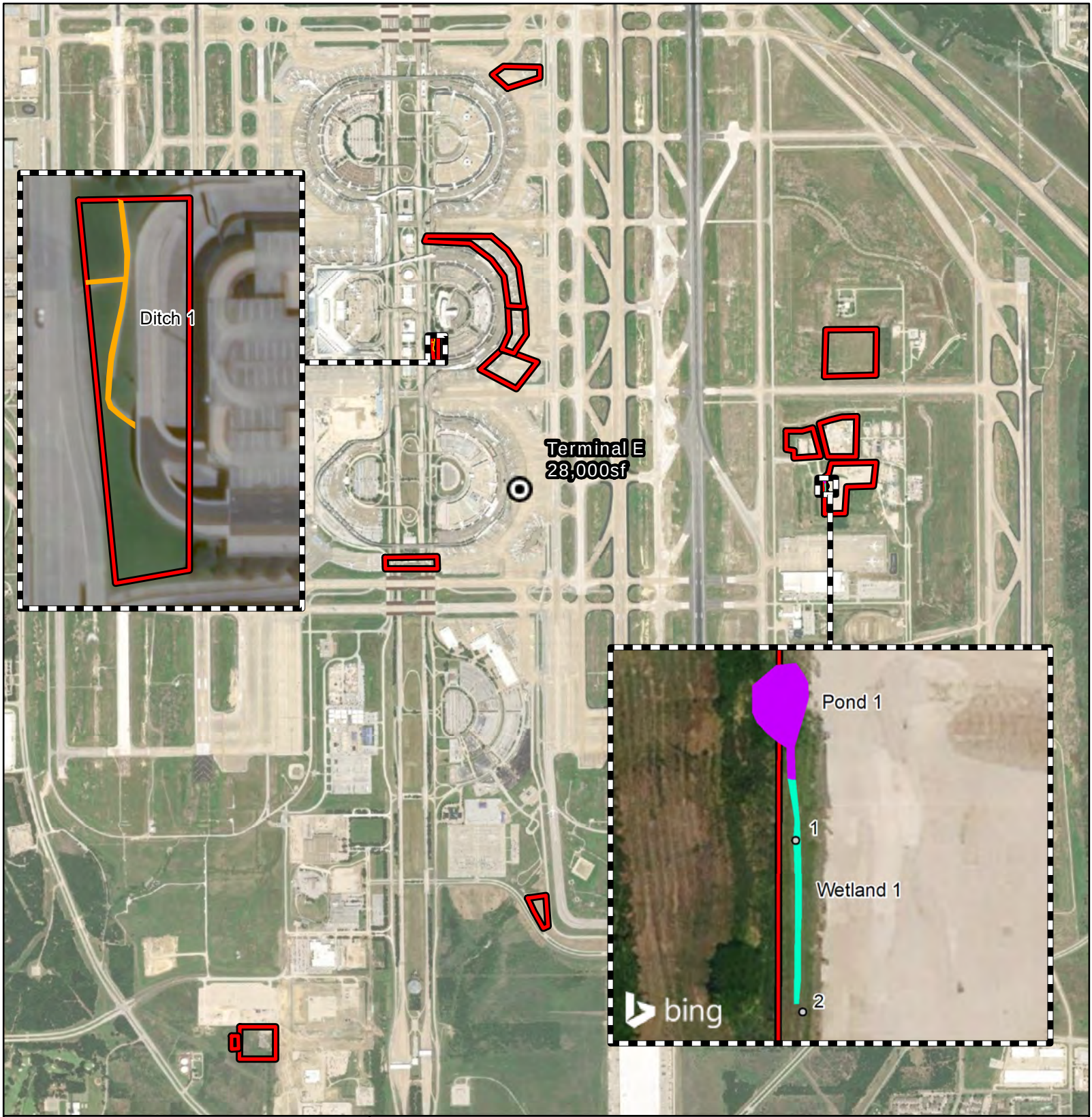

Figure 6.
Pre-2015 Aquatic Features Identified within the Survey Area

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
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File Ref. 03.006.094
Date: 9/29/2021

Survey Area
Wetland Determination Data Form

Aquatic Features Excluded From Jurisdiction

Wetland, Isolated
Ditch, Ephemeral
Artificial Pond

ATTACHMENT B

Delineation of Waters of the United States

integrated environmental solutions

30 September 2021

Ms. Sandy Lancaster
Dallas/Fort Worth International Airport
Environmental Affairs Department
3003 South Service Road, Annex Building A
DFW Airport, Texas 75261-9428

Re: CTA Development Project - Waters of the United States Delineation & Desktop Assessment
Approximately 69 acres across 13 different sites within the DFW International Airport CTA Terminals A and C Development Project located on the DFW International Airport complex, Dallas and Tarrant Counties, Texas

Dear Ms. Lancaster,

Integrated Environmental Solutions, LLC (IES) performed a site survey and desktop review to identify any aquatic features that meet a definition of a water of the United States on approximately 69 acres across 13 different sites within the DFW Airport CTA Terminals A and C Development Project located on the DFW International Airport complex, Dallas and Tarrant Counties, Texas. A desktop evaluation was conducted on Sites 1 through 7 as they were not able to be accessed due to airport regulations. A site survey was conducted on Sites 8 through 13 as they were able to be accessed via public roadways (**Attachment A, Figure 1**). This report will ultimately assess and delineate potentially jurisdictional aquatic features to ensure compliance with Sections 401 and 404 of the Clean Water Act (CWA).

INTRODUCTION

Waters of the United States are protected under guidelines outlined in Sections 401 and 404 of the CWA, in Executive Order (EO) 11990 (Protection of Wetlands), and by the review process of the Texas Commission on Environmental Quality (TCEQ). Agencies that regulate impacts to the nation's water resources within Texas include the U.S. Army Corps of Engineers (USACE), the U.S. Environmental Protection Agency (USEPA), the U.S. Fish and Wildlife Service (USFWS), and the TCEQ. The USACE has the primary regulatory authority for enforcing Section 404 requirements for waters of the United States.

The decision for whether a Section 404 of the CWA permit is required on a property is determined if there are waters of the United States present and the extent of losses of those features. The USACE and EPA have gone through rulemaking to define what is a water of the United States, independently and jointly, several times since the initial CWA. The longest standing definitions of waters of the United States were those published in 1986; however, these definitions were challenged in 2001 and 2007 U.S. Supreme Court decisions. Since then, both the Obama and Trump administration completed rulemaking to modify the definitions of waters of the United States in the Clean Water Rule in 2016 and the Navigable Water Protection Rule (NWPR) in 2020. A recent federal district court decision in Arizona struck down the NWPR but was silent on which definitions of waters of the United States would replace it. As of the date of this letter report, the USACE Fort Worth District has provided verbal guidance that the USACE will be utilizing the pre-2015 definitions (i.e., 1986 definitions combined with the *Rapanos* and *Carabell* U.S. Supreme Court decisions) to define waters of the United States. Please note, at this time there is no written guidance from USACE on this decision and whether the federal district court ruling actually applies nationwide. Furthermore, it is uncertain as to whether there will be any appeal to the federal appellate court. Therefore, this report will analyze all aquatic features within the project site to determine their applicability under both NWPR and the 1986 Rule.

Navigable Waters Protection Rule (Effective 22 June 2020)

The streamlined regulations have redefined waters of the United States as the following at 33 Code of Federal Regulations (CFR) 328.3 (a) as:

1. *The territorial seas, and waters which are currently used or were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters which are subject to the ebb and flow of the tide;*
2. *Tributaries;*
3. *Lakes and ponds, and impoundments of jurisdictional waters; and*
4. *Adjacent wetlands*

The following features are excluded from jurisdiction at 33 CFR 328.3 (b) as:

1. *Lake/pond/impoundment or wetland that does not contribute surface water flow directly or indirectly to an (a)(1) water and is not inundated by flooding from an (a)(1)-(a)(3) water in a typical year, surface water channel that does not contribute surface water flow directly or indirectly to an (a)(1) water in a typical year, or Water or water feature that is not identified in (a)(1)-(a)(4) and does not meet the other (b)(1) sub-categories;*
2. *Groundwater, including groundwater drained through subsurface drainage systems;*
3. *Ephemeral feature, including an ephemeral stream, swale, gully, rill, or pool;*
4. *Diffuse stormwater run-off over upland or directional sheet flow over upland;*
5. *Ditch that is not an (a)(1) or (a)(2) water;*
6. *Prior converted cropland;*
7. *Artificially irrigated area, including fields flooded for agricultural production, that would revert to upland should application of irrigation water to that area cease;*
8. *Artificial lake/pond constructed or excavated in upland or a non-jurisdictional water, so long as the artificial lake or pond is not an impoundment of a jurisdictional water;*
9. *Water-filled depression constructed/excavated in upland/non-jurisdictional water incidental to mining/construction or pit excavated in upland/non-jurisdictional water to obtain fill/sand/gravel;*
10. *Stormwater control feature constructed or excavated in upland or in a non-jurisdictional water to convey, treat, infiltrate, or store stormwater runoff;*
11. *Groundwater recharge, water reuse, or a wastewater recycling structure constructed or excavated in upland or in a non-jurisdictional water; and*
12. *Waste treatment system.*

Further definitions located at 33 CFR 328.3 (c) include:

(1) *Adjacent wetlands*. The term adjacent wetland means wetlands that:

i. Abut, meaning to touch at least one point or side of, a water identified in paragraph (a)(1), (2), or (3) of this section;

ii. Are inundated by flooding from a water identified in paragraph (a)(1), (2), or (3) of this section in a typical year;

iii. Are physically separated from a water identified in paragraph (a)(1), (2), or (3) of this section only by an artificial dike, barrier, or similar artificial structure so long as that structure allows for a direct hydrologic surface connection between the wetlands and the water identified in paragraph (a)(1), (2), or (3) of the section in atypical year, such as through a culvert, flood or tide gate, pump, or similar artificial feature. An adjacent wetland is jurisdictional in its entirety when a road or similar

artificial structure divides the wetland, as long as the structure allows for direct hydrologic connection through or over that structure in a typical year.

(6) *Lakes and ponds, and impoundments of jurisdictional waters*. The term lakes and ponds, and impoundments of jurisdictional waters means standing bodies of open water that contribute surface water flow to a water identified in paragraph (a)(1) of this section in a typical year either directly or through one or more waters identified in paragraph (a)(2), (3), or (4) of this section. A lake, pond, or impoundment of a jurisdictional water does not lose its jurisdictional status if it contributes surface water flow to a downstream jurisdictional water in a typical year through a channelized nonjurisdictional surface water feature, through a culvert, dike, spillway, or similar artificial feature, or through a debris pile, boulder field, or similar natural feature. A lake or pond, or impoundment of a jurisdictional water is also jurisdictional if it is inundated by flooding from a water identified in paragraph (a)(1), (2), or (3) of this section in a typical year.

(12) *Tributary*. The term tributary means a river, stream, or similar naturally occurring surface water channel that contributes surface water flow to a water identified in paragraph (a)(1) of this section in a typical year either directly or through one or more waters identified in paragraph (a)(2), (3), or (4) of this section. A tributary must be perennial or intermittent in a typical year. The alteration or relocation of a tributary does not modify its jurisdictional status as long as it continues to satisfy the flow conditions of this definition. A tributary does not lose its jurisdictional status if it contributes surface water flow to a downstream jurisdictional water in a typical year through a channelized nonjurisdictional surface water feature, through a subterranean river, through a culvert, dam, tunnel, or similar artificial feature, or through a debris pile, boulder field, or similar natural feature. The term tributary includes a ditch that either relocates a tributary, is constructed in a tributary, or is constructed in an adjacent wetland as long as the ditch satisfies the flow conditions of this definition.

1986 Waters of the United States Definitions and Rapanos Decision

The definition of waters of the United States, in 33 CFR 328.3, includes waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, wetlands, sloughs, wet meadows, or natural ponds and all impoundments of waters otherwise defined as waters of the United States. Also included are wetlands adjacent to waters (other than waters that are themselves wetlands). The term *adjacent* is defined as bordering, contiguous, or neighboring. Jurisdictional wetlands are a category of waters of the United States and have been defined by the USACE as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Waters of the United States are defined in 33 CFR 328.3 (a), 13 November 1986, as:

1. *All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;*
2. *All interstate waters including interstate wetlands;*
3. *All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters:*
    i. *Which are or could be used by interstate or foreign travelers for recreational or other purposes; or*
    ii. *From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or*
    iii. *Which are used or could be used for industrial purposes by industries in interstate commerce;*
4. *All impoundments of waters otherwise defined as waters of the United States under the definition;*
5. *Tributaries of waters identified in paragraphs (a)(1)-(4) of this section;*
6. *The territorial seas;*

7. *Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a)(1)-(6) of this section.*

On 05 June 2007, the USACE and the USEPA issued joint guidance on delineation of waters on the United States based on the U.S. Supreme Court decisions in *Rapanos* and *Carabell*. Under this guidance, potential waters of the United States have been classified as traditional navigable waters (TNW), relatively permanent waters (RPW) (i.e., having flow most of the year or at least seasonally), or non-RPWs. This guidance states that TNWs and RPWs and contiguous or adjacent wetlands to these aquatic features are waters of the United States. Wetlands that are bordering, contiguous, or neighboring another water of the United States is considered adjacent. Additionally, wetlands that are within the 100-year floodplain of another water of the United States are also considered adjacent. Non-RPWs, wetlands contiguous or adjacent to non-RPWs, and isolated wetlands must undergo a "significant nexus" test on a case-by-case basis to determine the jurisdictional nature of these aquatic features. Under the "significant nexus" test a water feature must have substantial connection to a TNW by direct flow, or by indirect biological, hydrologic, or chemical connection. Under the "significant nexus" test the USACE District Engineer must submit the jurisdictional determination (JD) to the regional USEPA office, which makes the decision whether to move the JD to Headquarters USACE to make the final determination.

This guidance does not void the January 2001 decision of the U.S. Supreme Court in Solid Waste Agency of Northern Cook County (SWANCC) v. USACE which disallowed regulation of isolated wetlands under the CWA through the "Migratory Bird Rule." Previously, the USACE assumed jurisdiction over isolated waters of the United States based on its 1986 preamble stating that migratory birds used these habitats. The "Migratory Bird Rule" provided the nexus to interstate commerce and thus protection under the CWA. However, the new guidance does require that the "significant nexus" test be performed in addition to an analysis of other potential interstate commerce uses for isolated waters.

METHODOLOGY

Prior to conducting the desktop evaluation and fieldwork, the U.S. Geological Survey (USGS) topographic map (**Attachment A, Figures 2A** and **2B**), the *Soil Survey of Dallas County* and *the Soil Survey of Tarrant County, Texas*, and the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) digital soil databases for Dallas and Tarrant Counties (**Attachment A, Figure 3**), the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) (**Attachment A, Figure 4**), and recent and historic aerial photographs of the proposed survey area were studied to identify possible aquatic features that could meet the definition of waters of the United States and areas prone to wetland development. Ms. Karisa Fenton and Ms. Claire Unruh of IES conducted the delineation in the field in accordance with the USACE procedures on 22 September 2021.

Wetland determinations and delineations were performed on location using the methodology outlined in the 1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineer Wetland Delineation Manual: Great Plains Region (Version 2.0). The presence of a wetland is determined by the positive indication of three criteria (i.e., hydrophytic vegetation, hydrology, and hydric soils). Potential jurisdictional boundaries for other water features (i.e., non-wetland) were delineated in the field at the ordinary high-water mark (OHWM). The 33 CFR 328.3 (c)(7) defines OHWM as the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Water feature boundaries were recorded on a Trimble GeoExplorer XT Global Positioning System (GPS) unit capable of sub-meter accuracy. Photographs were also taken at representative points within the survey area (**Attachment B**). Routine wetland determination data forms are provided in **Attachment C**. Historic aerial photographs, from Environmental Data Resources, Inc. (EDR), were used in the jurisdictional determination of some aquatic features, are included in **Attachment D.**

RESULTS

Background Review

Topographic Setting

The USGS topographic maps (Grapevine 7.5' Quadrangle 1959, revised 1982; Euless 7.5' Quadrangle 1959; revised 1992) illustrate one blue line feature within the survey area. The blue line feature is depicted meandering through the southern region of Site 8 and continuing into the northwestern region of Site 9, oriented southwest-to-northeast (*see* **Attachment A, Figure 2A**). The 2019 version of the Grapevine and Euless 7.5' Quadrangle maps illustrates the blue line feature in similar alignment (*see* **Attachment A, Figure 2B**). The overall topography was illustrated with slopes oriented west-to-east in Sites 1 through 11 and north-to-south in Sites 12 and 13. The maximum elevation of the property was approximately 580 feet above mean sea level (amsl) and a minimum elevation of approximately 520 feet amsl.

Soils

The *Soil Survey of Dallas County, Texas* identified four soil map units within the survey area, Ferris-Heiden complex, 5 to 12 percent slopes; Heiden clay, 1 to 3 percent slopes; Heiden clay, 2 to 5 percent slopes, eroded; and Houston Black-Urban land complex, 0 to 4 percent slopes. The *Soil Survey of Tarrant County, Texas* identified four soil map units within the survey area, Heiden clay, 1 to 3 percent slopes; Houston Black clay, 1 to 3 percent slopes; Houston Black-Urban land complex, 1 to 4 percent slopes; and Urban land. None of these soil map units were listed as a hydric soil on the Hydric Soils of Texas list prepared by the National Technical Committee for Hydric Soils (accessed 29 September 2021, Dallas and Tarrant Counties, Texas) (*see* **Attachment A, Figure 3**). Hydric soils are described as those soils that are sufficiently wet in the upper part to develop anaerobic conditions during the growing season.

FEMA FIRM

The FEMA FIRM (Dallas and Tarrant Counties; Map Panel 4439C0120K; effective 25 September 2009; 48113C0145K; effective 07 July 2014 and Map Panels 48439C0235L, and 48113C0285L; effective 03 March 2019) shows the entire survey area to be within Zone X (Areas determined to be outside the 0.2 percent annual chance floodplain) (*see* **Attachment A, Figure 4**).

Historic Aerial Photographs

Historic aerial photographs from an aerial photograph decade package from EDR were also reviewed to understand the sequence of events that have occurred in Site 10 of the survey area (*see* **Attachment D**). Site 10 was evaluated due to the presence of a pond and wetland. The following paragraphs provide a description of the aerial photographs based on site conditions:

> *1942-1968* – Site 10 is characterized as an active agricultural property comprised of pastureland. A drainage is depicted outside of the western boundary. The surrounding area is comprised of pastureland, drainages, and scattered homesteads.
>
> *1972* – Dirt roads are visible across Site 10. The drainage to the west has been channelized and an impoundment has been excavated to the north.
>
> *1979* – The roads are no longer visible and the impoundment to the north has been filled. A commercial complex has been constructed south of Site 10.
>
> *1984* – Site 10 has been entirely cleared.
>
> *1990* – Dark color signatures are visible in the channel to the west, indicating potential inundation.
>
> 1995 – Airport runways and buildings have been constructed surrounding Site 10 and a road has been cleared along the northern boundary. The drainage to the north that was previously impounded has been channelized and routed through a concrete channel.
>
> 2005-2012 – The eastern region of Site 10 has been cleared. Canopy cover has increased along the drainage to the west, and the area to the south.

2016 – A lot has been partially cleared in the southern region.

Weather History

The weather history for Wunderground.com Edwards weather station (KTXEULES47) recorded no rainfall in the 7-day period prior to and during the evaluation, and a total of 0.20 inch during the 30-day period prior to the site visit. The Antecedent Precipitation Tool (APT) indicated that the conditions on-site at the time of the evaluation were considered hydrologically "normal" based on the 30-year climactic average (32.885619 °N, -97.040544 °W).

Field Investigation

The 13 sites within the survey area consisted of four distinct vegetation communities: **urban matrix**, **frequently maintained grassland**, **infrequently maintained grassland**, and **shrub-scrub upland**. The **urban matrix** was found throughout a majority of Sites 1 through 6, 8 through 10, and the eastern side of Site 12. The urban matrix was comprised of concrete lots, roads, buildings, and active construction areas. The entirety of Sites 7 and 11, and the western portions of Sites 5 and 8 contained the **frequently maintained grassland** vegetation community, dominated by mowed Bermudagrass (*Cynodon dactylon*). The **infrequently maintained grassland** was observed in the central region of Site 12 and was comprised of Maximilian sunflower (*Helianthus maximiliani*), meadow dropseed (*Sporobolus compositus*), Johnsongrass (*Sorghum halepense*), white heath aster (Symphyotrichum ericoides), King Ranch bluestem (*Bothriochloa ischaemum*), sumpweed (*Iva annua*), Canada goldenrod (*Solidago canadensis*), prairie broomweed (*Amphiachyris dracunculoides*), Bermudagrass, and annual sunflower (*Helianthus annuus*). The **shrub-scrub** upland vegetation community was observed on the western side of Site 12 and throughout Site 13, dominated by honey mesquite (*Prosopis glandulosa*), sugarberry (*Celtis laevigata*), giant ragweed (*Ambrosia trifida*), Johnsongrass, Bermudagrass, and annual sunflower.

Water from Sites 1 through 10 flows east into Hackberry Creek, then into the Elm Fork Trinity River, and ultimately into the Trinity River, a TNW. Water from Sites 11 through 13 flows south into Big Bear Creek, then into the West Fork Trinity River, and ultimately into the Trinity River, a TNW.

Desktop Evaluation

Aquatic features within Sites 1 through 7 were identified and delineated using both the National Hydrography Dataset (NHD) and historic and recent aerial photography. Sites 8 through 13 were field verified after a review of the available secondary data. **Table 1** and the following paragraphs detail the aquatic features identified within the survey sites at the time of evaluation (**Attachment A, Figure 5** and **6**).

Table 1. Aquatic Features Identified within the Survey Area

Water Identification	Hydrology Characteristics	Area (Acre)	Length (Linear Feet)
Wetland 1	Seasonally Saturated	0.01	---
Ditch 1	Ephemeral	0.03	267
Pond 1	Seasonally Inundated	0.03	---

**Actual acreage less than 0.01 acre*

Wetland 1 was an emergent wetland observed along the western boundary of Site 10, adjacent to Pond 1. The wetland appeared to form when the construction site to the east was cleared, and construction activities resulted in the formation of a berm outside of the construction fenceline allowing water to pool in the space between the fence and berm after rainfall. Hydrologic vegetation was dominated by saltmarsh aster (*Symphyotrichum subulatum*), and sumpweed (*Iva annua*). Hydric soils were indicated by a Depleted Matrix with a matrix color of 10YR 4/2 with redoximorphic concentrations of 5YR 4/6 in the pore linings and matrix. Hydrologic indicators consisted of drainage patterns, surface soil cracks, and a positive FAC-Neutral test.

Ditch 1 was a shallow, concrete-lined, stormwater drainage ditch within Site 5. Based on historic and recent aerial photography, Ditch 1 appears to have been constructed prior to 1995 to convey excess stormwater from the surrounding roads, lots, and fields. The USGS topographic map does not illustrate a blue line feature in the location of Ditch 1 and the shallow nature of the concrete channel suggests that the man-made feature replaced a swale.

Ditch 1 appeared dry in all aerial photographs. As such, it is IES' professional opinion that Ditch 1 would be considered an ephemeral feature.

Pond 1 was a small, artificial pond located along the western boundary of Site 10 with no OHWMs entering or exiting the pond. A review of aerial photography indicates Pond 1 was excavated in 2020, along the edge of a construction site with a small berm constructed across the gradient to capture sheet flow. Pond 1 was inundated at the time of the evaluation. Given the relatively small size of the pond and its location high in the watershed, it is IES' professional opinion that Pond 1 be considered seasonally inundated.

POTENTIAL JURISDICTIONAL ASSESSMENT

Due to the uncertainty associated with the definitions of waters of the United States and thereby the jurisdiction of features, IES is providing an analysis of jurisdiction based on the current NWPR and the former definitions using the *Rapanos* and *Carabell* decisions.

Navigable Waters Protection Rule (Effective 22 June 2020)

Table 2 provides an overview of the jurisdictional assessment of the aquatic features located within the survey area under the NWPR. Under this rule, none of the aquatic features located within the survey area would be considered a water of the United States (*see* **Attachment A, Figure 5**). **Wetland 1** was adjacent to an isolated pond and **Ditch 1** was a man-made ephemeral ditch; therefore, these features do not meet the definition of an adjacent wetland, or a replacement of a jurisdictional water and would not be subject to regulation. **Pond 1** does not contribute water flow through a surface connection to any intermittent or perennial water; therefore, it would not meet a definition of a jurisdictional pond or impoundment under the NWPR.

Table 2. Jurisdictional Assessment of Aquatic Features under the NWPR

Water Identification	Hydrology Characteristics	NWPR Classification
Wetland (b)(1)		
Wetland 1	Seasonally Saturated	Wetland
Ditch (b)(5)		
Ditch 1	Ephemeral	Ditch
Artificial Pond (b)(8)		
Pond 1	Seasonally Inundated	Artificial Pond

[1](a)(1-4) definitions are regulated under Section 404 of the CWA, while (b)(1-12) are excluded from regulation

1986 Waters of the United States Definitions and Rapanos Decision

The 05 June 2007 USACE and USEPA jointly published instructional guidebook is intended to provide the USACE field staff a national standard operating procedure for conducting jurisdictional determinations. The guidebook was prepared by combining all prior applicable provisions, regulations, statutes, and case laws pertaining to the CWA. All terms, definitions, and conclusions regarding the jurisdictional nature of the aquatic features used within this report are derived directly, as they are practiced, from the guidance. The following outlines the applicable interpretations of the guidance appropriate for this situation. **Table 3** provides an overview of the jurisdictional assessment of the aquatic features under the 1986 Waters of the United States definitions and the *Rapanos* decision (**Attachment A, Figure 6**).

Table 3. Jurisdictional Assessment of Aquatic Features Under the 1986 Definitions

Water Identification	Post-*Rapanos* Water Classification	33 CFR 328.3 Definition
Non-Jurisdictional Features		
Wetland 1	Seasonally Saturated	---
Ditch 1	Ephemeral	---
Pond 1	Artificial Pond	---

Non-Jurisdictional Features

Wetland 1

Wetland 1 was identified along a short swale, upstream of a pond that ran along a construction fence. Wetland 1 was neither adjacent to or abutting any non-RPWs or RPWs and lacked a significant nexus to a TNW. As such, Wetland 1 does not meet a definition of a water of the United States and would not be regulated under Section 404 of the CWA.

Ditch 1

Based on the historic aerial photography, Ditch 1 was excavated in an upland area prior to 1995 to convey surface hydrology off the surrounding roads, concrete lots, and fields. The entire ditch was dry in all aerial photographs. The USGS topographic map does not illustrate a blue line feature in the location of Ditch 1 and the shallow, concrete-lined channel suggests that the stormwater ditch replaced a swale. Current site conditions indicate that the ditch is ephemeral and does not carry relatively permanent flow. Under the 2007 guidance:

Drainage ditches would not be subject to jurisdiction under Section 404 of the CWA by definition, as such features;

- are not tributaries of waters, impoundment of waters, or are waters as defined in paragraphs (a)(1) through (7) of the CWA 33 CFR 328.3;
- are not TNW's or wetlands adjacent to a TNW, nor are they non-navigable tributaries of a TNW with relatively permanent flow or wetlands that abut such tributaries; and
- in accordance with the Rapanos guidance, ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water, are generally not considered to be waters of the United States.

Generally, under the guidance, features that do not have the physical characteristics of a tributary or a wetland and only convey sporadic flow with a speculative connection to a TNW are not considered waters of the United States.

Pond 1

Based on evidence provided by recent aerial photographs, Pond 1 was an artificial pond constructed in 2020. Pond 1 was constructed along a fence line on the edge of a construction site by excavating and placing earthen fill across the natural gradient of the landscape in such a manner to collect and redirect upslope sheet flow. Under the 2007 guidance:

Pond 1 would not be subject to jurisdiction under Section 404 of the CWA, by definition, as it;

- is not a natural pond, impoundment of waters, or a water as defined in paragraphs (a)(1)-(7) of the CWA 33 CFR 328.3;
- is not a TNW or wetland adjacent to a TNW, nor is it a non-navigable tributary of a TNW with relatively permanent flow or wetlands that abut such tributaries; and
- as clarified under 33 CFR 323.2 (b), The term *lake* … As used in this regulation, the term does not include artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water for such purposes as stock watering, irrigation, settling basins, cooling, and rice growing.

CONCLUSIONS

To summarize the delineation, a wetland, a ditch, and a pond were identified and delineated within the survey area. A summary of these features' characteristics is presented in **Table 1** and a summary of the jurisdictional assessment is presented in **Table 2** under the NWPR and in **Table 3** for the 1986 waters of the United States definitions and the *Rapanos* decision.

Under the ***NWPR,*** and the ***1986 waters of the United States definitions*** and the *Rapanos* decision, none of the identified aquatic features would be waters of the United States.

This delineation is based on professional experience in the approved methodology, photograph interpretation and assessing the desktop resources, and from experience with the USACE Fort Worth District regulators; however, this delineation does not constitute a jurisdictional determination of waters of the United States. This delineation has been based on the professional experience of IES staff and our interpretation of USACE regulations at 33 CFR 328.3, the joint USACE/USEPA guidance regarding the *Rapanos* and *Carabell* decisions, IES' interpretation of the NWPR, current judicial reviews, and the Regulatory Guidance Letter (RGL) 08-02. While, IES believes our delineation to be accurate, final authority to interpret the regulations lies solely with the USACE and USEPA. The USACE Headquarters in association with the USEPA often issue guidance that changes the interpretation of published regulations. USACE/USEPA guidance issued after the date of this report has the potential to invalidate the report conclusions and/or recommendations, which may create the need to reevaluate the report conclusions. IES has no regulatory authority, as such, proceeding based solely upon this report does not protect the Client from potential sanction or fines from the USACE/USEPA. The Client acknowledges that they have the opportunity to submit this report to the USACE for a preliminary jurisdictional determination for concurrence prior to proceeding with any work within aquatic features located on the survey area. If the Client elects not to do so, then the Client proceeds at their sole risk.

IES appreciates the opportunity to work with you and the Dallas Fort Worth International Airport Environmental Affairs Department on this project, and we hope we may be of assistance to you in the future. If you have any comments, questions, or concerns, please do not hesitate to contact us. We can be reached at 972-562-7672 or by email at skipp@intenvsol.com or rreinecke@intenvsol.com.

Sincerely,

Integrated Environmental Solutions, LLC.

Mr. Shae Kipp
Ecologist

Attachments

File ref: 03.006.094

ATTACHMENT A
Figures

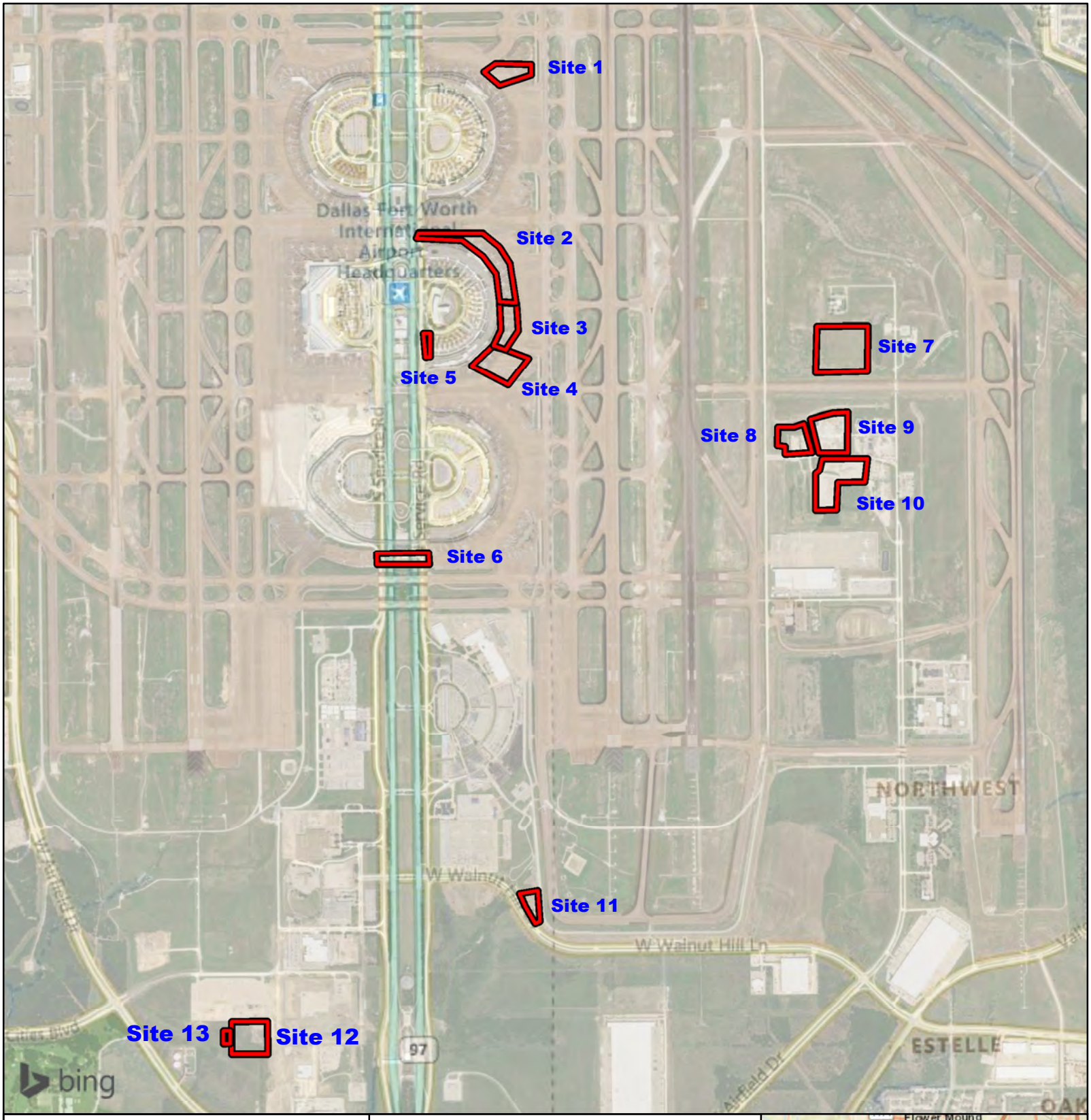

Figure 1.
General Location Map

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
0 2,000

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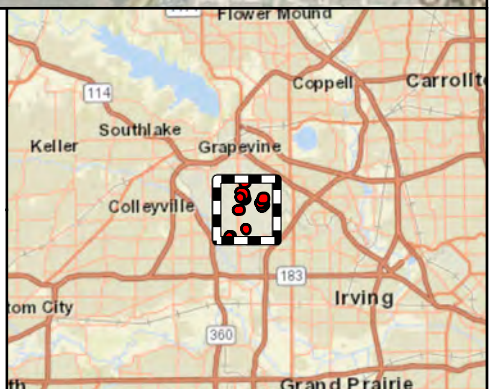
W E
S

File Ref. 03.006.094
Date: 9/28/2021

Survey Area



Area of Detail

Scale: 1 inch equals 10 miles

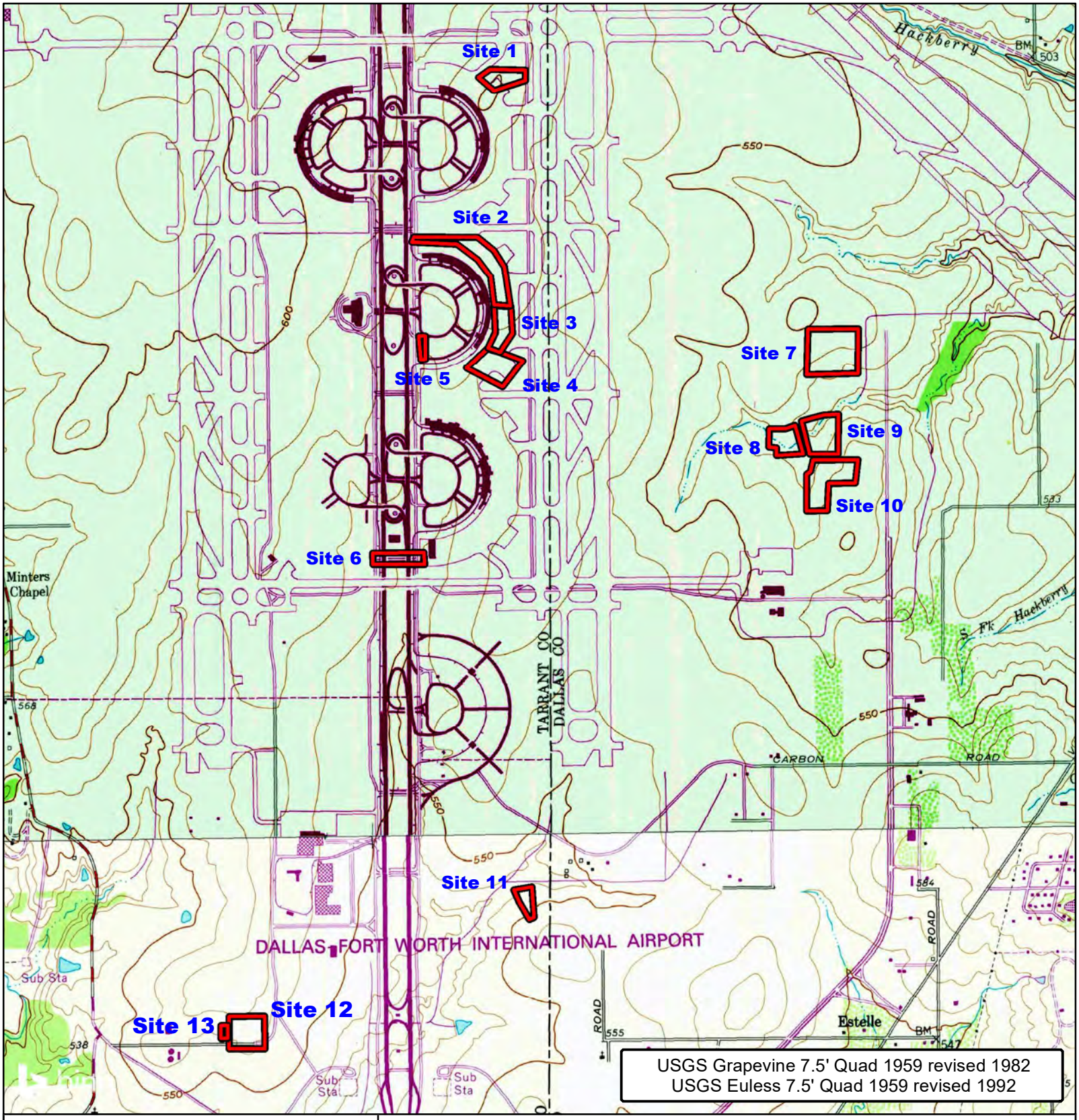


Figure 2A.
Topographic Setting

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
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File Ref. 03.006.094
Date: 9/28/2021

Survey Area

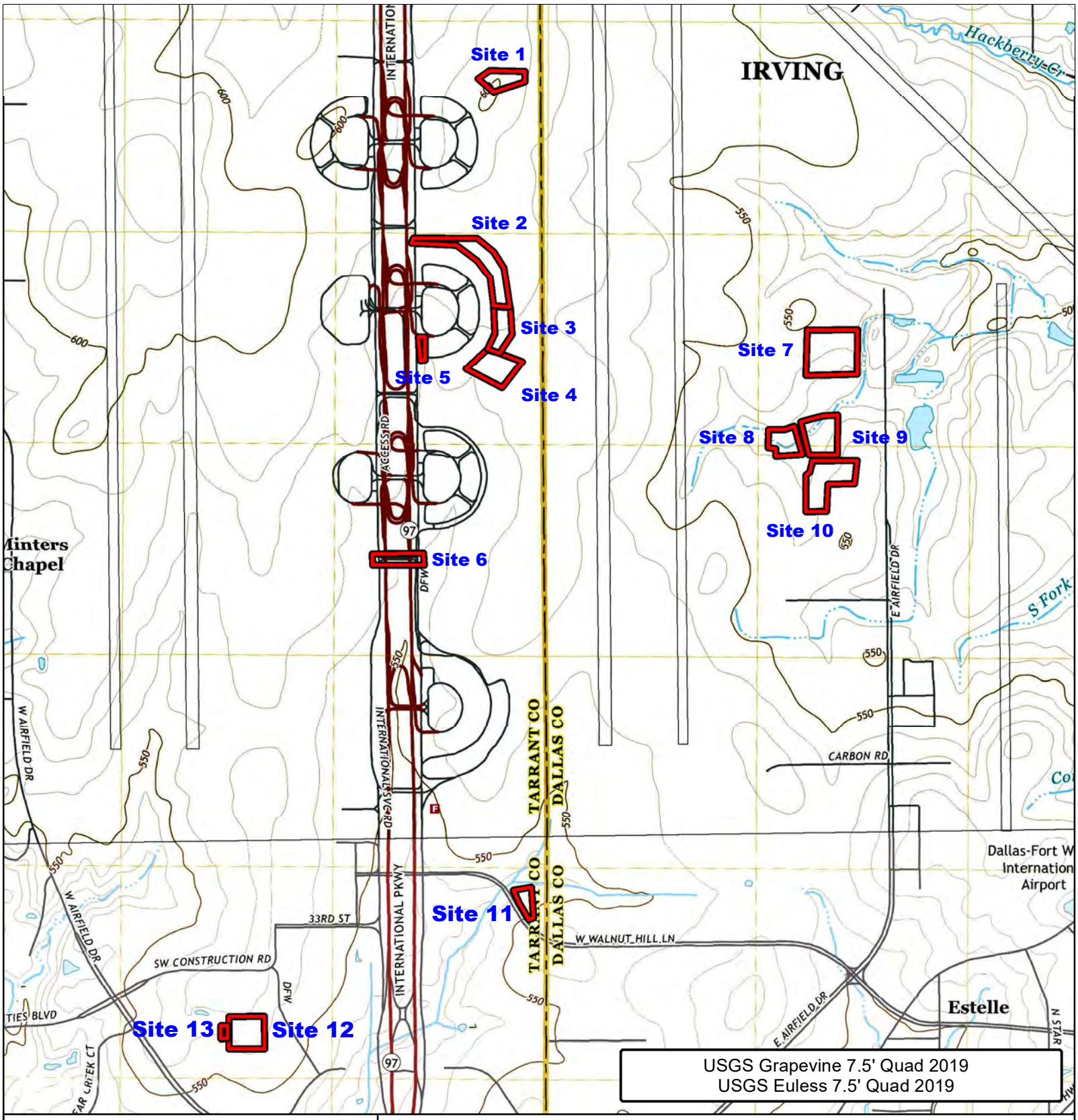

Figure 2B.
Topographic Setting

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

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File Ref. 03.006.094
Date: 9/28/2021

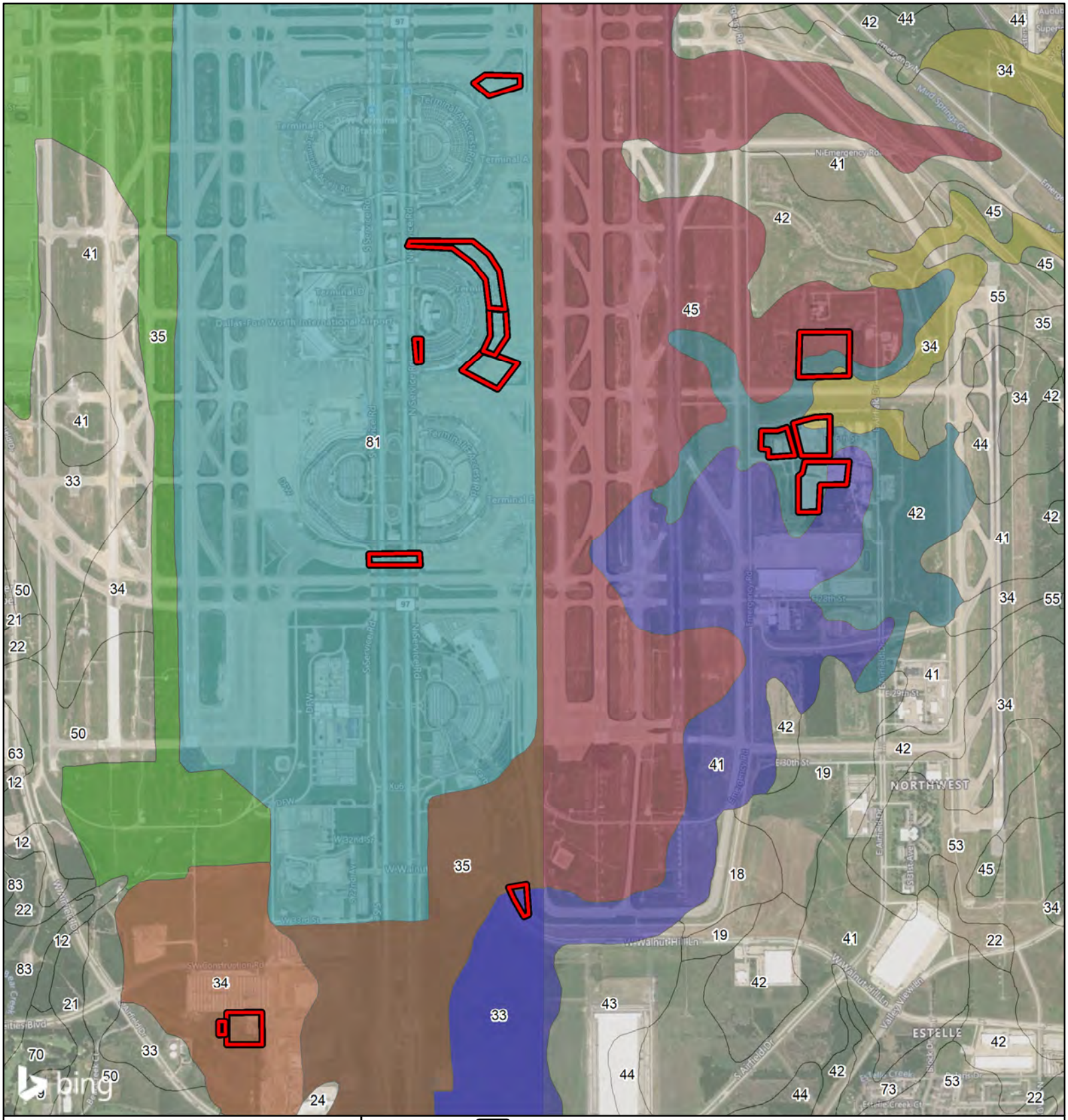

Figure 3.
Soils Map

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
0 2,000

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W E
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File Ref. 03.006.094
Date: 9/29/2021

Survey Area
Soil map units outside survey area

Soil Map Units - Dallas County

- 34- Ferris-Heiden complex, 5 to 12 percent slopes
- 41- Heiden clay, 1 to 3 percent slopes
- 42- Heiden clay, 2 to 5 percent slopes, eroded
- 45- Houston Black-Urban land complex, 0 to 4 percent slopes

Soil Map Units - Tarrant County

- 33 - Heiden clay, 1 to 3 percent slopes
- 34 - Houston Black clay, 1 to 3 percent slopes
- 35 - Houston Black-Urban land complex, 1 to 4 percent slopes
- 81 - Urban land

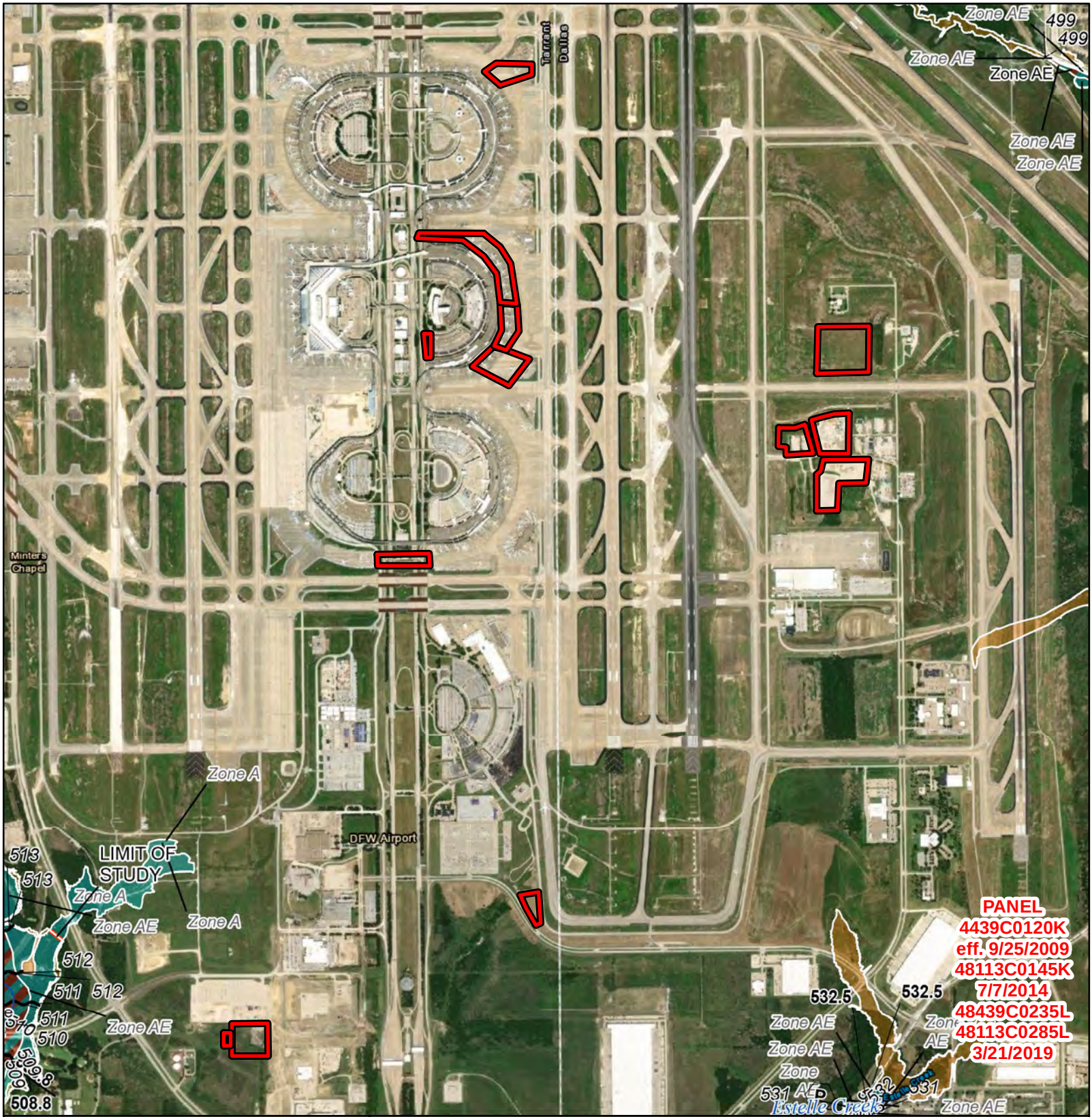

Figure 4.
Federal Emergency Management Agency
Flood Insurance Rate Map

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
0
2,000

N
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File Ref. 03.006.094
Date: 9/29/2021

Survey Area

FEMA FIRM Zone Descriptions

- Zone X - Areas determined to be outside the 0.2% annual chance floodplain
- Zone X - Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood
- Zone A - Special Flood Hazard Areas subject to inundation by the 1% annual chance flood; No base flood elevations determined
- Zone AE - Special Flood Hazard Areas subject to inundation by the 1% annual chance flood; Base flood elevations determined
- Zone AE - Floodway areas in Zone AE

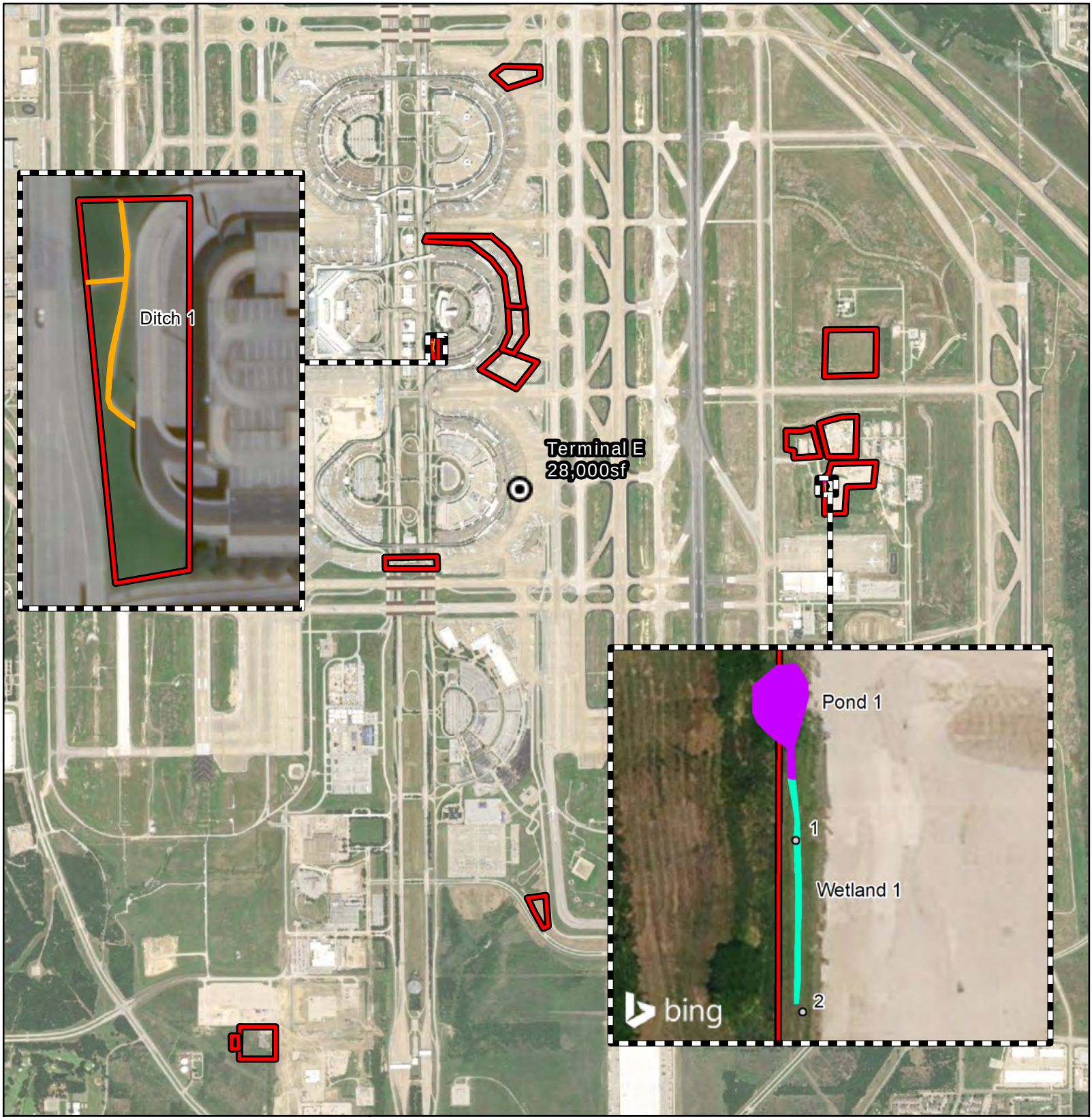

Figure 5.
NWPR Aquatic Features Identified within the Survey Area

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
0 2,000

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File Ref. 03.006.094
Date: 9/29/2021

Survey Area
Wetland Determination Data Form

Aquatic Features Excluded From Jurisdiction

Wetland (b)(1)
Ditch (b)(5)
Artificial Pond (b)(8)

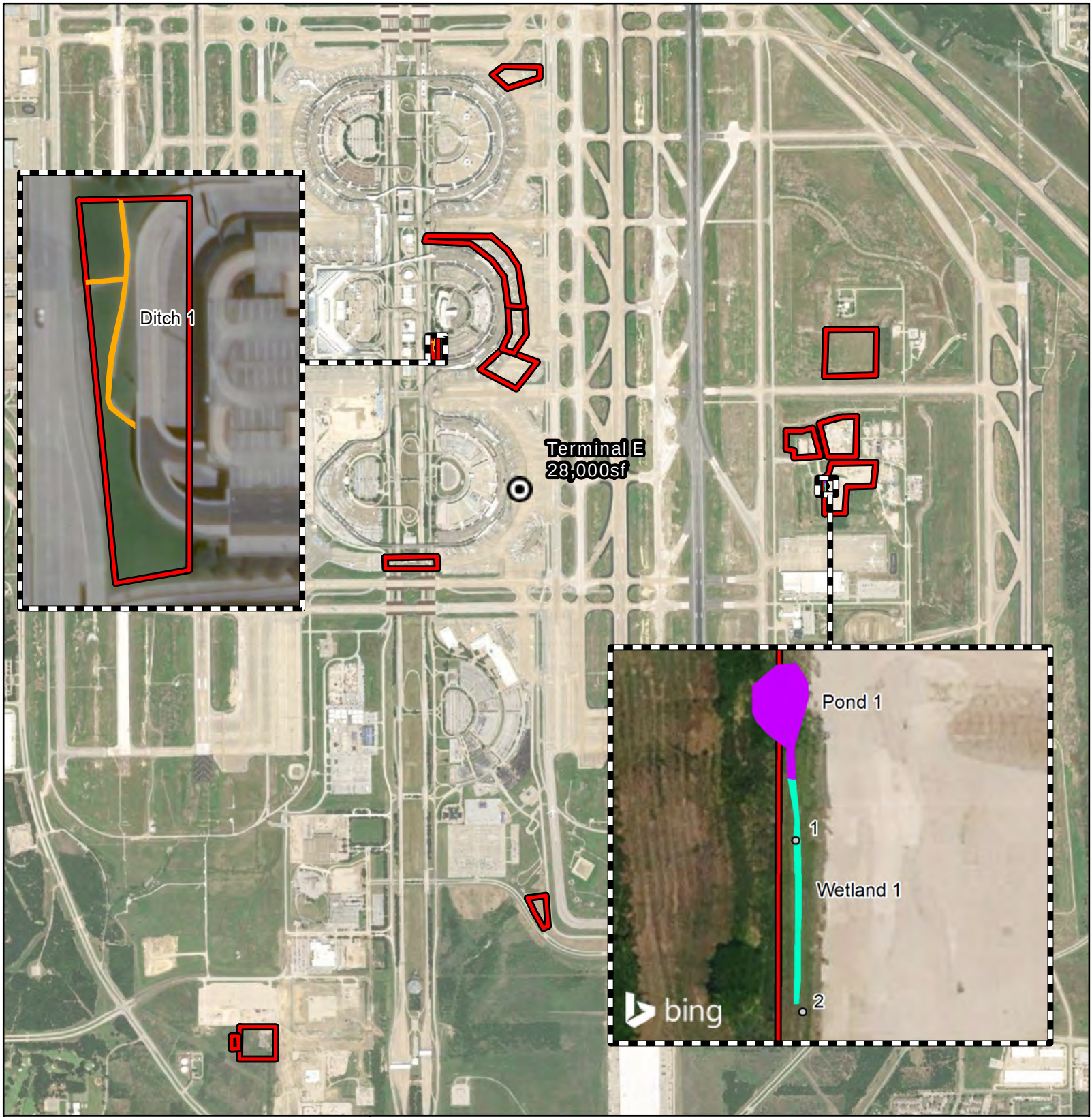

Figure 6.
Pre-2015 Aquatic Features Identified within the Survey Area

CTA Development
Cities of Irving, Euless, Grapevine, and Coppell
Dallas and Tarrant Counties, Texas

1 in = 2,000 feet

Feet
0 2,000

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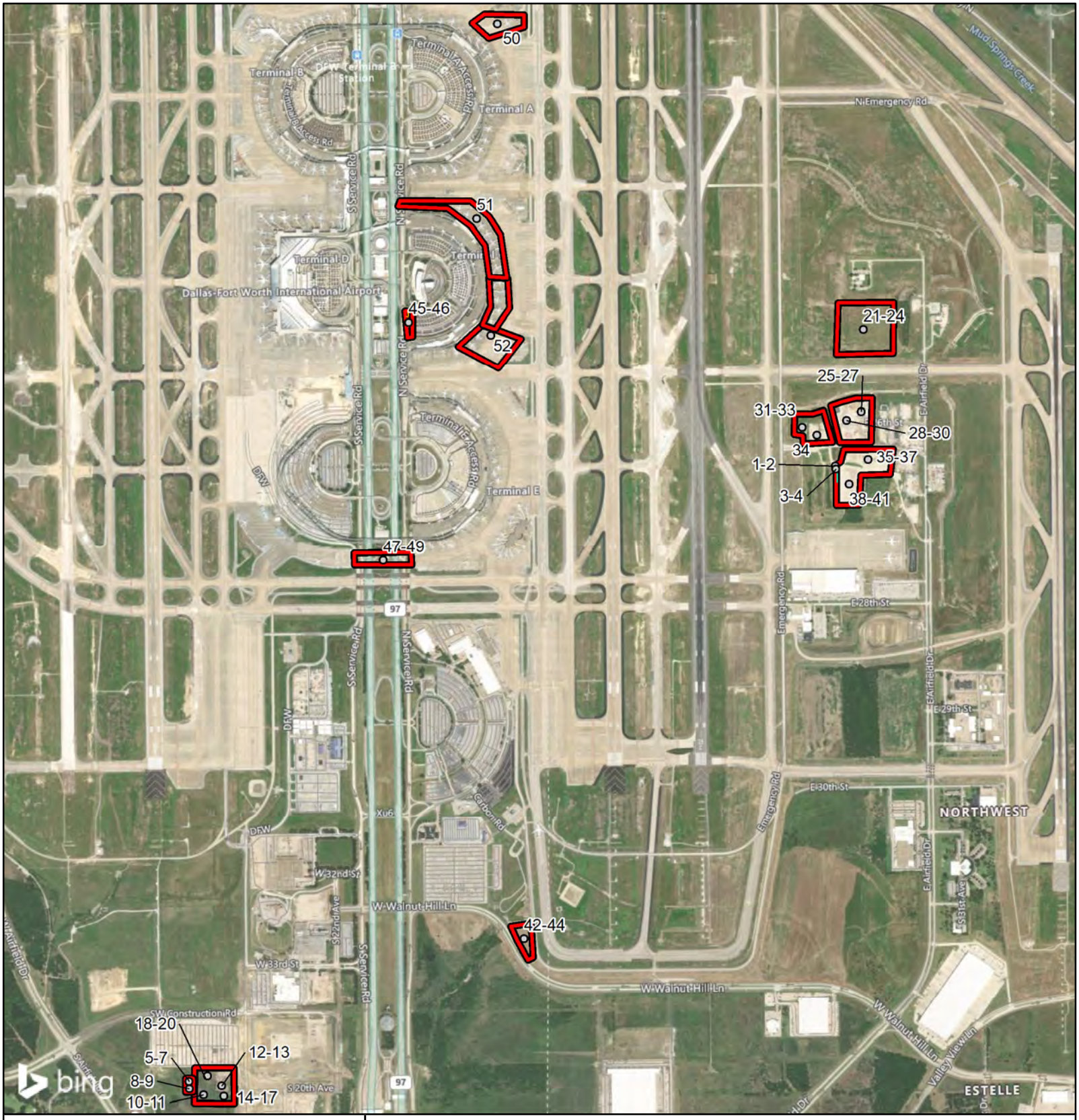
File Ref. 03.006.094
Date: 9/29/2021

Survey Area
Wetland Determination Data Form

Aquatic Features Excluded From Jurisdiction

Wetland, Isolated
Ditch, Ephemeral
Artificial Pond

ATTACHMENT B
Site Photographs



Photograph Location Map

CTA Development
DFW International Airport
Dallas and Tarrant Counties, Texas

1 in = 1,800 feet

Feet
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1,800

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File Ref. 03.006.094
Date: 9/29/2021

Survey Area
Photograph Location

Aquatic Features Excluded From Jurisdiction

Wetland, Isolated
Ditch, Ephemeral
Artificial Pond

Photograph 1

Photograph 2

Photograph 3

Photograph 4

Photograph 5

Photograph 6

Photograph 7

Photograph 8

Photograph 9

Photograph 10

Photograph 11

Photograph 12

Photograph 13

Photograph 14

Photograph 15

Photograph 16

Photograph 17

Photograph 18

Photograph 19

Photograph 20

Photograph 21

Photograph 22

Photograph 23

Photograph 24

Photograph 25

Photograph 26

Photograph 27

Photograph 28

Photograph 29

Photograph 30

Photograph 31

Photograph 32

Photograph 33

Photograph 34

Photograph 35

Photograph 36

Photograph 37

Photograph 38

Photograph 39

Photograph 40

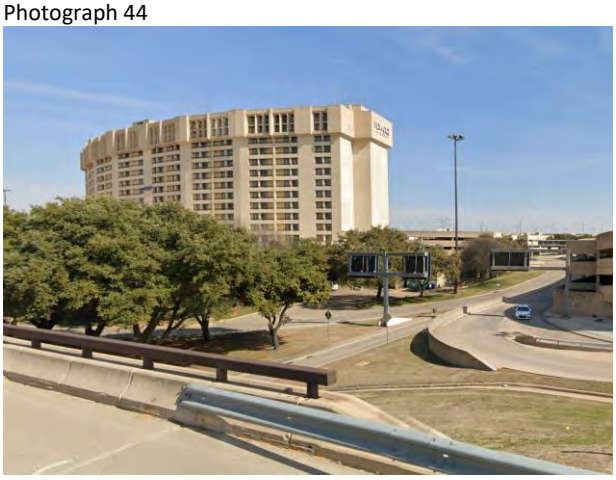
Photograph 41

Photograph 42

Photograph 43

Photograph 44

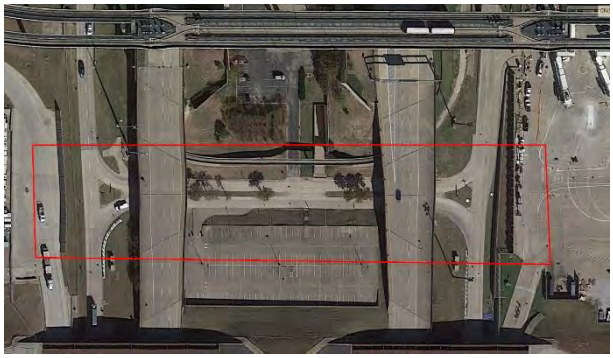
Photograph 45*



Photograph 46*

Photograph 47*

Photograph 48*



Photograph 49*

Photograph 50*

Photograph 51*

Photograph 52*

*Aerial Images and Street View Images from Google Earth

ATTACHMENT C
Routine Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CTA Development Project | City/County: DFW Airport/Tarrant | Sampling Date: 9/22/2021

Applicant/Owner: Dallas/Fort Worth International Airport, Environmental Affairs Department | State: TX | Sampling Point: 1

Investigator(s): Karisa Fenton; Claire Unruh | Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Swale | Local relief (concave, convex, none): Concave | Slope %: 0-1

Subregion (LRR): J | Lat: 32.889606 N | Long: -97.019763 W | Datum: NAD 1983

Soil Map Unit Name: Heiden clay, 2 to 5 percent slopes, eroded | NWI Classification: N/A

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

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ☒	No ☐	Is the Sampled Area within a wetland?	**Yes** ☒ **No** ☐
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐		

Remarks: Swale adjacent to pond along construction fenceline.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot Size: 30' Radius)	Absolute % Coverage	Dominant Species?	Indicator Status
1. *N/A*			
2.			
3.			
4.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot Size: 15' Radius)			
1. *N/A*			
2.			
3.			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot Size: 5' Radius)			
1. *Iva annua*	40	Yes	FAC
2. *Symphyotrichum subulatum*	35	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	75 = Total Cover		

Woody Vine Stratum (Plot Size: 15' Radius)			
1. *N/A*			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 25

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index Worksheet:

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

Prevalence Index = B/A=

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- Yes 2 - Dominance Test is > 50%
- 3 - Prevalence Index is ≤ 3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? **Yes** ☒ **No** ☐

Remarks:

SOILS

Sampling Point: 1

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Loc[2]	Texture	Remarks
0-16	10 YR 4/2	97	5 YR 4/6	3	C	PL/M	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) **(LRR F)**
- ☐ 1 cm Muck (A9) (**LRR F, G, H)**
- ☐ Depleted below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ☐ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16 **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 CM Muck (A9) **(LRR I, J)**
- ☐ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ☐ Dark Surface (S7) **(LRR G)**
- ☐ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ☒ **No** ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☒ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☒ Drainage patterns (B10)
- ☐ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present? Yes? ☐ No? ☒ Depth (inches): N/A

Water Table Present? Yes? ☐ No? ☒ Depth (inches): N/A

Saturation Present? (includes capillary fringe) Yes? ☐ No? ☒ Depth (inches): N/A

Wetland Hydrology Present? **Yes** ☒ **No** ☐

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

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CTA Development Project | City/County: DFW Airport/Tarrant | Sampling Date: 9/22/2021

Applicant/Owner: Dallas/Fort Worth International Airport, Environmental Affairs Department | State: TX | Sampling Point: 2

Investigator(s): Karisa Fenton; Claire Unruh | Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): None | Slope %: 0-1

Subregion (LRR): J | Lat: 32.889606 N | Long: -97.019763 W | Datum: NAD 1983

Soil Map Unit Name: Heiden clay, 2 to 5 percent slopes, eroded | NWI Classification: N/A

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

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ☐	No ☒	Is the Sampled Area within a wetland?	Yes ☐ No ☒
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒		

Remarks: Hillslope upslope of wetland swale, along construction fenceline. Upland berm evident between wetland and downslope area.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot Size: 30' Radius)	Absolute % Coverage	Dominant Species?	Indicator Status
1. *N/A*			
2.			
3.			
4.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot Size: 15' Radius)			
1. *N/A*			
2.			
3.			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot Size: 5' Radius)			
1. *Helianthus annuus*	40	Yes	FACU
2. *Sorghum halepense*	40	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	80 = Total Cover		

Woody Vine Stratum (Plot Size: 15' Radius)			
1. *N/A*			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 20

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index Worksheet:

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

Prevalence Index = B/A=

Hydrophytic Vegetation Indicators:

_____ 1 - Rapid Test for Hydrophytic Vegetation

_____ 2 - Dominance Test is > 50%

_____ 3 - Prevalence Index is ≤ 3.0[1]

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

_____ Problematic Hydrophytic Vegetation[1] (Explain)

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

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

SOILS

Sampling Point: 2

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	10 YR 4/2	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) **(LRR F)**
- ☐ 1 cm Muck (A9) (**LRR F, G, H)**
- ☐ Depleted below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ☐ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16 **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 CM Muck (A9) **(LRR I, J)**
- ☐ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ☐ Dark Surface (S7) **(LRR G)**
- ☐ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: N/A

Depth (inches): N/A

Hydric Soil Present? **Yes** ☐ **No** ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage patterns (B10)
- ☐ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present? Yes? ☐ No? ☒ Depth (inches): N/A

Water Table Present? Yes? ☐ No? ☒ Depth (inches): N/A

Saturation Present? (includes capillary fringe) Yes? ☐ No? ☒ Depth (inches): N/A

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:

ATTACHMENT D
Historic Aerial Photographs

CTA Development Project

2682 E Airfield Dr

Dallas, TX 75261

Inquiry Number: 6681807.1

September 28, 2021

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

09/28/21

Site Name:

CTA Development Project
2682 E Airfield Dr
Dallas, TX 75261
EDR Inquiry # 6681807.1

Client Name:

Integrated Env. Solutions, Inc.
610 Elm St Suite 300
McKinney, TX 75069
Contact: Claire Unruh

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

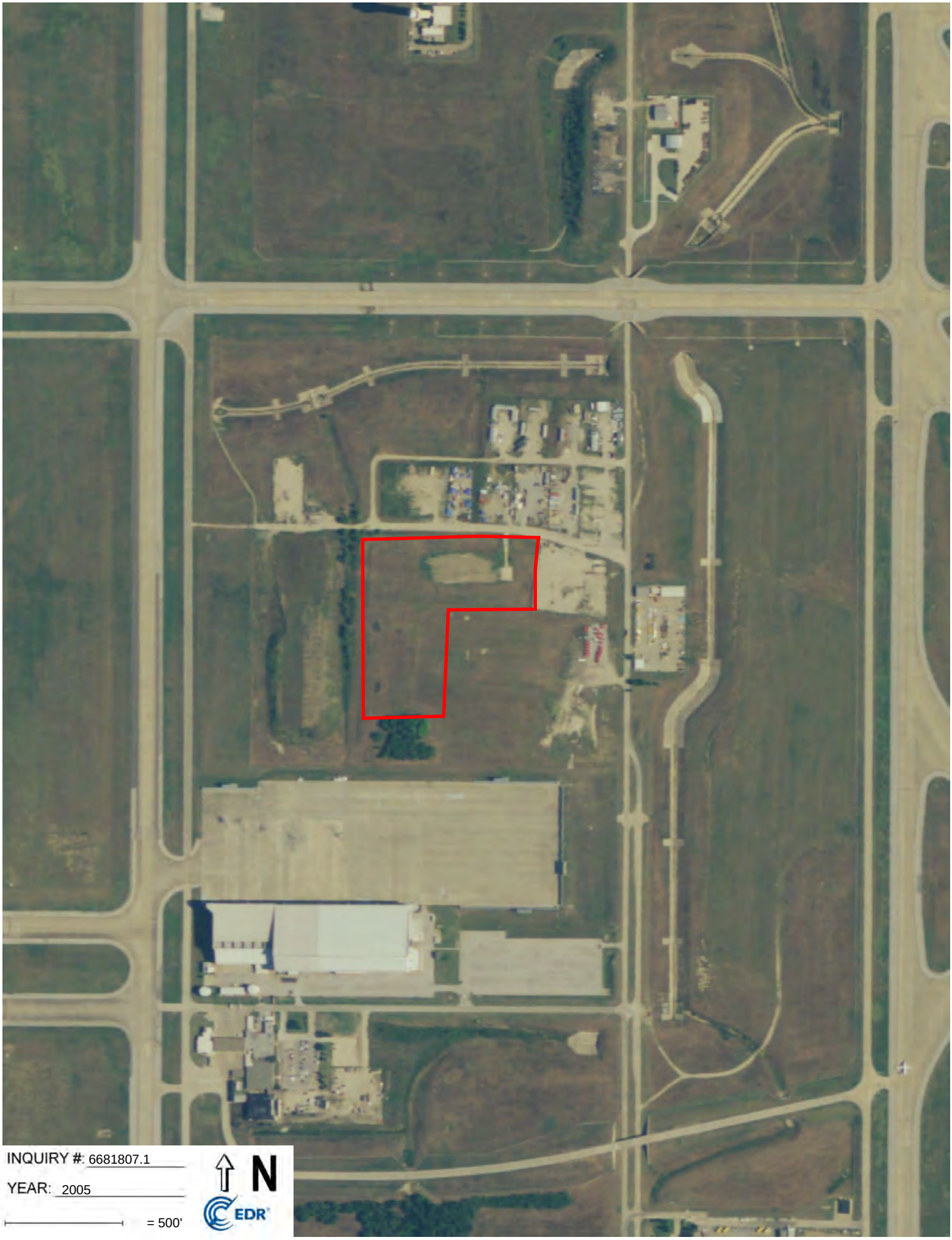
Year	Scale	Details	Source
2016	1"=500'	Flight Year: 2016	USDA/NAIP
2012	1"=500'	Flight Year: 2012	USDA/NAIP
2008	1"=500'	Flight Year: 2008	USDA/NAIP
2005	1"=500'	Flight Year: 2005	USDA/NAIP
1995	1"=500'	Acquisition Date: January 31, 1995	USGS/DOQQ
1990	1"=500'	Flight Date: January 29, 1990	NAPP
1984	1"=500'	Flight Date: May 10, 1984	TXDOT
1979	1"=500'	Flight Date: November 11, 1979	USDA
1972	1"=500'	Flight Date: February 13, 1972	USDA
1968	1"=500'	Flight Date: September 18, 1968	USGS
1958	1"=500'	Flight Date: January 07, 1958	ASCS
1950	1"=500'	Flight Date: December 17, 1950	USDA
1942	1"=500'	Flight Date: January 27, 1942	USDA

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.


INQUIRY #: 6681807.1
YEAR: 2016
= 500'
N
EDR


INQUIRY #: 6681807.1
YEAR: 2012
= 500'
N
EDR


INQUIRY #: 6681807.1
YEAR: 2008
= 500'
N
EDR



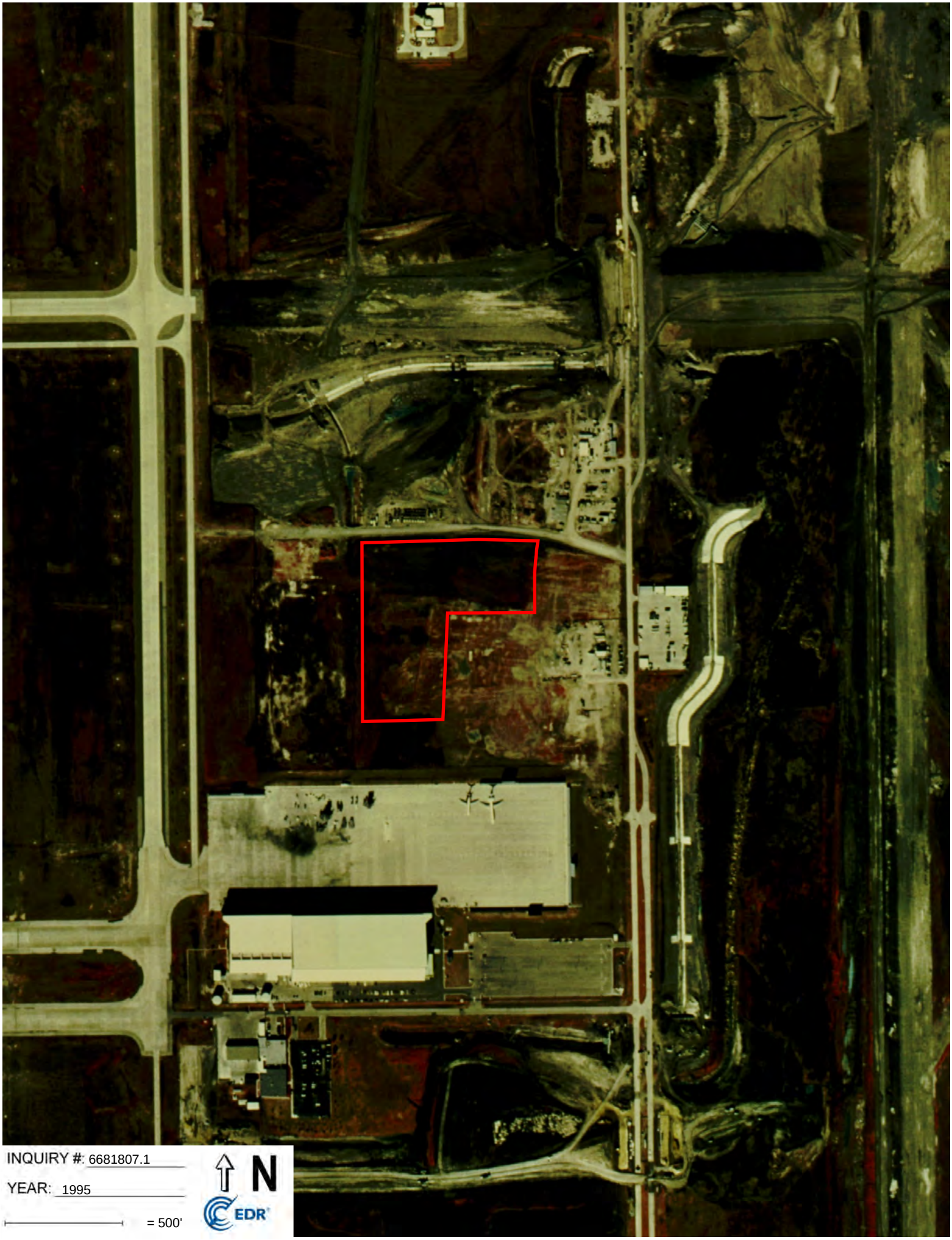
INQUIRY #: 6681807.1

YEAR: 2005

= 500'

N

EDR



INQUIRY #: 6681807.1

YEAR: 1995

= 500'

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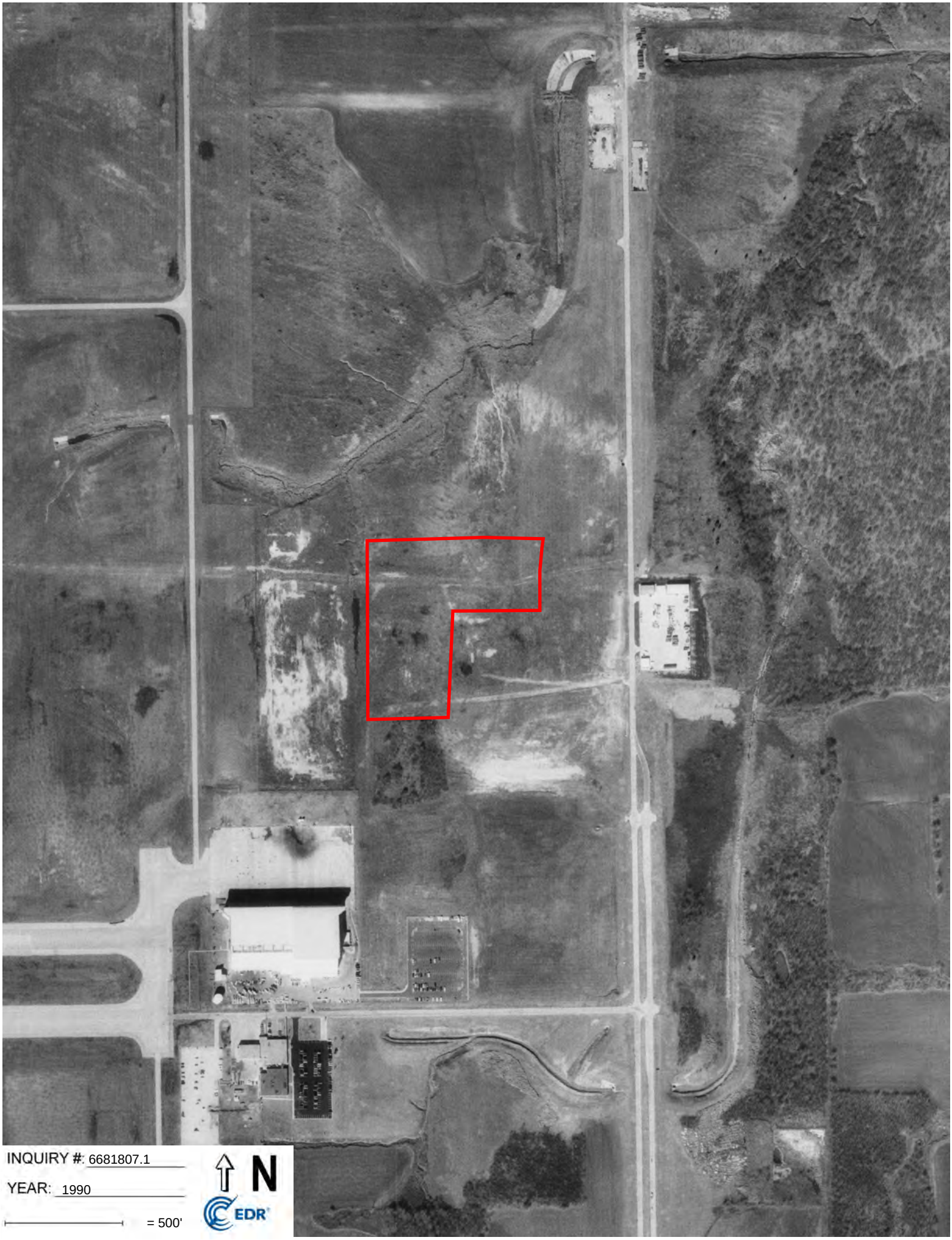
EDR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YEAR: 1990
= 500'
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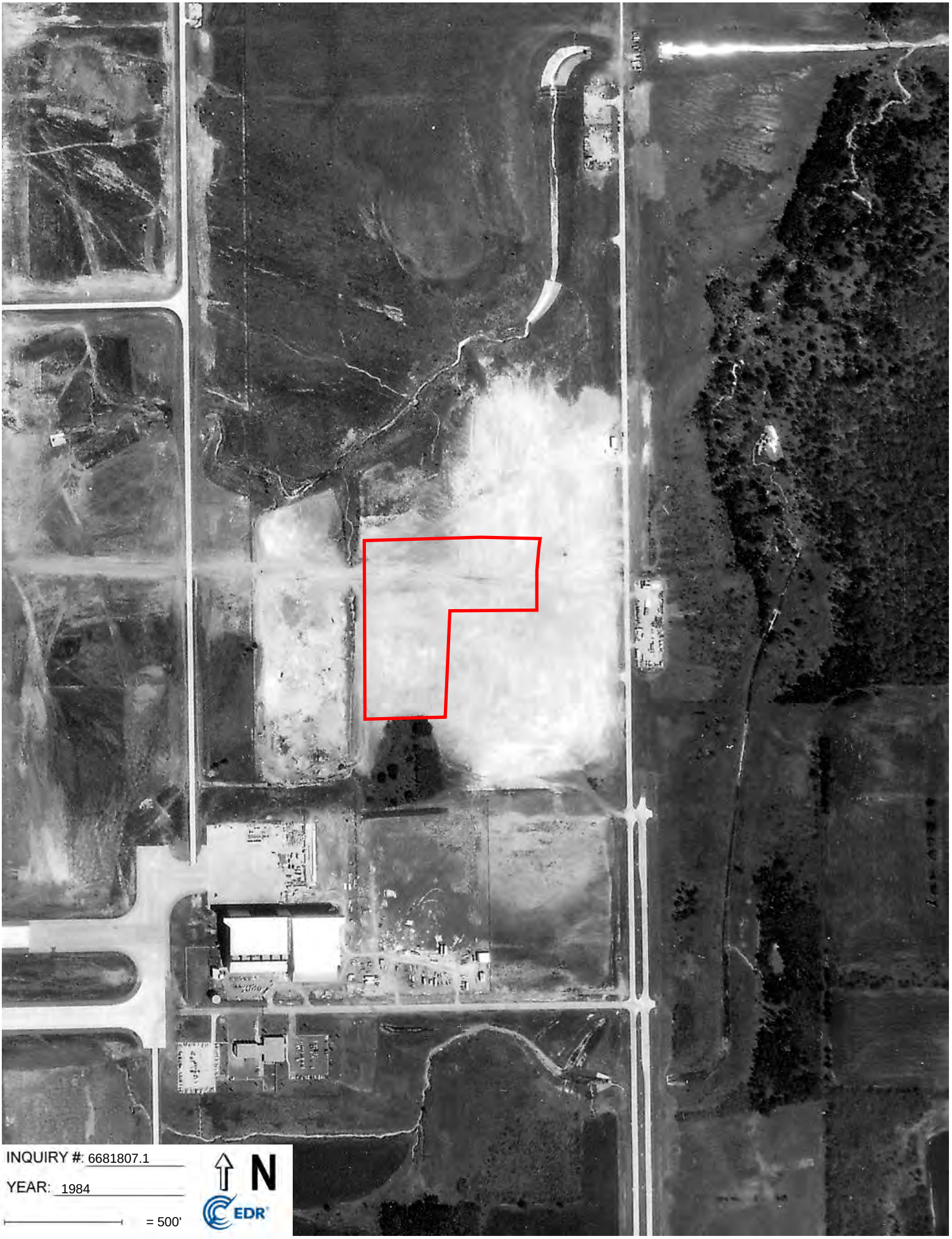
EDR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YEAR: 1984
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EDR

INQUIRY #: 6681807.1

YEAR: 1979

= 500'

N

EDR

INQUIRY #: 6681807.1

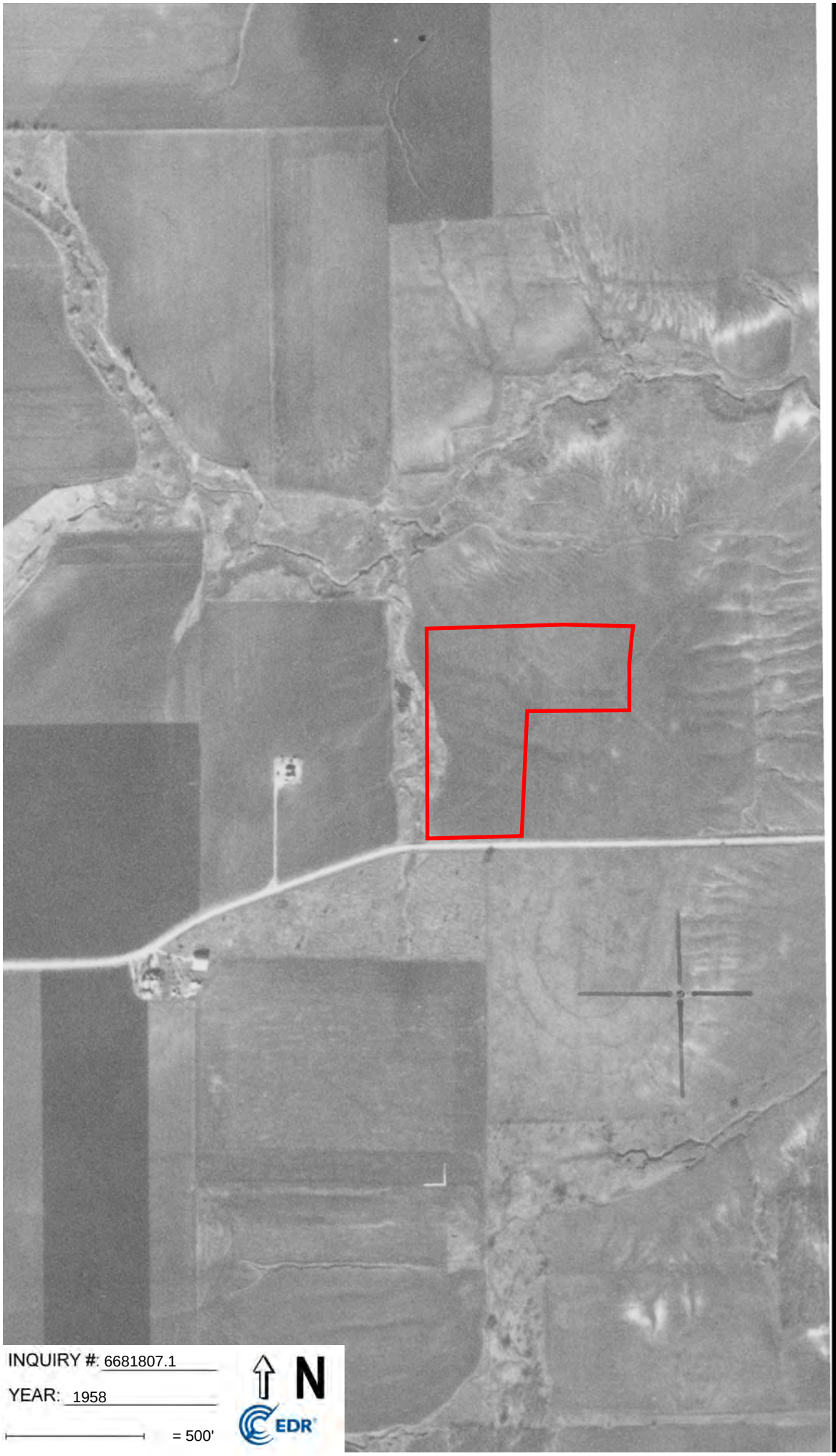
YEAR: 1972

= 500'

N

EDR


INQUIRY #: 6681807.1
YEAR: 1968
= 500'
N
EDR



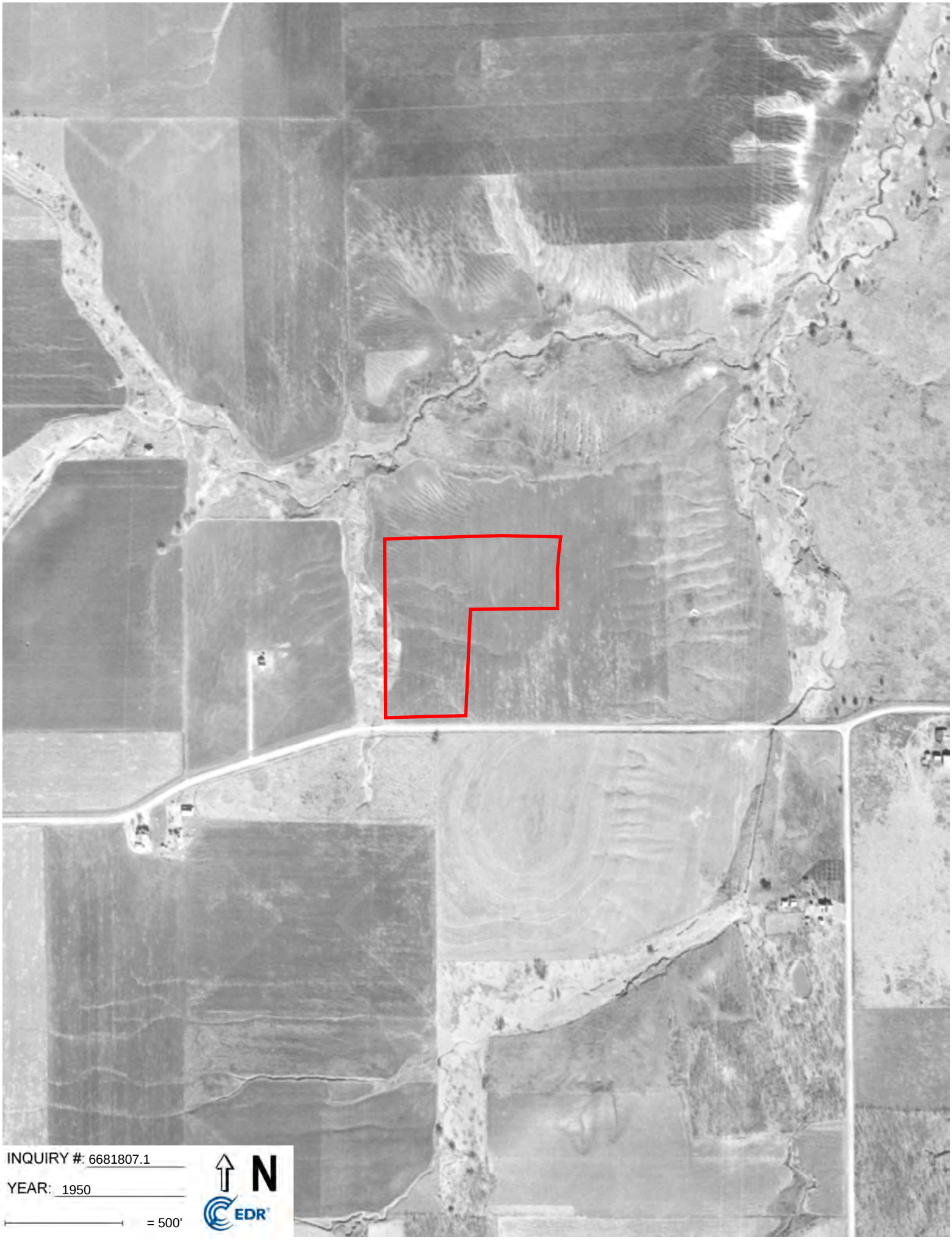
INQUIRY #: 6681807.1

YEAR: 1958

= 500'

N

EDR


INQUIRY #: 6681807.1
YEAR: 1950
= 500'
N
EDR

INQUIRY #: 6681807.1

YEAR: 1942

= 500'

N

EDR

11 February 2022

Texas Commission on Environmental Quality
Robert Sadlier, Deputy Director
Water Quality Division
PO Box 13087 MC 145
Austin, Texas 78711-3087

RE: Project Review for the Central Terminal Area Redevelopments, Dallas Fort Worth International Airport, Cities of Euless, Irving, and Grapevine, Dallas and Tarrant Counties, Texas

Dear Mr. Sadlier,

The Dallas Fort Worth International Airport (DFW) is developing four separate single and complete actions associated with the Central Terminal Area Redevelopment. These three actions include: (1) Central Terminal Area, which includes Terminal C Renovations, Terminal C Garage Updates, Terminal C-Pier, and the Terminal A-Pier; (2) Airfield Efficiency Improvements including the replacement of the Northeast Lighting Vault; (3) Services Delivery System (SDS) Supplemental Electric Central Utility Plant (CUP) and Associated New Pump House and Boiler House; and (4) Project Integration and Organization/Design-Build (PIO/DB) Building. The first three projects are in close physical proximity; however, due to construction schedules, the Federal Aviation Administration (FAA) has determined that the four actions will be reviewed independently under separate Environmental Assessments (EA) and Categorical Exclusions (CATEX) in accordance with the National Environmental Policy Act (NEPA) of 1969, the President's Council on Environmental Quality (CEQ) regulations to implement NEPA (40 Code of Federal Regulations [CFR] Parts 1500 to 1508), and the FAA regulations implementing NEPA (44 CFR Part 10). FAA is required to consider potential environmental impacts before funding or approving actions and projects. As part of this process, DFW requests your preliminary review for compliance with all federal and state laws and regulations including the Endangered Species Act (ESA), U.S. Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act (MBTA).

DFW respectfully requests that you provide comments or written concurrence within 30 days from the date of this letter. **Attachment A** contains all figures and **Attachment B** contains the delineation report. All comments or written concurrence with the findings can be sent to ***Ms. Sandra Lancaster, DFW Environmental Program Manager*** at

3003 South Service Road, EAD Annex, Building A
PO Box 619428
DFW Airport, Texas 75261
(o) 972-973-5573
slancaster@dfwairport.com

PROPOSED ACTIONS

DFW is respectfully requesting your review and comment on four separate actions that will be undergoing NEPA review. The first three projects are occurring on developed areas of DFW associated with Terminals A and C along with the adjacent Airfield. The PIO/DB Building will be constructed on a disturbed area within the Southwest Consolidated Campus. **Attachment A**, **Figures 1**, **2A**, and **2B** provide an aerial overview of the discrete project locations and a topographic overview on the historic and recent U.S. Geological Survey (USGS) quadrangle maps. **Attachment A, Figure 3** illustrates the soil map units within the project area, **Figure 4** illustrates the Federal Emergency Management Agency (FEMA) mapped floodplains, and **Figure 5** illustrates the delineated aquatic resources under the pre-2015 definitions. **Sites 2**, **3**, and **4** on the attached figures are the main project area components for Terminal C activities and **Site 1** encompasses the Terminal A activities. **Sites 8** through **10** are the construction staging, fabrication yards, and employee parking for the during of construction for the Central Terminal Area. **Site 6** is the Terminal C Garage laydown area. **Site 7** is the Airfield Improvement construction staging area. **Site 5** is the SDS Supplemental Electric CUP laydown area. The PIO/DB Building is located within **Sites 12** and **13**.

Central Terminal Area

The Proposed Action within the Central Terminal Area is associated with the need to increase gate capacity to meet current demand and projected increased demand for air travel from and to DFW; and to improve passenger experience within Terminal C by modernizing flow, increasing concession areas, and providing new boarding facilities. FAA has determined that due to the potential air quality effects, this proposed action will be analyzed as an EA. Specific elements associated with this proposed action include:

- Construction of a new two-level pier structure to Terminal A, including 10 new gates, which will provide a net increase of 5 gates totaling 130,000 square feet of new construction;
- Construction of a new two-level pier structure to Terminal C, including 9 new gates, which will provide a net increase of 4 gates totaling 115,000 square feet of new construction;
- Renovations within Terminal C, which include relocation of the South Baggage Hall, addition to the South, Center, and North Ticketing Halls, Renovation of the Ticketing Halls, System Upgrades, and a new Loading Dock; and
- Replacement and Renovation of the Terminal C Parking Garages and Associated Roadways.

Airfield Efficiency Improvements

The Proposed Action within the Airfield will include infill in several infield areas to allow the efficient transition of aircraft between the DFW taxiway system and the East Ramp Area. Currently, transition of aircraft between the DFW taxiway system and the East Ramp Area is inefficient and requires unnecessary fuel burn. Changes made as part of the Proposed Action will enhance airfield efficiency and safety by allowing for more efficient aircraft movements to and from the East Ramp Area while reducing long term fuel burn by aircraft. FAA has determined that an EA will be required due to the presence of hazardous materials within the Northeast Lighting Vault, which is being replaced as part of this Proposed Action. The Proposed Action consists of airside improvements to improve operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to/from the existing terminal area. Specific elements associated with this Proposed Action include:

- Creation or relocation of Aircraft Entry/Exit Positions along Taxiways G, K, and Z;
- Replacement and relocation of existing ancillary facilities (i.e., Northeast Lighting Vault, Terminal A South Triturator, etc.);
- Infill of four infield areas with concrete apron pavement;
- Underground utility work related to the above-mentioned improvements (e.g., electric, sanitary sewer, stormwater management system, potable water, and communications infrastructure); and

- Relocation of JY Taxiway connection to improve aircraft operations and optimize overall terminal area apron.

SDS, Supplemental Electric CUP, and Associated New Pump House and Boiler House

This Proposed Action is due to the age of the existing boiler house at the existing CUP, which has exceeded its useful life. The existing CUP and boiler house do not provide system resiliency or allow for effective use of renewable energy sources. Under this Proposed Action, aging infrastructure will be replaced and improved to provide more efficient use within Terminal C and provide overall system redundancy to the DFW. FAA has determined that an EA will be required due to the presence of hazardous materials within the existing infrastructure, which is being replaced as part of this Proposed Action. This Proposed Action includes the following utility improvements to Terminal C:

- Construction of a new Terminal C Boiler House and South Pump Room (approximately 5,500 square feet) to supply hot and chilled water;
- Construction of a new Terminal C North Pump Room (approximately 1,800 square feet);
- New gas service yard and new electrical service for new Terminal C Garage, Boiler House, and Pump Rooms; and
- Construction of a new Electric Brute Force CUP.

PIO Building

This Proposed Action would include the design, construction, and delivery of a PIO-DB to accommodate DFW project management, Central Terminal Area Development general contractors, designers, and subcontractors responsible for the delivery of the overall project. This will be a temporary facility that will be operational from September 2022 through September 2023. It will be a 1-story approximately 40,000 square foot fully furnished facility with 250 surface parking spaces occupying 10 acres. Currently, DFW does not have the building space or locations near the construction staging areas to office the staff necessary to oversee and manage the planning and construction scopes. By consolidating all project staff in one building it will provide efficiency in coordination and management of project activities. FAA determined that since this building will be constructed in a currently disturbed area designated for these uses that a CATEX would be the appropriate level of analysis.

AFFECTED RESOURCES OF THE PROPOSED ACTION

Resource area analyses will be undertaken during the NEPA processes. Anticipated potential effects that will likely be mitigated include air quality and noise associated with the Central Terminal Area Improvements and hazardous materials and wastes that are located within the Airfield Improvements project areas and within the SDS, Supplemental Electric CUP project areas. Socioeconomic conditions are not likely to be adversely affected based on the anticipated increased air traffic volume associated with the Central Terminal Area Improvements. DFW is currently in coordination with the Texas Historical Commission (THC) under the National Historic Preservation Act (NHPA) of 1966, as amended, specifically, Section 106, to address archeological and above-ground historic resources associated with the Central Terminal Area Improvements. The PIO/DB Building and the SDS, Supplemental Electric CUP activities have received THC concurrence of “no adverse effects” to archeological or historic resources.

Integrated Environmental Solutions, LLC (IES), under contract to DFW, performed a site visit and desktop analysis of the specific project locations associated with each of the proposed actions 21 September 2021 to provide a delineation of waters of the United States and to perform a protected species habitat assessment. Biological resources and water resources within the proposed project areas are limited to non-jurisdictional features associated with stormwater management and control and common urban and urban edge landscapes providing little to no habitat value. As such, the proposed projects are not expected to have any impacts on any federally or state-listed threatened or endangered species.

Waters of the United States

The September 2021 delineation identified three non-jurisdictional features associated with past construction activities at DFW Airport. A drainage ditch associated with DFW's current underground stormwater management system was identified within the proposed footprint of the new Boiler House to support the SDS, Supplemental Electric CUP. A detention pond and associated wetland drainage were located within an existing construction staging area to the east of Runway 17C/35C and Runway 17L/35R. These features were man-made as part of a stormwater control system that did not replace or connect two waters of the United States and they have no more than a speculative connection to a Traditional Navigable Water (TNW); therefore, they would not be regulated under Clean Water Act (CWA) Section 404.

Vegetation Communities

The project areas consist of four distinct vegetation communities: **urban matrix**, **frequently maintained grassland**, **infrequently maintained grassland**, and **shrub-scrub upland**. The **urban matrix** was found throughout a majority of the Central Terminal Areas and was comprised of concrete lots, roads, buildings, and active construction areas. The project area for the SDS, Supplemental Electric CUP, and the Boiler House and Pump House contained the **frequently maintained grassland** vegetation community, dominated by mowed Bermudagrass (*Cynodon dactylon*). The **infrequently maintained grassland** was observed in the PIO/DB Building project area and was comprised of Maximilian sunflower (*Helianthus maximiliani*), meadow dropseed (*Sporobolus compositus*), Johnsongrass (*Sorghum halepense*), white heath aster (*Symphyotrichum ericoides*), King Ranch bluestem (*Bothriochloa ischaemum*), sumpweed (*Iva annua*), Canada goldenrod (*Solidago canadensis*), prairie broomweed (*Amphiachyris dracunculoides*), Bermudagrass, and annual sunflower (*Helianthus annuus*). The **shrub-scrub upland** vegetation community was also observed on the western side of the PIO/DB Building project area, dominated by honey mesquite (*Prosopis glandulosa*), sugarberry (*Celtis laevigata*), giant ragweed (*Ambrosia trifida*), Johnsongrass, Bermudagrass, and annual sunflower.

Federally Protected Species

According to the U.S. Fish and Wildlife Service (USFWS), four species are listed as federally protected (i.e., threatened or endangered) with the potential to occur within Dallas and Tarrant Counties; these include: Golden-cheeked Warbler (*Dendroica chrysoparia*), Piping Plover (*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), and Whooping Crane (*Grus americana*). Two of these species are conditionally listed as threatened on the basis that the proposed project is for wind energy production: Red Knot and Piping Plover. No federally listed critical habitat for these species is located within the vicinity of the project areas.

The Golden-cheeked Warbler, Red Knot, Piping Plover, and Whooping Crane are listed federally as threatened and endangered species for Dallas and Tarrant Counties. These projects will not be related to wind energy; therefore, the Red Knot and Piping Plover will not be affected.

- The Golden-cheeked Warbler requires a habitat that includes forested areas dominated by Ashe juniper (*Juniperus ashei*) in mixed stands with various oaks (*Quercus* spp.). This unique vegetation community is not present within the survey area.
- Whooping Cranes utilize estuaries, prairie marshes, moist grasslands, croplands, and will use large shallow wetland areas associated with lakes for roosting and feeding. Although the survey area did contain wetlands, the size and urban location would not be a suitable habitat for Whooping Cranes.
- The monarch butterfly is currently a federal candidate species and has no formal protection. None of the vegetation communities would offer feeding ideal habitat for this species. It could be occasionally observed as stopover habitat along community edges.

In summary, the habitats present within the survey area were not suitable for any of the federally listed threatened or endangered species; nor were the habitats suitable for nesting, feeding, or stopover migration habitat for these species.

Due to a lack of perennial flowing water, there would be no habitat for any mollusk species or for the alligator snapping turtle. The Texas horned lizard is unlikely to occupy any of the vegetation communities within the project area due to dense understory cover and the high urban interface. The black bear is no longer considered extant in the greater Dallas Fort Worth metropolitan area.

Migratory Birds

Affects to migratory birds from the proposed actions are expected to be minimal based on the highly urban nature of the majority of the project areas, the proposed use of LED high efficiency lighting, and DFW's ongoing program to monitor for migratory bird nests prior to any construction activities.

Thank you for your timely review of the enclosed information. If you have any questions, please contact me at 972-973-5573 or via e-mail at slancaster@dfwairport.com

Sincerely,

Dallas Fort Worth International Airport

Sandra Lancaster
Environmental Program Manager

Attachment A
Attachment B

IES File ref: 03.006.096

11 February 2022

Texas Commission on Environmental Quality
Sam Short, Deputy Director
Air Permits Division
PO Box 13087 MC 206
Austin, Texas 78711-3087

RE: Project Review for the Central Terminal Area Redevelopments, Dallas Fort Worth International Airport, Cities of Euless, Irving, and Grapevine, Dallas and Tarrant Counties, Texas

Dear Mr. Short,

The Dallas Fort Worth International Airport (DFW) is developing four separate single and complete actions associated with the Central Terminal Area Redevelopment. These three actions include: (1) Central Terminal Area, which includes Terminal C Renovations, Terminal C Garage Updates, Terminal C-Pier, and the Terminal A-Pier; (2) Airfield Efficiency Improvements including the replacement of the Northeast Lighting Vault; (3) Services Delivery System (SDS) Supplemental Electric Central Utility Plant (CUP) and Associated New Pump House and Boiler House; and (4) Project Integration and Organization/Design-Build (PIO/DB) Building. The first three projects are in close physical proximity; however, due to construction schedules, the Federal Aviation Administration (FAA) has determined that the four actions will be reviewed independently under separate Environmental Assessments (EA) and Categorical Exclusions (CATEX) in accordance with the National Environmental Policy Act (NEPA) of 1969, the President's Council on Environmental Quality (CEQ) regulations to implement NEPA (40 Code of Federal Regulations [CFR] Parts 1500 to 1508), and the FAA regulations implementing NEPA (44 CFR Part 10). FAA is required to consider potential environmental impacts before funding or approving actions and projects. As part of this process, DFW requests your preliminary review for compliance with all federal and state laws and regulations including the Endangered Species Act (ESA), U.S. Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act (MBTA).

DFW respectfully requests that you provide comments or written concurrence within 30 days from the date of this letter. **Attachment A** contains all figures and **Attachment B** contains the delineation report. All comments or written concurrence with the findings can be sent to ***Ms. Sandra Lancaster, DFW Environmental Program Manager*** at

3003 South Service Road, EAD Annex, Building A
PO Box 619428
DFW Airport, Texas 75261
(o) 972-973-5573
slancaster@dfwairport.com

PROPOSED ACTIONS

DFW is respectfully requesting your review and comment on four separate actions that will be undergoing NEPA review. The first three projects are occurring on developed areas of DFW associated with Terminals A and C along with the adjacent Airfield. The PIO/DB Building will be constructed on a disturbed area within the Southwest Consolidated Campus. **Attachment A**, **Figures 1**, **2A**, and **2B** provide an aerial overview of the discrete project locations and a topographic overview on the historic and recent U.S. Geological Survey (USGS) quadrangle maps. **Attachment A, Figure 3** illustrates the soil map units within the project area, **Figure 4** illustrates the Federal Emergency Management Agency (FEMA) mapped floodplains, and **Figure 5** illustrates the delineated aquatic resources under the pre-2015 definitions. **Sites 2**, **3**, and **4** on the attached figures are the main project area components for Terminal C activities and **Site 1** encompasses the Terminal A activities. **Sites 8** through **10** are the construction staging, fabrication yards, and employee parking for the during of construction for the Central Terminal Area. **Site 6** is the Terminal C Garage laydown area. **Site 7** is the Airfield Improvement construction staging area. **Site 5** is the SDS Supplemental Electric CUP laydown area. The PIO/DB Building is located within **Sites 12** and **13**.

Central Terminal Area

The Proposed Action within the Central Terminal Area is associated with the need to increase gate capacity to meet current demand and projected increased demand for air travel from and to DFW; and to improve passenger experience within Terminal C by modernizing flow, increasing concession areas, and providing new boarding facilities. FAA has determined that due to the potential air quality effects, this proposed action will be analyzed as an EA. Specific elements associated with this proposed action include:

- Construction of a new two-level pier structure to Terminal A, including 10 new gates, which will provide a net increase of 5 gates totaling 130,000 square feet of new construction;
- Construction of a new two-level pier structure to Terminal C, including 9 new gates, which will provide a net increase of 4 gates totaling 115,000 square feet of new construction;
- Renovations within Terminal C, which include relocation of the South Baggage Hall, addition to the South, Center, and North Ticketing Halls, Renovation of the Ticketing Halls, System Upgrades, and a new Loading Dock; and
- Replacement and Renovation of the Terminal C Parking Garages and Associated Roadways.

Airfield Efficiency Improvements

The Proposed Action within the Airfield will include infill in several infield areas to allow the efficient transition of aircraft between the DFW taxiway system and the East Ramp Area. Currently, transition of aircraft between the DFW taxiway system and the East Ramp Area is inefficient and requires unnecessary fuel burn. Changes made as part of the Proposed Action will enhance airfield efficiency and safety by allowing for more efficient aircraft movements to and from the East Ramp Area while reducing long term fuel burn by aircraft. FAA has determined that an EA will be required due to the presence of hazardous materials within the Northeast Lighting Vault, which is being replaced as part of this Proposed Action. The Proposed Action consists of airside improvements to improve operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to/from the existing terminal area. Specific elements associated with this Proposed Action include:

- Creation or relocation of Aircraft Entry/Exit Positions along Taxiways G, K, and Z;
- Replacement and relocation of existing ancillary facilities (i.e., Northeast Lighting Vault, Terminal A South Triturator, etc.);
- Infill of four infield areas with concrete apron pavement;
- Underground utility work related to the above-mentioned improvements (e.g., electric, sanitary sewer, stormwater management system, potable water, and communications infrastructure); and

- Relocation of JY Taxiway connection to improve aircraft operations and optimize overall terminal area apron.

SDS, Supplemental Electric CUP, and Associated New Pump House and Boiler House

This Proposed Action is due to the age of the existing boiler house at the existing CUP, which has exceeded its useful life. The existing CUP and boiler house do not provide system resiliency or allow for effective use of renewable energy sources. Under this Proposed Action, aging infrastructure will be replaced and improved to provide more efficient use within Terminal C and provide overall system redundancy to the DFW. FAA has determined that an EA will be required due to the presence of hazardous materials within the existing infrastructure, which is being replaced as part of this Proposed Action. This Proposed Action includes the following utility improvements to Terminal C:

- Construction of a new Terminal C Boiler House and South Pump Room (approximately 5,500 square feet) to supply hot and chilled water;
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Resource area analyses will be undertaken during the NEPA processes. Anticipated potential effects that will likely be mitigated include air quality and noise associated with the Central Terminal Area Improvements and hazardous materials and wastes that are located within the Airfield Improvements project areas and within the SDS, Supplemental Electric CUP project areas. Socioeconomic conditions are not likely to be adversely affected based on the anticipated increased air traffic volume associated with the Central Terminal Area Improvements. DFW is currently in coordination with the Texas Historical Commission (THC) under the National Historic Preservation Act (NHPA) of 1966, as amended, specifically, Section 106, to address archeological and above-ground historic resources associated with the Central Terminal Area Improvements. The PIO/DB Building and the SDS, Supplemental Electric CUP activities have received THC concurrence of “no adverse effects” to archeological or historic resources.

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Waters of the United States

The September 2021 delineation identified three non-jurisdictional features associated with past construction activities at DFW Airport. A drainage ditch associated with DFW's current underground stormwater management system was identified within the proposed footprint of the new Boiler House to support the SDS, Supplemental Electric CUP. A detention pond and associated wetland drainage were located within an existing construction staging area to the east of Runway 17C/35C and Runway 17L/35R. These features were man-made as part of a stormwater control system that did not replace or connect two waters of the United States and they have no more than a speculative connection to a Traditional Navigable Water (TNW); therefore, they would not be regulated under Clean Water Act (CWA) Section 404.

Vegetation Communities

The project areas consist of four distinct vegetation communities: **urban matrix**, **frequently maintained grassland**, **infrequently maintained grassland**, and **shrub-scrub upland**. The **urban matrix** was found throughout a majority of the Central Terminal Areas and was comprised of concrete lots, roads, buildings, and active construction areas. The project area for the SDS, Supplemental Electric CUP, and the Boiler House and Pump House contained the **frequently maintained grassland** vegetation community, dominated by mowed Bermudagrass (*Cynodon dactylon*). The **infrequently maintained grassland** was observed in the PIO/DB Building project area and was comprised of Maximilian sunflower (*Helianthus maximiliani*), meadow dropseed (*Sporobolus compositus*), Johnsongrass (*Sorghum halepense*), white heath aster (*Symphyotrichum ericoides*), King Ranch bluestem (*Bothriochloa ischaemum*), sumpweed (*Iva annua*), Canada goldenrod (*Solidago canadensis*), prairie broomweed (*Amphiachyris dracunculoides*), Bermudagrass, and annual sunflower (*Helianthus annuus*). The **shrub-scrub upland** vegetation community was also observed on the western side of the PIO/DB Building project area, dominated by honey mesquite (*Prosopis glandulosa*), sugarberry (*Celtis laevigata*), giant ragweed (*Ambrosia trifida*), Johnsongrass, Bermudagrass, and annual sunflower.

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Thank you for your timely review of the enclosed information. If you have any questions, please contact me at 972-973-5573 or via e-mail at slancaster@dfwairport.com

Sincerely,

Dallas Fort Worth International Airport

Sandra Lancaster
Environmental Program Manager

Attachment A
Attachment B

IES File ref: 03.006.096

11 February 2022

Texas Commission on Environmental Quality
Beth Seaton, Deputy Director
Remediation Division
PO Box 13087 MC 225
Austin, Texas 78711-3087

RE: Project Review for the Central Terminal Area Redevelopments, Dallas Fort Worth International Airport, Cities of Euless, Irving, and Grapevine, Dallas and Tarrant Counties, Texas

Dear Ms. Seaton,

The Dallas Fort Worth International Airport (DFW) is developing four separate single and complete actions associated with the Central Terminal Area Redevelopment. These three actions include: (1) Central Terminal Area, which includes Terminal C Renovations, Terminal C Garage Updates, Terminal C-Pier, and the Terminal A-Pier; (2) Airfield Efficiency Improvements including the replacement of the Northeast Lighting Vault; (3) Services Delivery System (SDS) Supplemental Electric Central Utility Plant (CUP) and Associated New Pump House and Boiler House; and (4) Project Integration and Organization/Design-Build (PIO/DB) Building. The first three projects are in close physical proximity; however, due to construction schedules, the Federal Aviation Administration (FAA) has determined that the four actions will be reviewed independently under separate Environmental Assessments (EA) and Categorical Exclusions (CATEX) in accordance with the National Environmental Policy Act (NEPA) of 1969, the President's Council on Environmental Quality (CEQ) regulations to implement NEPA (40 Code of Federal Regulations [CFR] Parts 1500 to 1508), and the FAA regulations implementing NEPA (44 CFR Part 10). FAA is required to consider potential environmental impacts before funding or approving actions and projects. As part of this process, DFW requests your preliminary review for compliance with all federal and state laws and regulations including the Endangered Species Act (ESA), U.S. Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act (MBTA).

DFW respectfully requests that you provide comments or written concurrence within 30 days from the date of this letter. **Attachment A** contains all figures and **Attachment B** contains the delineation report. All comments or written concurrence with the findings can be sent to ***Ms. Sandra Lancaster, DFW Environmental Program Manager*** at

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PROPOSED ACTIONS

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- Construction of a new two-level pier structure to Terminal C, including 9 new gates, which will provide a net increase of 4 gates totaling 115,000 square feet of new construction;
- Renovations within Terminal C, which include relocation of the South Baggage Hall, addition to the South, Center, and North Ticketing Halls, Renovation of the Ticketing Halls, System Upgrades, and a new Loading Dock; and
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The Golden-cheeked Warbler, Red Knot, Piping Plover, and Whooping Crane are listed federally as threatened and endangered species for Dallas and Tarrant Counties. These projects will not be related to wind energy; therefore, the Red Knot and Piping Plover will not be affected.

- The Golden-cheeked Warbler requires a habitat that includes forested areas dominated by Ashe juniper (*Juniperus ashei*) in mixed stands with various oaks (*Quercus* spp.). This unique vegetation community is not present within the survey area.
- Whooping Cranes utilize estuaries, prairie marshes, moist grasslands, croplands, and will use large shallow wetland areas associated with lakes for roosting and feeding. Although the survey area did contain wetlands, the size and urban location would not be a suitable habitat for Whooping Cranes.
- The monarch butterfly is currently a federal candidate species and has no formal protection. None of the vegetation communities would offer feeding ideal habitat for this species. It could be occasionally observed as stopover habitat along community edges.

In summary, the habitats present within the survey area were not suitable for any of the federally listed threatened or endangered species; nor were the habitats suitable for nesting, feeding, or stopover migration habitat for these species.

Due to a lack of perennial flowing water, there would be no habitat for any mollusk species or for the alligator snapping turtle. The Texas horned lizard is unlikely to occupy any of the vegetation communities within the project area due to dense understory cover and the high urban interface. The black bear is no longer considered extant in the greater Dallas Fort Worth metropolitan area.

Migratory Birds

Affects to migratory birds from the proposed actions are expected to be minimal based on the highly urban nature of the majority of the project areas, the proposed use of LED high efficiency lighting, and DFW's ongoing program to monitor for migratory bird nests prior to any construction activities.

Thank you for your timely review of the enclosed information. If you have any questions, please contact me at 972-973-5573 or via e-mail at slancaster@dfwairport.com

Sincerely,

Dallas Fort Worth International Airport

Sandra Lancaster
Environmental Program Manager

Attachment A
Attachment B

IES File ref: 03.006.096

11 February 2022

U.S. Environmental Protection Agency
Mr. Ronnie Crossland, Land, Chemical, and Redevelopment Division
1201 Elm Street, Ste. 500
Dallas, Texas 75270

RE: Project Review for the Central Terminal Area Redevelopments, Dallas Fort Worth International Airport, Cities of Euless, Irving, and Grapevine, Dallas and Tarrant Counties, Texas

Dear Mr. Crossland,

The Dallas Fort Worth International Airport (DFW) is developing four separate single and complete actions associated with the Central Terminal Area Redevelopment. These three actions include: (1) Central Terminal Area, which includes Terminal C Renovations, Terminal C Garage Updates, Terminal C-Pier, and the Terminal A-Pier; (2) Airfield Efficiency Improvements including the replacement of the Northeast Lighting Vault; (3) Services Delivery System (SDS) Supplemental Electric Central Utility Plant (CUP) and Associated New Pump House and Boiler House; and (4) Project Integration and Organization/Design-Build (PIO/DB) Building. The first three projects are in close physical proximity; however, due to construction schedules, the Federal Aviation Administration (FAA) has determined that the four actions will be reviewed independently under separate Environmental Assessments (EA) and Categorical Exclusions (CATEX) in accordance with the National Environmental Policy Act (NEPA) of 1969, the President's Council on Environmental Quality (CEQ) regulations to implement NEPA (40 Code of Federal Regulations [CFR] Parts 1500 to 1508), and the FAA regulations implementing NEPA (44 CFR Part 10). FAA is required to consider potential environmental impacts before funding or approving actions and projects. As part of this process, DFW requests your preliminary review for compliance with all federal and state laws and regulations including the Endangered Species Act (ESA), U.S. Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act (MBTA).

DFW respectfully requests that you provide comments or written concurrence within 30 days from the date of this letter. **Attachment A** contains all figures and **Attachment B** contains the delineation report. All comments or written concurrence with the findings can be sent to ***Ms. Sandra Lancaster, DFW Environmental Program Manager*** at

3003 South Service Road, EAD Annex, Building A
PO Box 619428
DFW Airport, Texas 75261
(o) 972-973-5573
slancaster@dfwairport.com

PROPOSED ACTIONS

DFW is respectfully requesting your review and comment on four separate actions that will be undergoing NEPA review. The first three projects are occurring on developed areas of DFW associated with Terminals A and C along with the adjacent Airfield. The PIO/DB Building will be constructed on a disturbed area within the Southwest Consolidated Campus. **Attachment A**, **Figures 1**, **2A**, and **2B** provide an aerial overview of the discrete project locations and a topographic overview on the historic and recent U.S. Geological Survey (USGS) quadrangle maps. **Attachment A, Figure 3** illustrates the soil map units within the project area, **Figure 4** illustrates the Federal Emergency Management Agency (FEMA) mapped floodplains, and **Figure 5** illustrates the delineated aquatic resources under the pre-2015 definitions. **Sites 2**, **3**, and **4** on the attached figures are the main project area components for Terminal C activities and **Site 1** encompasses the Terminal A activities. **Sites 8** through **10** are the construction staging, fabrication yards, and employee parking for the during of construction for the Central Terminal Area. **Site 6** is the Terminal C Garage laydown area. **Site 7** is the Airfield Improvement construction staging area. **Site 5** is the SDS Supplemental Electric CUP laydown area. The PIO/DB Building is located within **Sites 12** and **13**.

Central Terminal Area

The Proposed Action within the Central Terminal Area is associated with the need to increase gate capacity to meet current demand and projected increased demand for air travel from and to DFW; and to improve passenger experience within Terminal C by modernizing flow, increasing concession areas, and providing new boarding facilities. FAA has determined that due to the potential air quality effects, this proposed action will be analyzed as an EA. Specific elements associated with this proposed action include:

- Construction of a new two-level pier structure to Terminal A, including 10 new gates, which will provide a net increase of 5 gates totaling 130,000 square feet of new construction;
- Construction of a new two-level pier structure to Terminal C, including 9 new gates, which will provide a net increase of 4 gates totaling 115,000 square feet of new construction;
- Renovations within Terminal C, which include relocation of the South Baggage Hall, addition to the South, Center, and North Ticketing Halls, Renovation of the Ticketing Halls, System Upgrades, and a new Loading Dock; and
- Replacement and Renovation of the Terminal C Parking Garages and Associated Roadways.

Airfield Efficiency Improvements

The Proposed Action within the Airfield will include infill in several infield areas to allow the efficient transition of aircraft between the DFW taxiway system and the East Ramp Area. Currently, transition of aircraft between the DFW taxiway system and the East Ramp Area is inefficient and requires unnecessary fuel burn. Changes made as part of the Proposed Action will enhance airfield efficiency and safety by allowing for more efficient aircraft movements to and from the East Ramp Area while reducing long term fuel burn by aircraft. FAA has determined that an EA will be required due to the presence of hazardous materials within the Northeast Lighting Vault, which is being replaced as part of this Proposed Action. The Proposed Action consists of airside improvements to improve operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to/from the existing terminal area. Specific elements associated with this Proposed Action include:

- Creation or relocation of Aircraft Entry/Exit Positions along Taxiways G, K, and Z;
- Replacement and relocation of existing ancillary facilities (i.e., Northeast Lighting Vault, Terminal A South Triturator, etc.);
- Infill of four infield areas with concrete apron pavement;
- Underground utility work related to the above-mentioned improvements (e.g., electric, sanitary sewer, stormwater management system, potable water, and communications infrastructure); and

- Relocation of JY Taxiway connection to improve aircraft operations and optimize overall terminal area apron.

SDS, Supplemental Electric CUP, and Associated New Pump House and Boiler House

This Proposed Action is due to the age of the existing boiler house at the existing CUP, which has exceeded its useful life. The existing CUP and boiler house do not provide system resiliency or allow for effective use of renewable energy sources. Under this Proposed Action, aging infrastructure will be replaced and improved to provide more efficient use within Terminal C and provide overall system redundancy to the DFW. FAA has determined that an EA will be required due to the presence of hazardous materials within the existing infrastructure, which is being replaced as part of this Proposed Action. This Proposed Action includes the following utility improvements to Terminal C:

- Construction of a new Terminal C Boiler House and South Pump Room (approximately 5,500 square feet) to supply hot and chilled water;
- Construction of a new Terminal C North Pump Room (approximately 1,800 square feet);
- New gas service yard and new electrical service for new Terminal C Garage, Boiler House, and Pump Rooms; and
- Construction of a new Electric Brute Force CUP.

PIO Building

This Proposed Action would include the design, construction, and delivery of a PIO-DB to accommodate DFW project management, Central Terminal Area Development general contractors, designers, and subcontractors responsible for the delivery of the overall project. This will be a temporary facility that will be operational from September 2022 through September 2023. It will be a 1-story approximately 40,000 square foot fully furnished facility with 250 surface parking spaces occupying 10 acres. Currently, DFW does not have the building space or locations near the construction staging areas to office the staff necessary to oversee and manage the planning and construction scopes. By consolidating all project staff in one building it will provide efficiency in coordination and management of project activities. FAA determined that since this building will be constructed in a currently disturbed area designated for these uses that a CATEX would be the appropriate level of analysis.

AFFECTED RESOURCES OF THE PROPOSED ACTION

Resource area analyses will be undertaken during the NEPA processes. Anticipated potential effects that will likely be mitigated include air quality and noise associated with the Central Terminal Area Improvements and hazardous materials and wastes that are located within the Airfield Improvements project areas and within the SDS, Supplemental Electric CUP project areas. Socioeconomic conditions are not likely to be adversely affected based on the anticipated increased air traffic volume associated with the Central Terminal Area Improvements. DFW is currently in coordination with the Texas Historical Commission (THC) under the National Historic Preservation Act (NHPA) of 1966, as amended, specifically, Section 106, to address archeological and above-ground historic resources associated with the Central Terminal Area Improvements. The PIO/DB Building and the SDS, Supplemental Electric CUP activities have received THC concurrence of “no adverse effects” to archeological or historic resources.

Integrated Environmental Solutions, LLC (IES), under contract to DFW, performed a site visit and desktop analysis of the specific project locations associated with each of the proposed actions 21 September 2021 to provide a delineation of waters of the United States and to perform a protected species habitat assessment. Biological resources and water resources within the proposed project areas are limited to non-jurisdictional features associated with stormwater management and control and common urban and urban edge landscapes providing little to no habitat value. As such, the proposed projects are not expected to have any impacts on any federally or state-listed threatened or endangered species.

Waters of the United States

The September 2021 delineation identified three non-jurisdictional features associated with past construction activities at DFW Airport. A drainage ditch associated with DFW's current underground stormwater management system was identified within the proposed footprint of the new Boiler House to support the SDS, Supplemental Electric CUP. A detention pond and associated wetland drainage were located within an existing construction staging area to the east of Runway 17C/35C and Runway 17L/35R. These features were man-made as part of a stormwater control system that did not replace or connect two waters of the United States and they have no more than a speculative connection to a Traditional Navigable Water (TNW); therefore, they would not be regulated under Clean Water Act (CWA) Section 404.

Vegetation Communities

The project areas consist of four distinct vegetation communities: **urban matrix**, **frequently maintained grassland**, **infrequently maintained grassland**, and **shrub-scrub upland**. The **urban matrix** was found throughout a majority of the Central Terminal Areas and was comprised of concrete lots, roads, buildings, and active construction areas. The project area for the SDS, Supplemental Electric CUP, and the Boiler House and Pump House contained the **frequently maintained grassland** vegetation community, dominated by mowed Bermudagrass (*Cynodon dactylon*). The **infrequently maintained grassland** was observed in the PIO/DB Building project area and was comprised of Maximilian sunflower (*Helianthus maximiliani*), meadow dropseed (*Sporobolus compositus*), Johnsongrass (*Sorghum halepense*), white heath aster (*Symphyotrichum ericoides*), King Ranch bluestem (*Bothriochloa ischaemum*), sumpweed (*Iva annua*), Canada goldenrod (*Solidago canadensis*), prairie broomweed (*Amphiachyris dracunculoides*), Bermudagrass, and annual sunflower (*Helianthus annuus*). The **shrub-scrub upland** vegetation community was also observed on the western side of the PIO/DB Building project area, dominated by honey mesquite (*Prosopis glandulosa*), sugarberry (*Celtis laevigata*), giant ragweed (*Ambrosia trifida*), Johnsongrass, Bermudagrass, and annual sunflower.

Federally Protected Species

According to the U.S. Fish and Wildlife Service (USFWS), four species are listed as federally protected (i.e., threatened or endangered) with the potential to occur within Dallas and Tarrant Counties; these include: Golden-cheeked Warbler (*Dendroica chrysoparia*), Piping Plover (*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), and Whooping Crane (*Grus americana*). Two of these species are conditionally listed as threatened on the basis that the proposed project is for wind energy production: Red Knot and Piping Plover. No federally listed critical habitat for these species is located within the vicinity of the project areas.

The Golden-cheeked Warbler, Red Knot, Piping Plover, and Whooping Crane are listed federally as threatened and endangered species for Dallas and Tarrant Counties. These projects will not be related to wind energy; therefore, the Red Knot and Piping Plover will not be affected.

- The Golden-cheeked Warbler requires a habitat that includes forested areas dominated by Ashe juniper (*Juniperus ashei*) in mixed stands with various oaks (*Quercus* spp.). This unique vegetation community is not present within the survey area.
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In summary, the habitats present within the survey area were not suitable for any of the federally listed threatened or endangered species; nor were the habitats suitable for nesting, feeding, or stopover migration habitat for these species.

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Affects to migratory birds from the proposed actions are expected to be minimal based on the highly urban nature of the majority of the project areas, the proposed use of LED high efficiency lighting, and DFW's ongoing program to monitor for migratory bird nests prior to any construction activities.

Thank you for your timely review of the enclosed information. If you have any questions, please contact me at 972-973-5573 or via e-mail at slancaster@dfwairport.com

Sincerely,

Dallas Fort Worth International Airport

Sandra Lancaster
Environmental Program Manager

Attachment A
Attachment B

IES File ref: 03.006.096

11 February 2022

U.S. Environmental Protection Agency
Mr. Charles Maguire, Water Division
1201 Elm Street, Ste. 500
Dallas, Texas 75270

RE: Project Review for the Central Terminal Area Redevelopments, Dallas Fort Worth International Airport, Cities of Euless, Irving, and Grapevine, Dallas and Tarrant Counties, Texas

Dear Mr. Maguire,

The Dallas Fort Worth International Airport (DFW) is developing four separate single and complete actions associated with the Central Terminal Area Redevelopment. These three actions include: (1) Central Terminal Area, which includes Terminal C Renovations, Terminal C Garage Updates, Terminal C-Pier, and the Terminal A-Pier; (2) Airfield Efficiency Improvements including the replacement of the Northeast Lighting Vault; (3) Services Delivery System (SDS) Supplemental Electric Central Utility Plant (CUP) and Associated New Pump House and Boiler House; and (4) Project Integration and Organization/Design-Build (PIO/DB) Building. The first three projects are in close physical proximity; however, due to construction schedules, the Federal Aviation Administration (FAA) has determined that the four actions will be reviewed independently under separate Environmental Assessments (EA) and Categorical Exclusions (CATEX) in accordance with the National Environmental Policy Act (NEPA) of 1969, the President's Council on Environmental Quality (CEQ) regulations to implement NEPA (40 Code of Federal Regulations [CFR] Parts 1500 to 1508), and the FAA regulations implementing NEPA (44 CFR Part 10). FAA is required to consider potential environmental impacts before funding or approving actions and projects. As part of this process, DFW requests your preliminary review for compliance with all federal and state laws and regulations including the Endangered Species Act (ESA), U.S. Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act (MBTA).

DFW respectfully requests that you provide comments or written concurrence within 30 days from the date of this letter. **Attachment A** contains all figures and **Attachment B** contains the delineation report. All comments or written concurrence with the findings can be sent to ***Ms. Sandra Lancaster, DFW Environmental Program Manager*** at

3003 South Service Road, EAD Annex, Building A
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PROPOSED ACTIONS

DFW is respectfully requesting your review and comment on four separate actions that will be undergoing NEPA review. The first three projects are occurring on developed areas of DFW associated with Terminals A and C along with the adjacent Airfield. The PIO/DB Building will be constructed on a disturbed area within the Southwest Consolidated Campus. **Attachment A**, **Figures 1**, **2A**, and **2B** provide an aerial overview of the discrete project locations and a topographic overview on the historic and recent U.S. Geological Survey (USGS) quadrangle maps. **Attachment A, Figure 3** illustrates the soil map units within the project area, **Figure 4** illustrates the Federal Emergency Management Agency (FEMA) mapped floodplains, and **Figure 5** illustrates the delineated aquatic resources under the pre-2015 definitions. **Sites 2**, **3**, and **4** on the attached figures are the main project area components for Terminal C activities and **Site 1** encompasses the Terminal A activities. **Sites 8** through **10** are the construction staging, fabrication yards, and employee parking for the during of construction for the Central Terminal Area. **Site 6** is the Terminal C Garage laydown area. **Site 7** is the Airfield Improvement construction staging area. **Site 5** is the SDS Supplemental Electric CUP laydown area. The PIO/DB Building is located within **Sites 12** and **13**.

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Thank you for your timely review of the enclosed information. If you have any questions, please contact me at 972-973-5573 or via e-mail at slancaster@dfwairport.com

Sincerely,

Dallas Fort Worth International Airport

Sandra Lancaster
Environmental Program Manager

Attachment A
Attachment B

IES File ref: 03.006.096

11 February 2022

U.S. Environmental Protection Agency
Mr. David Garcia, Air & Radiation Division
1201 Elm Street, Ste. 500
Dallas, Texas 75270

RE: Project Review for the Central Terminal Area Redevelopments, Dallas Fort Worth International Airport, Cities of Euless, Irving, and Grapevine, Dallas and Tarrant Counties, Texas

Dear Mr. Garcia,

The Dallas Fort Worth International Airport (DFW) is developing four separate single and complete actions associated with the Central Terminal Area Redevelopment. These three actions include: (1) Central Terminal Area, which includes Terminal C Renovations, Terminal C Garage Updates, Terminal C-Pier, and the Terminal A-Pier; (2) Airfield Efficiency Improvements including the replacement of the Northeast Lighting Vault; (3) Services Delivery System (SDS) Supplemental Electric Central Utility Plant (CUP) and Associated New Pump House and Boiler House; and (4) Project Integration and Organization/Design-Build (PIO/DB) Building. The first three projects are in close physical proximity; however, due to construction schedules, the Federal Aviation Administration (FAA) has determined that the four actions will be reviewed independently under separate Environmental Assessments (EA) and Categorical Exclusions (CATEX) in accordance with the National Environmental Policy Act (NEPA) of 1969, the President's Council on Environmental Quality (CEQ) regulations to implement NEPA (40 Code of Federal Regulations [CFR] Parts 1500 to 1508), and the FAA regulations implementing NEPA (44 CFR Part 10). FAA is required to consider potential environmental impacts before funding or approving actions and projects. As part of this process, DFW requests your preliminary review for compliance with all federal and state laws and regulations including the Endangered Species Act (ESA), U.S. Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act (MBTA).

DFW respectfully requests that you provide comments or written concurrence within 30 days from the date of this letter. **Attachment A** contains all figures and **Attachment B** contains the delineation report. All comments or written concurrence with the findings can be sent to ***Ms. Sandra Lancaster, DFW Environmental Program Manager*** at

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PROPOSED ACTIONS

DFW is respectfully requesting your review and comment on four separate actions that will be undergoing NEPA review. The first three projects are occurring on developed areas of DFW associated with Terminals A and C along with the adjacent Airfield. The PIO/DB Building will be constructed on a disturbed area within the Southwest Consolidated Campus. **Attachment A**, **Figures 1**, **2A**, and **2B** provide an aerial overview of the discrete project locations and a topographic overview on the historic and recent U.S. Geological Survey (USGS) quadrangle maps. **Attachment A, Figure 3** illustrates the soil map units within the project area, **Figure 4** illustrates the Federal Emergency Management Agency (FEMA) mapped floodplains, and **Figure 5** illustrates the delineated aquatic resources under the pre-2015 definitions. **Sites 2**, **3**, and **4** on the attached figures are the main project area components for Terminal C activities and **Site 1** encompasses the Terminal A activities. **Sites 8** through **10** are the construction staging, fabrication yards, and employee parking for the during of construction for the Central Terminal Area. **Site 6** is the Terminal C Garage laydown area. **Site 7** is the Airfield Improvement construction staging area. **Site 5** is the SDS Supplemental Electric CUP laydown area. The PIO/DB Building is located within **Sites 12** and **13**.

Central Terminal Area

The Proposed Action within the Central Terminal Area is associated with the need to increase gate capacity to meet current demand and projected increased demand for air travel from and to DFW; and to improve passenger experience within Terminal C by modernizing flow, increasing concession areas, and providing new boarding facilities. FAA has determined that due to the potential air quality effects, this proposed action will be analyzed as an EA. Specific elements associated with this proposed action include:

- Construction of a new two-level pier structure to Terminal A, including 10 new gates, which will provide a net increase of 5 gates totaling 130,000 square feet of new construction;
- Construction of a new two-level pier structure to Terminal C, including 9 new gates, which will provide a net increase of 4 gates totaling 115,000 square feet of new construction;
- Renovations within Terminal C, which include relocation of the South Baggage Hall, addition to the South, Center, and North Ticketing Halls, Renovation of the Ticketing Halls, System Upgrades, and a new Loading Dock; and
- Replacement and Renovation of the Terminal C Parking Garages and Associated Roadways.

Airfield Efficiency Improvements

The Proposed Action within the Airfield will include infill in several infield areas to allow the efficient transition of aircraft between the DFW taxiway system and the East Ramp Area. Currently, transition of aircraft between the DFW taxiway system and the East Ramp Area is inefficient and requires unnecessary fuel burn. Changes made as part of the Proposed Action will enhance airfield efficiency and safety by allowing for more efficient aircraft movements to and from the East Ramp Area while reducing long term fuel burn by aircraft. FAA has determined that an EA will be required due to the presence of hazardous materials within the Northeast Lighting Vault, which is being replaced as part of this Proposed Action. The Proposed Action consists of airside improvements to improve operational efficiency and safety, relieve terminal area congestion, and reduce taxiing time to/from the existing terminal area. Specific elements associated with this Proposed Action include:

- Creation or relocation of Aircraft Entry/Exit Positions along Taxiways G, K, and Z;
- Replacement and relocation of existing ancillary facilities (i.e., Northeast Lighting Vault, Terminal A South Triturator, etc.);
- Infill of four infield areas with concrete apron pavement;
- Underground utility work related to the above-mentioned improvements (e.g., electric, sanitary sewer, stormwater management system, potable water, and communications infrastructure); and

- Relocation of JY Taxiway connection to improve aircraft operations and optimize overall terminal area apron.

SDS, Supplemental Electric CUP, and Associated New Pump House and Boiler House

This Proposed Action is due to the age of the existing boiler house at the existing CUP, which has exceeded its useful life. The existing CUP and boiler house do not provide system resiliency or allow for effective use of renewable energy sources. Under this Proposed Action, aging infrastructure will be replaced and improved to provide more efficient use within Terminal C and provide overall system redundancy to the DFW. FAA has determined that an EA will be required due to the presence of hazardous materials within the existing infrastructure, which is being replaced as part of this Proposed Action. This Proposed Action includes the following utility improvements to Terminal C:

- Construction of a new Terminal C Boiler House and South Pump Room (approximately 5,500 square feet) to supply hot and chilled water;
- Construction of a new Terminal C North Pump Room (approximately 1,800 square feet);
- New gas service yard and new electrical service for new Terminal C Garage, Boiler House, and Pump Rooms; and
- Construction of a new Electric Brute Force CUP.

PIO Building

This Proposed Action would include the design, construction, and delivery of a PIO-DB to accommodate DFW project management, Central Terminal Area Development general contractors, designers, and subcontractors responsible for the delivery of the overall project. This will be a temporary facility that will be operational from September 2022 through September 2023. It will be a 1-story approximately 40,000 square foot fully furnished facility with 250 surface parking spaces occupying 10 acres. Currently, DFW does not have the building space or locations near the construction staging areas to office the staff necessary to oversee and manage the planning and construction scopes. By consolidating all project staff in one building it will provide efficiency in coordination and management of project activities. FAA determined that since this building will be constructed in a currently disturbed area designated for these uses that a CATEX would be the appropriate level of analysis.

AFFECTED RESOURCES OF THE PROPOSED ACTION

Resource area analyses will be undertaken during the NEPA processes. Anticipated potential effects that will likely be mitigated include air quality and noise associated with the Central Terminal Area Improvements and hazardous materials and wastes that are located within the Airfield Improvements project areas and within the SDS, Supplemental Electric CUP project areas. Socioeconomic conditions are not likely to be adversely affected based on the anticipated increased air traffic volume associated with the Central Terminal Area Improvements. DFW is currently in coordination with the Texas Historical Commission (THC) under the National Historic Preservation Act (NHPA) of 1966, as amended, specifically, Section 106, to address archeological and above-ground historic resources associated with the Central Terminal Area Improvements. The PIO/DB Building and the SDS, Supplemental Electric CUP activities have received THC concurrence of “no adverse effects” to archeological or historic resources.

Integrated Environmental Solutions, LLC (IES), under contract to DFW, performed a site visit and desktop analysis of the specific project locations associated with each of the proposed actions 21 September 2021 to provide a delineation of waters of the United States and to perform a protected species habitat assessment. Biological resources and water resources within the proposed project areas are limited to non-jurisdictional features associated with stormwater management and control and common urban and urban edge landscapes providing little to no habitat value. As such, the proposed projects are not expected to have any impacts on any federally or state-listed threatened or endangered species.

Waters of the United States

The September 2021 delineation identified three non-jurisdictional features associated with past construction activities at DFW Airport. A drainage ditch associated with DFW's current underground stormwater management system was identified within the proposed footprint of the new Boiler House to support the SDS, Supplemental Electric CUP. A detention pond and associated wetland drainage were located within an existing construction staging area to the east of Runway 17C/35C and Runway 17L/35R. These features were man-made as part of a stormwater control system that did not replace or connect two waters of the United States and they have no more than a speculative connection to a Traditional Navigable Water (TNW); therefore, they would not be regulated under Clean Water Act (CWA) Section 404.

Vegetation Communities

The project areas consist of four distinct vegetation communities: **urban matrix**, **frequently maintained grassland**, **infrequently maintained grassland**, and **shrub-scrub upland**. The **urban matrix** was found throughout a majority of the Central Terminal Areas and was comprised of concrete lots, roads, buildings, and active construction areas. The project area for the SDS, Supplemental Electric CUP, and the Boiler House and Pump House contained the **frequently maintained grassland** vegetation community, dominated by mowed Bermudagrass (*Cynodon dactylon*). The **infrequently maintained grassland** was observed in the PIO/DB Building project area and was comprised of Maximilian sunflower (*Helianthus maximiliani*), meadow dropseed (*Sporobolus compositus*), Johnsongrass (*Sorghum halepense*), white heath aster (*Symphyotrichum ericoides*), King Ranch bluestem (*Bothriochloa ischaemum*), sumpweed (*Iva annua*), Canada goldenrod (*Solidago canadensis*), prairie broomweed (*Amphiachyris dracunculoides*), Bermudagrass, and annual sunflower (*Helianthus annuus*). The **shrub-scrub upland** vegetation community was also observed on the western side of the PIO/DB Building project area, dominated by honey mesquite (*Prosopis glandulosa*), sugarberry (*Celtis laevigata*), giant ragweed (*Ambrosia trifida*), Johnsongrass, Bermudagrass, and annual sunflower.

Federally Protected Species

According to the U.S. Fish and Wildlife Service (USFWS), four species are listed as federally protected (i.e., threatened or endangered) with the potential to occur within Dallas and Tarrant Counties; these include: Golden-cheeked Warbler (*Dendroica chrysoparia*), Piping Plover (*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), and Whooping Crane (*Grus americana*). Two of these species are conditionally listed as threatened on the basis that the proposed project is for wind energy production: Red Knot and Piping Plover. No federally listed critical habitat for these species is located within the vicinity of the project areas.

The Golden-cheeked Warbler, Red Knot, Piping Plover, and Whooping Crane are listed federally as threatened and endangered species for Dallas and Tarrant Counties. These projects will not be related to wind energy; therefore, the Red Knot and Piping Plover will not be affected.

- The Golden-cheeked Warbler requires a habitat that includes forested areas dominated by Ashe juniper (*Juniperus ashei*) in mixed stands with various oaks (*Quercus* spp.). This unique vegetation community is not present within the survey area.
- Whooping Cranes utilize estuaries, prairie marshes, moist grasslands, croplands, and will use large shallow wetland areas associated with lakes for roosting and feeding. Although the survey area did contain wetlands, the size and urban location would not be a suitable habitat for Whooping Cranes.
- The monarch butterfly is currently a federal candidate species and has no formal protection. None of the vegetation communities would offer feeding ideal habitat for this species. It could be occasionally observed as stopover habitat along community edges.

In summary, the habitats present within the survey area were not suitable for any of the federally listed threatened or endangered species; nor were the habitats suitable for nesting, feeding, or stopover migration habitat for these species.

Due to a lack of perennial flowing water, there would be no habitat for any mollusk species or for the alligator snapping turtle. The Texas horned lizard is unlikely to occupy any of the vegetation communities within the project area due to dense understory cover and the high urban interface. The black bear is no longer considered extant in the greater Dallas Fort Worth metropolitan area.

Migratory Birds

Affects to migratory birds from the proposed actions are expected to be minimal based on the highly urban nature of the majority of the project areas, the proposed use of LED high efficiency lighting, and DFW's ongoing program to monitor for migratory bird nests prior to any construction activities.

Thank you for your timely review of the enclosed information. If you have any questions, please contact me at 972-973-5573 or via e-mail at slancaster@dfwairport.com

Sincerely,

Dallas Fort Worth International Airport

Sandra Lancaster
Environmental Program Manager

Attachment A
Attachment B

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DFW DALLAS FORT WORTH INTERNATIONAL AIRPORT