

3 Affected Environment

Federal Aviation Administration (FAA) Order 1050.1F states the affected environment section of an Environmental Assessment (EA) should “succinctly [describe] the environmental conditions of the potentially affected geographic area or areas.”¹ The amount of information on potentially affected resources should be based on the expected impact and be commensurate with the impact’s importance. The following provides a description of the existing environmental conditions in and around the vicinity of Raleigh-Durham International Airport (RDU). The year 2020 is used throughout the EA as the year of existing conditions unless otherwise noted.

3.1 Setting

RDU is an international airport located on approximately 4,800 acres of land within Wake and Durham counties, North Carolina. For the purposes of this EA, two study areas have been defined. The General Study Area (GSA) and the Detailed Study Area (DSA). Both study areas are shown on **Exhibit 3-1**. The GSA covers approximately 9,750 acres and is defined as the area where both direct and indirect impacts may result from the development of the Proposed Action. The GSA is based on the future noise contours and resembles the shape of those contours (future noise contours are discussed in detail later in this EA in Section 4.10). The areas of potential impacts were then enlarged and squared off to follow roadway and other identifiable features where possible. The DSA covers approximately 1,430 acres and is defined as the area where only direct impacts may result from the development of the Proposed Action. Coastal Resources, Farmlands, and Wild and Scenic Rivers, a subcategory of water resources, are not present in either of the study areas and, therefore, are not discussed in the following sections.

3.2 Air Quality

3.2.1 Regulatory Setting

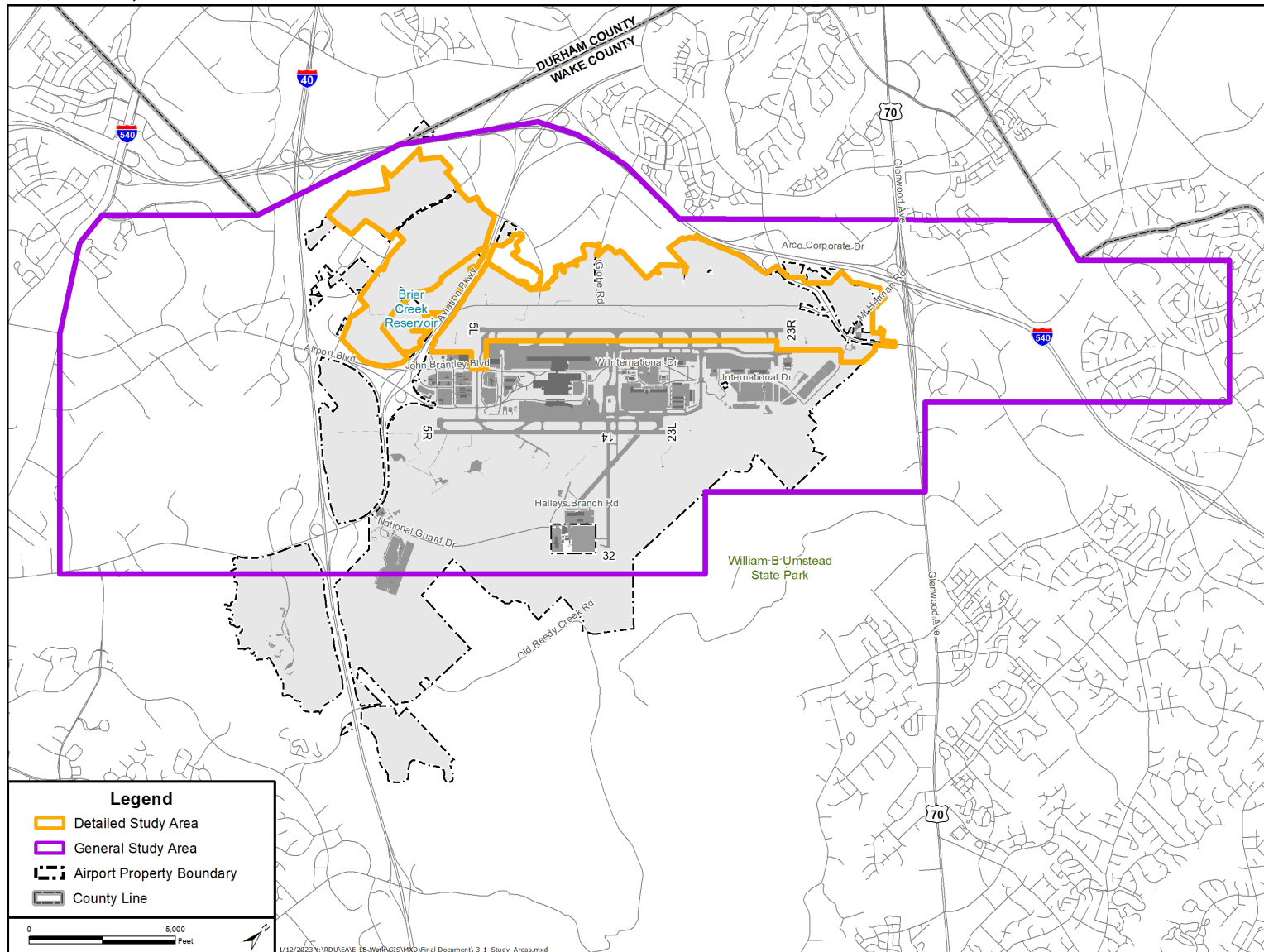
An airport air quality assessment requires consideration under both the Clean Air Act of 1970, as amended (CAA), and National Environmental Policy Act (NEPA). These two federal laws require distinct analyses and may be separately applicable to an airport project. The CAA establishes standards and programs to evaluate, achieve, and maintain acceptable air quality in the United States (U.S.). In accordance with CAA requirements, the U.S. Environmental Protection Agency (USEPA) established the National Ambient Air Quality Standards (NAAQS) for six common air pollutants (known as “criteria air pollutants”) that are potentially harmful to human health and welfare.²

¹ FAA, 2015, Order 1050.1F, Environmental Impacts: Policies and Procedures, Section 6-2.1(e).

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

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EXHIBIT 3-1, STUDY AREAS



Source: Airport Authority and Landrum & Brown, 2021

The USEPA considers the presence of the following six criteria pollutants to be indicators of air quality: Carbon monoxide (CO); Nitrogen dioxide (NO₂); Ground-level Ozone (O₃);³ Sulfur dioxide (SO₂); Particulate matter (PM₁₀ and PM_{2.5});⁴ and, Lead (Pb).⁵ The NAAQS are provided in **Appendix C**. For each of the criteria pollutants, the USEPA established primary standards intended to protect public health, and secondary standards to protect other aspects of public welfare, such as preventing materials damage, preventing crop and vegetation damage, and assuring good visibility. Areas of the country where air pollution levels consistently exceed these standards may be designated nonattainment by the USEPA.

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 USEPA. Some regulatory provisions, for instance the CAA General Conformity regulations, apply only to areas designated as nonattainment or maintenance.

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

3.2.2 Affected Environment

The Airport's location is within North Carolina's Eastern Piedmont Intrastate Air Quality Control Region.⁶ The area was previously designated nonattainment for the 1971 CO standard but was redesignated as "attainment" effective September 18, 1995.⁷ Additionally, the USEPA has classified Durham and Wake Counties as attainment for CO effective September 18, 2015, ending conformity requirements for CO; therefore, no *de minimis* threshold will be applied for this pollutant in the air quality analysis.⁸ The area was designated as nonattainment for the 1997 8-hour ozone standard; however, on December 26, 2007, the USEPA determined the area had reached the 1997 8-hour ozone standard and the region was redesignated to maintenance. As such, the area operates under a maintenance plan for 8-hour ozone. Even though the standard was revoked in 2015, the maintenance plan remains in effect and contains future year emissions budgets under which the maintenance area

³ Ozone is not directly emitted from a source. Rather, ozone is formed through photochemical reactions involving emissions of the precursor pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOC), in the presence of abundant sunlight and heat. Therefore, emissions of ozone on a project level are evaluated based on the rate of emissions of the ozone precursor pollutants, NO_x and VOC.

⁴ PM₁₀ and PM_{2.5} are airborne inhalable particles that are less than ten micrometers (coarse particles) and less than 2.5 micrometers (fine particles) in diameter, respectively.

⁵ Airborne lead in urban areas is primarily emitted by vehicles using leaded fuels. Since 1975, lead emissions have been in decline due in part to the introduction of catalyst-equipped vehicles and the decline in production of leaded gasoline. In general, an analysis of lead is limited to projects that emit significant quantities of the pollutant (e.g., lead smelters) and is generally not applied to transportation projects. For lead, a major source, as defined by USEPA for a Nonattainment New Source Review permitting program would emit over 100 tons per year. Therefore, an emissions inventory of lead was not conducted for this EA.

⁶ Title 40 Protection of the Environment. CFR. Chapter 1, Subchapter C, Part 81 Subpart B §81.148 Eastern Piedmont Intrastate Air Quality Control Region.

⁷ Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants, USEPA Green Book, January 31, 2022. Available on-line: https://www3.epa.gov/airquality/greenbook/anayo_nc.html

⁸ Letter from the USEPA Region 4 Air, Pesticides, and Toxics Management Division to the Durham-Chapel Hill Carrboro Metropolitan Planning Organization and the Capital Area Metropolitan Planning Organization, December 16, 2015.

can demonstrate that timely attainment of NAAQS will be achieved.⁹ Furthermore, the area is in attainment for the 2008 and 2015 8-hour ozone standards. Regardless, the area continues to operate under the maintenance plan for the 1997 8-hour ozone standard. The ozone precursor pollutants are volatile organic compounds (VOC) and nitrogen oxides (NO_x); and as such, the pollutants of concern for this project are VOC and NO_x. The area is attainment for all other criteria pollutants. **Table 3-1** summarizes the attainment and nonattainment designations for the GSA.

TABLE 3-1, ATTAINMENT / NONATTAINMENT DESIGNATIONS FOR THE GSA

POLLUTANTS	NAAQS
Carbon monoxide (CO)	Attainment – Meets the NAAQS
Nitrogen dioxide (NO ₂)	Attainment – Meets the NAAQS
Ozone (O ₃)	Maintenance - Attainment was reached in 2007, but the area has continued under a maintenance plan to ensure attainment. Emissions of ozone on a project level are evaluated based on the rate of emissions of the ozone precursor pollutants, NO _x and VOC.
Sulfur dioxide (SO ₂)	Attainment – Meets the NAAQS
Particulate matter (PM ₁₀ and PM _{2.5})	Attainment – Meets the NAAQS
Lead (Pb)	Attainment – Meets the NAAQS

Source: EPA Green Book, <https://www.epa.gov/green-book>, 2022.

Various sources of emissions were considered for this EA. For the existing conditions, the emissions inventory focused on aircraft operational emissions that may be affected including taxiing, takeoff, and landings as well as motor vehicle emissions that may be affected from the relocation of Lumley Road.¹⁰ Appendix C presents the methodology, a discussion of the pollutants of concern, and inputs used to prepare the existing conditions emissions inventory.

The emissions inventory was developed consistent with FAA guidelines, the FAA’s *Aviation Emissions and Air Quality Handbook, Version 3, Update 1*, the FAA Order 1050.1F Desk Reference, and using FAA’s Aviation Environmental Design Tool (AEDT, version 3d).¹¹ The emissions inventory for the existing conditions is shown in **Table 3-2** and provides the total annual pollutant emissions in tons per year. The existing conditions emissions inventory shows the pollutants with the greatest emissions are CO and NO_x. There were approximately 530 tons of CO and 265 tons of NO_x. These pollutants are produced from the incomplete combustion of aircraft and motor vehicle engines.

⁹ Limited Maintenance Plan for the Great Smoky Mountains National Park, Rocky Mount, & Triangle Maintenance Areas for the 1997 8-Hour Ozone NAAQS, North Carolina Department of Environmental Quality, February 2022, Available on-line: <https://deq.nc.gov/about/divisions/air-quality/air-quality-planning/state-implementation-plans-sips/limited-maintenance-plan-great-smoky-mountains-national-park-rocky-mount-triangle-maintenance-areas>

¹⁰ Aircraft engine ground run-ups are routine aircraft engine maintenance tests performed to test engines and diagnose engine issues. There would be no change to aircraft engine ground run-ups due to the Proposed Action.

¹¹ FAA, AEDT (Version 3d), <https://aedt.faa.gov/>, August 12, 2021.

TABLE 3-2, EXISTING CONDITIONS EMISSIONS INVENTORY (TONS/YEAR)

EMISSION SOURCE	CO	VOC*	NO _x	SO _x	PM ₁₀	PM _{2.5}
Aircraft Taxiing	266.2	45.9	37.4	10.5	0.9	0.9
Aircraft Landing and Takeoff	251.8	7.7	226.5	16.1	1.8	1.8
Motor Vehicles	11.1	0.2	1.3	0.0	0.0	0.0
Total:	529.1	53.8	265.2	26.6	2.7	2.7

Note: CO = Carbon Monoxide; VOC = Volatile Organic Compounds; NO_x = Nitrous Oxides; SO_x = Sulfur Oxides; PM₁₀ = Coarse Particulate Matter; PM_{2.5} = Fine Particulate Matter
 Numbers may not sum due to rounding

Source: Landrum & Brown, 2021.

3.3 Biological Resources (including fish, wildlife, and plants)

3.3.1 Regulatory Setting

Biological resources are valued for their intrinsic, aesthetic, economic, and recreational qualities and include fish, wildlife, plants, and their respective habitats. Typical categories of biological resources include:

- Terrestrial and aquatic plant and animal species;
- Game and non-game species;
- Special status species (state- or federally-listed threatened or endangered species, marine mammals, or species of concern, such as species proposed for listing, migratory birds and eagles); and
- Environmentally sensitive or critical habitats.

3.3.2 Affected Environment

Federally-Listed Threatened and Endangered Species

Information from the U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Conservation (IPaC) system, a database that contains the official federal threatened and endangered species list, was obtained to determine the species list that could be affected by the Proposed Action.¹²

The USFWS lists the following federally-protected species shown in **Table 3-3**, under the Endangered Species Act (ESA). In addition, the USFWS recently published its proposal to list the tricolored bat (*Perimyotis subflavus*) (TCB) as endangered on September 14, 2022 (87 Federal Register [FR] 56381–56393). This small bat species is known to occur in Wake County. It is an insectivore, and forages in forests and on the edges of forests. It may roost in forests, culverts, and structures. A final listing decision may come as soon as September 2023.

¹² USFWS IPaC website, <https://ecos.fws.gov/ipac/>, Accessed November 4, 2021.

TABLE 3-3, FEDERAL THREATENED AND ENDANGERED SPECIES

TYPE	COMMON NAME	NAME	STATUS
Bird	Red-cockaded Woodpecker	<i>Picoides borealis</i>	Endangered
Amphibian	Neuse River Waterdog	<i>Necturus lewisi</i>	Threatened
Fish	Carolina Madtom	<i>Noturus furiosus</i>	Endangered
Clam	Atlantic Pigtoe	<i>Fusconaia masoni</i>	Threatened
Clam	Dwarf Wedgemussel	<i>Alasmidonta heterodon</i>	Endangered
Flowering Plant	Michaux's Sumac	<i>Rhus michauxii</i>	Endangered
Mammal	Tricolored Bat	<i>Perimyotis subflavus</i>	Proposed Endangered

Note: The National Oceanic and Atmospheric Administration (NOAA) – National Marine Fisheries Service (NMFS) lists one federally-protected species, Atlantic sturgeon, that may occur in Wake County. However, no habitat for the Atlantic Sturgeon is within the DSA.

Source: USFWS, November 2022

State Designated Threatened, Endangered, Special Concern, or Significantly Rare Species

In addition to the USFWS information, the North Carolina Natural Heritage Program (NCNHP) database was reviewed. The extensive list of the North Carolina state designated threatened, endangered, or special concern species that are found in Wake County is provided in **Appendix D**. There were 24 animals and 26 plants listed.

Terrestrial and Aquatic Plant and Animal Species / Game and Non-Game Species

A discussion of Terrestrial and Aquatic Plant and Animal Species as well as Game and Non-Game Species is provided in Appendix D.

Field Survey

Pedestrian field surveys of the DSA were conducted between July 2021 and January 2022 to verify the presence or absence of federally threatened and endangered species or potential habitat for federally threatened and endangered species in the DSA. The following provides a summary of the field survey findings. The biological assessment is provided in Appendix D.

- **Red-Cockaded Woodpecker:** There is no critical habitat listed for the red-cockaded woodpecker (RCW). However, suitable nesting and foraging habitat for the RCW exists within the DSA. Specifically, the wooded areas off Pleasant Grove Church Road (on both the east and west side of the road) and directly north of the existing runway contain potential foraging habitat with nesting-sized trees. Loblolly pine is the predominant pine species present. No nesting cavities, potential starts, or individuals were identified or observed within the DSA. However, due to the presence of potential habitat, a 0.5-mile survey surrounding suitable habitat was conducted. Suitable foraging and nesting habitat are present to the south and southeast of the DSA near and within William B. Umstead State Park; however, this habitat was more than 0.5 miles away and separated from the DSA by the Airport, highways, and other roads that would present an impediment to RCWs attempting to move between the two areas. The areas of habitat within the DSA are surrounded in the remaining directions by an extensive anthropogenic landscape, which isolates the potential habitat from connectivity to other suitable habitat. No cavities, potential starts, or individuals were identified during the 0.5-mile survey. The Airport and the noise produced there may also present an additional deterrence to any potential RCW settlement. A review of the October 2021 NCNHP dataset indicates no known occurrences of

RCW within the DSA or within one mile of the DSA. Additionally, there are currently no extant RCW occurrences located in Wake County.

- Neuse River Waterdog: While there is critical habitat listed for this species, it does not occur within the DSA. Suitable habitat for the Neuse River Waterdog, however, is present within the DSA. Winter trapping surveys were completed in November 2021. The Neuse River Waterdog was not detected during the survey efforts and suitable habitat, while present, was sparse throughout the DSA.
- Carolina Madtom: There is no critical habitat listed for the Carolina Madtom. However, suitable habitat for the Carolina Madtom is present within the DSA. Electro-fishing surveys for the Carolina Madtom were conducted in Brier Creek on September 22, 2021, and in Little Brier Creek on November 1, 2021. The Carolina Madtom were not detected during these efforts and suitable habitat was sparse throughout the DSA.
- Atlantic Pigtoe: While there is no critical habitat listed within the DSA, suitable habitat for the Atlantic Pigtoe is present within the DSA. Mussel surveys were conducted in Brier Creek, Brier Creek Reservoir, Little Brier Creek, and Stirrup Iron Creek on September 22, 2021 and September 29, 2021. Additional shoreline mussel surveys were completed in Brier Creek Reservoir on December 7-9, 2021. The Atlantic Pigtoe was not found during the surveys.
- Dwarf Wedgemussel: There is no critical habitat listed for the Dwarf Wedgemussel. However, suitable habitat for the Dwarf Wedgemussel is present within the DSA. Mussel surveys were conducted in Brier Creek, Brier Creek Reservoir, Little Brier Creek, and Stirrup Iron Creek on September 22, 2021 and September 29, 2021. Additional shoreline mussel surveys were completed in Brier Creek Reservoir on December 7-9, 2021. The Dwarf Wedgemussel was not found during the surveys.
- Michaux's Sumac: There is no critical habitat listed for the Michaux's Sumac. Suitable habitat for Michaux's Sumac includes open areas caused by disturbances, usually along roadsides, in highway rights-of-way, or around margins of regularly maintained clearings. Suitable habitat for this species was present within the DSA along roadsides and other utility rights-of-way. However, during the field investigations, no individuals were found. Additionally, a review of the October 2021 NCNHP dataset indicates no known occurrences of Michaux's Sumac within the DSA or within one mile of the DSA.

Migratory Bird Treaty Act

Certain birds are protected under the Migratory Bird Treaty Act. Bird species are listed as being of particular concern either because they occur on the USFWS Birds of Conservation Concern list or warrant special attention in the project location. The list of these bird species is provided in Appendix D.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act is enforced by the USFWS. Golden Eagles do not nest in North Carolina. Habitat for the bald eagle primarily consists of mature forests in proximity to large bodies of open water for foraging. Large dominant trees are utilized for nesting sites, typically within one mile of open water. A desktop-Geographic Information System (GIS) assessment of the DSA, as well as the area within a one-mile radius of the project limits, was conducted. Multiple water bodies large enough or sufficiently open to be considered potential feeding sources for bald eagles were identified. Since foraging habitat was found, a field investigation of the DSA and the area within 660 feet of the project limits was conducted. One bald eagle nest was identified, approximately 1,900 feet north of an existing runway, in a loblolly pine stand between the Brier Creek Reservoir and a large stormwater impoundment. This is a previously non-reported nesting site. A review of the NCNHP

dataset revealed no additional occurrences of bald eagle within the DSA or within one mile of the DSA. Due to the presence of a bald eagle nest, an additional site visit was performed in January 2022 during the breeding season to determine if the nest is active. The site visit confirmed that the nest is active.

3.4 Climate

3.4.1 Regulatory Setting

According to FAA Order 1050.1F, the discussion of potential climate impacts should be documented in a separate section of the NEPA document, distinct from air quality.

3.4.2 Affected Environment

The affected environment section for climate includes a discussion of the current level of preparedness with respect to the impacts of climate change. This involves describing current measures that are in place to adapt to the impacts of climate change. In addition, the affected environment section for climate discloses the existing greenhouse gas (GHG) emissions that may be affected by the Proposed Action.

Level of Preparedness

The Airport Authority currently conducts various initiatives that conserve natural resources, reduces emissions with the use of biodiesel in certain Airport Authority vehicles, reduces solid waste through recycling efforts, and conserves energy with light emitting diode (LED) lighting and fritted glass to reduce cooling needs. The Airport Authority has also purchased ten electric vehicles for use at RDU.

In addition, the Airport Authority is currently developing RDU's first Sustainability Management Plan (SMP) to improve the tracking and communication of the airport's sustainability initiatives, increase efficiency, and better incorporate economic savings and environmental stewardship into project planning. The SMP will provide a road map for the integration of environmental sustainability into its planning, construction, maintenance, operations, and design processes. RDU is developing sustainability goals with respect to energy usage, materials and waste management, GHG emissions, water and stormwater management, business continuity and resiliency, sustainable buildings and infrastructure, land use and natural resources management, community/customers/employees, and sustainable transportation.

Existing GHG Emissions

GHGs are gases that trap heat in the earth's atmosphere. GHGs include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), hydrofluorocarbons (HFC), and perfluorocarbons (PFCs). Of these GHGs, only CO₂, CH₄ and N₂O are potentially emitted directly or indirectly because of the Proposed Action and are included in this analysis.

GHGs differ from each other in their ability to absorb energy and how long they stay in the atmosphere. The Global Warming Potential (GWP) is a standard of measurement that was developed to allow comparisons of the global warming impacts of different gases by converting each gas amount to a carbon dioxide equivalent (CO₂e). GWPs provide a common unit of measure, which allows for one emission estimate of these different gases. See Appendix C for a more detailed discussion of GHGs, the methodology, and inputs used to prepare the existing conditions GHG emissions inventory.

A GHG emissions inventory was prepared based on the same emissions sources (aircraft taxiing, landing, and takeoff and motor vehicles that may be affected by the relocation of Lumley Road) as described in Section 3.2.2. GHG emissions were only quantified from aircraft operating on the ground

up to 3,000 feet above ground level.^{13,14} **Table 3-4** provides the GHG CO₂e for the existing conditions in metric tons per year.

TABLE 3-4, EXISTING CONDITIONS GHG EMISSIONS INVENTORY (METRIC TONS/YEAR)

EMISSIONS SOURCE	CO ₂ e
Aircraft Taxiing	25,554
Aircraft Landing and Takeoff	39,460
Motor Vehicles	1,283
Total:	66,297

Note: Numbers may not sum due to rounding
 Source: Landrum & Brown, 2021.

3.5 Department of Transportation Act (DOT) Section 4(f)

3.5.1 Regulatory Setting

Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966 (49 U.S. Code [U.S.C.] § 303) protects publicly owned parks, recreational areas, wildlife and waterfowl refuges of national, state, or local significance, and public and private historic sites of national, state, or local significance. Section 4(f) provides that the Secretary of Transportation may approve a transportation program or project requiring the use of publicly owned land of a public park, recreation area, or wildlife or waterfowl refuge of national, state, or local significance, or land of an historic site of national, state, or local significance, only if there is no feasible and prudent alternative to using that land and the program or project includes all possible planning to minimize harm resulting from the use. Section 4(f) applies only to transportation modal agencies within the USDOT, including the FAA.

3.5.2 Affected Environment

Records maintained by the National Park Service, the North Carolina State Historic Preservation Office (SHPO), Wake County, Durham County, along with information obtained from cultural resource surveys conducted in the area, were reviewed to identify known Section 4(f) resources within the DSA and the GSA.

The Crabtree Creek Recreational Demonstration Area, now named the William B. Umstead State Park, is listed on the National Register of Historic Places (NRHP) and was identified as having a portion of the park within the GSA. The approximately 5,600-acre park is located south of the Airport directly bordering Airport property. The location of the park within the GSA is highlighted on **Exhibit 3-10** later in this chapter in Section 3.8. This state park is a 4(f) resource because it is a recreational park of significance to the area, and it is also a 4(f) resource because it is listed on the NRHP.

In addition to research, archaeological and architectural survey reports were conducted to determine if there were any potential 4(f) resources that may be impacted. The only report that determined a

¹³ Air quality is affected by temperature inversions. A temperature inversion occurs when the upper air is warmer than the air near the ground. The base of the temperature inversion is referred to as the mixing height. Air and pollutants mix freely within the mixing layer but are “capped” at the mixing height. Generally, pollutant concentrations are highest when the mixing height is relatively low as pollutants are pressed down toward the surface; conversely, concentrations are less when the mixing height is higher, and more mixing is possible. The study area for aircraft under NEPA extend vertically up to the mixing height. The mixing height used in this assessment is defined as 3,000 feet in altitude above field elevation (AFE), which is the recommendation in the FAA’s Aviation Emissions and Air Quality Handbook Version 3 Update 1.

¹⁴ FAA’s Aviation Emissions and Air Quality Handbook Version 3 Update 1, Section 6.3.2 FAA NEPA Guidance, page 51, January 2015.

resource eligible for listing in the NRHP, which would then be considered a 4(f) resource, was the architectural report for buildings that would be demolished as part of the Proposed Action. One resource, consisting of two structures, was determined by an architectural historian, as potentially eligible. This resource, identified as WA 7949, the former Estes Express Lines Terminal and Maintenance Shop, is located north of the proposed runway. These buildings are located on Airport property and have already been vacated by the Estes Express Lines. While the architectural historian made this eligibility determination, the FAA disagrees with the conclusion in the report. While these structures were for a trucking facility in the Southeast, it was not the original Estes Express location nor the Headquarters for the company. The facility was constructed circa 1973, at the end of the era when trucking was growing in this region. It played an insignificant role in the development and expansion of the trucking industry and is just coming to its 50 years in age. Also, this facility was not associated with any individuals who played a major role in the development of the trucking industry in the Southeast. For these reasons and with the information submitted in the report, FAA did not support the conclusion that the former Estes Express Lines facility was eligible for listing in the NRHP. The SHPO concurred with FAA's conclusion by letter dated December 1, 2022. See **Appendix E** for the report and FAA and SHPO coordination. Therefore, the former Estes Express Lines Terminal and Maintenance Shop is not considered a 4(f) resource.

Section 6(f) of the Land and Water Conservation Fund Act (LWCF) is also pertinent to Section 4(f) lands. Section 6(f) prohibits recreational facilities funded under the LWCF from being converted to non-recreational use unless approval is received from the director of the grantor agency. A review of the LWCF grants awarded in North Carolina was conducted to identify any recreational facilities funded under the LWCF within the GSA.¹⁵ There are no recreational facilities funded under the LWCF within the GSA.

3.6 Hazardous Materials, Solid Waste, and Pollution Prevention

3.6.1 Regulatory Setting

FAA Order 1050.1F states that hazardous materials, solid waste, and pollution prevention includes an evaluation of the waste streams, potential hazardous materials, and pollution prevention procedures used at the Airport. Primary laws passed and executive orders issued governing the handling and disposal of hazardous materials, solid waste and pollution prevention include the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), Pollution Prevention Act (PPA), Toxic Substances Control Act (TSCA), Oil Pollution Act (OPA), Executive Order (EO) 12088, and EO 12580.

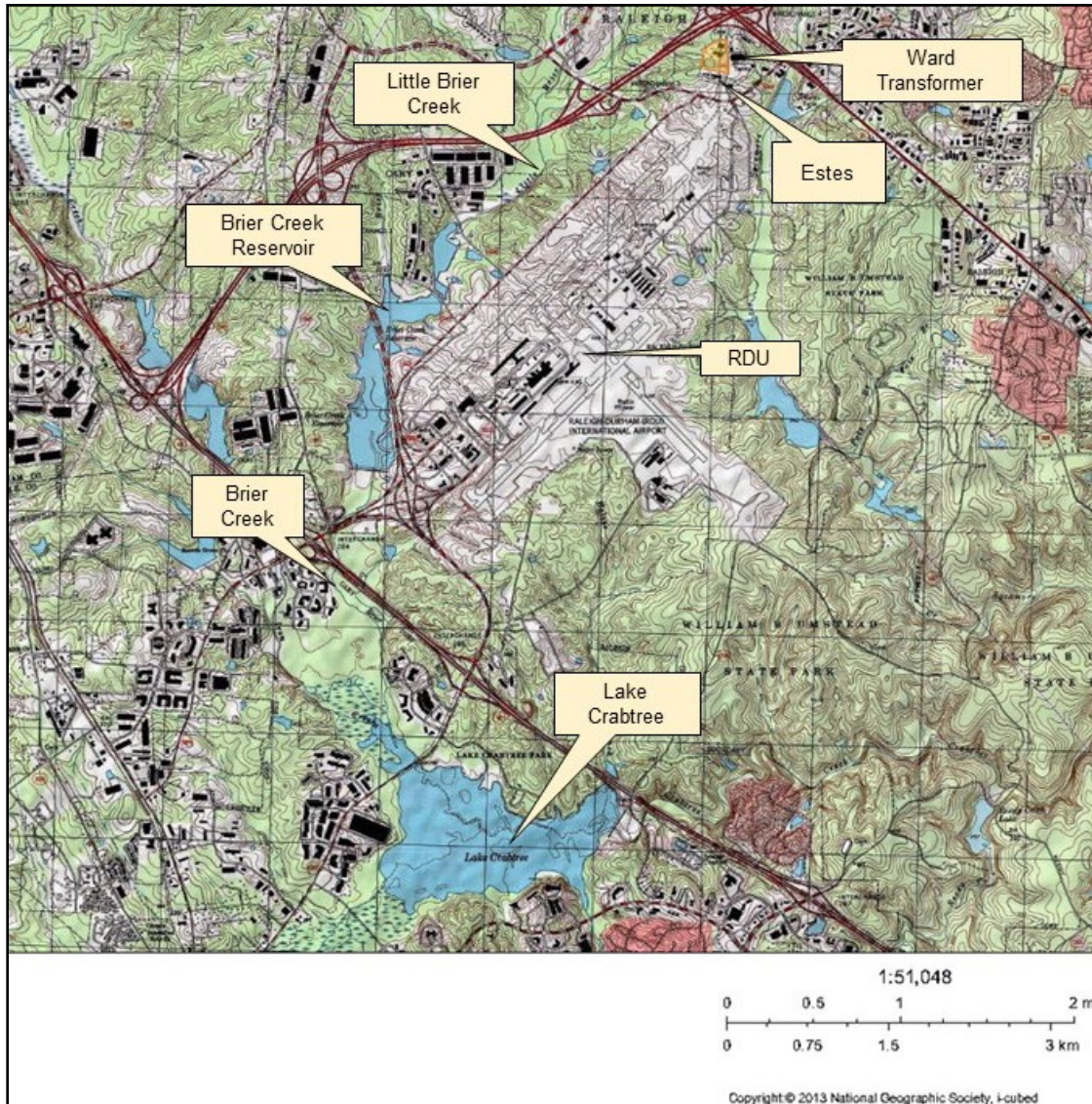
¹⁵ North Carolina Division of Parks & Recreation, LWCF Grants Awarded. <https://www.ncparks.gov/about-us/grants/land-and-water-conservation-fund-grants/lwcf-grants-awarded>, Accessed January 2023.

3.6.2 Affected Environment

National Priorities List (NPL) Sites

A search for National Priorities List (NPL) sites near RDU using the USEPA's NEPAassist and the North Carolina Department of Environmental Quality (NCDEQ), Division of Waste Management's Site Locator GIS-based search tools identified the Ward Transformer Superfund Site (the Site) as the only NPL-listed federal remediation site within the DSA. The Site is shown on **Exhibit 3-2**.^{16, 17}

EXHIBIT 3-2, WARD TRANSFORMER SUPERFUND SITE LOCATION



Source: NCDEQ, Online: <https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=7dd59be2750b40bebebfa49fc383f688>. Accessed August 25, 2021

¹⁶ USEPA NEPAassist. Online: <https://nepassisttool.epa.gov/nepassist/nepamap.aspx?wherestr=Raleigh+Durham+Airport>. Accessed August 25, 2021.

¹⁷ NCDEQ, Division of Waste Management Site Locator Tool. Online: <https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=7dd59be2750b40bebebfa49fc383f688>. Accessed August 25, 2021.

The Site was proposed to be added to the NPL on September 5, 2002 because previous facility operations, not associated with the Airport Authority or any airport operations, were found to have contributed polychlorinated biphenyls (PCBs), dioxins, furans, arsenic, chromium, copper, lead, manganese, and zinc throughout the Site at levels that presented threats to human health and the environment.^{18, 19} The Site was officially added to the NPL on April 30, 2003. USEPA is the lead enforcement agency with support from NCDEQ. Little Brier Creek, Brier Creek Reservoir, Brier Creek, Lake Crabtree, and Crabtree Creek were determined to have been impacted by PCBs originating from the Ward Transformer facility.²⁰

Because of the scale and complexity of the overall impacted area, USEPA organized the Site into two operable units (OUs), OU1 and OU2. OU1 includes soil, sediment, surface water and fish downgradient from the site, including Reaches B, C and D of Little Brier Creek; Brier Creek Reservoir; Lake Crabtree; and Lower Crabtree Creek.²¹ The OU1 downstream reach designations and water bodies are provided in **Exhibit 3-3**.

OU2 includes Reach A of the unnamed tributary to Little Brier Creek, the Ward Transformer facility and property along Reach A within the Interstate I-540 right-of-way (ROW), a portion of the Mt. Herman Road North Carolina Department of Transportation (NCDOT) ROW in front of the Site, a portion of the Catalyst Manufacturing facility east of Mt. Herman Road, the former Estes Express Lines facility, a portion of the Lumley Road (NCDOT ROW), and portions of Airport property.²² The area of OU2 is provided in **Exhibit 3-4**.

Investigation of the Ward Transformer facility by USEPA and state regulators began in 1978. Between April 2003 and April 2007, the USEPA conducted a multi-phase Remedial Investigation and Feasibility Study (RI/FS) of the Site. In September 2008, USEPA established a Record of Decision (ROD) which identified its selected response action for OU1.²³ The response action included excavation and offsite disposal of sediments and flood plain soil from Reaches B, C, and D, and Lower Brier Creek; monitored natural recovery in Brier Creek Reservoir, Lake Crabtree, and Lower Crabtree Creek; and establishing institutional controls. USEPA's Ward Transformer Raleigh, NC Cleanup Progress website indicates that Remedial Design for OU1 is ongoing.²⁴

¹⁸ USEPA, National Priorities List for Uncontrolled Hazardous Waste Sites, Proposed Rule No. 38. 67 FR 56794 (September 5, 2002).

¹⁹ USEPA, April 30, 2003, NPL Site Narrative for Ward Transformer. Available online: <https://semspub.epa.gov/work/HQ/184292.pdf>. Accessed August 25, 2021.

²⁰ Weston Solutions, Inc., September 2004, Ward Transformer Site Revised Remedial Investigation and Risk Assessment Report, Volume 1, Revision 2.

²¹ USEPA, September 2008, Record of Decision, Ward Transformer Superfund Site Operable Unit 1, Raleigh, Wake County, North Carolina.

²² Hilary M. Thornton, Letter to Eric. T. Byrd, May 13, 2021.

²³ USEPA, September 2008, Record of Decision, Ward Transformer Superfund Site Operable Unit 1, Raleigh, Wake County, North Carolina.

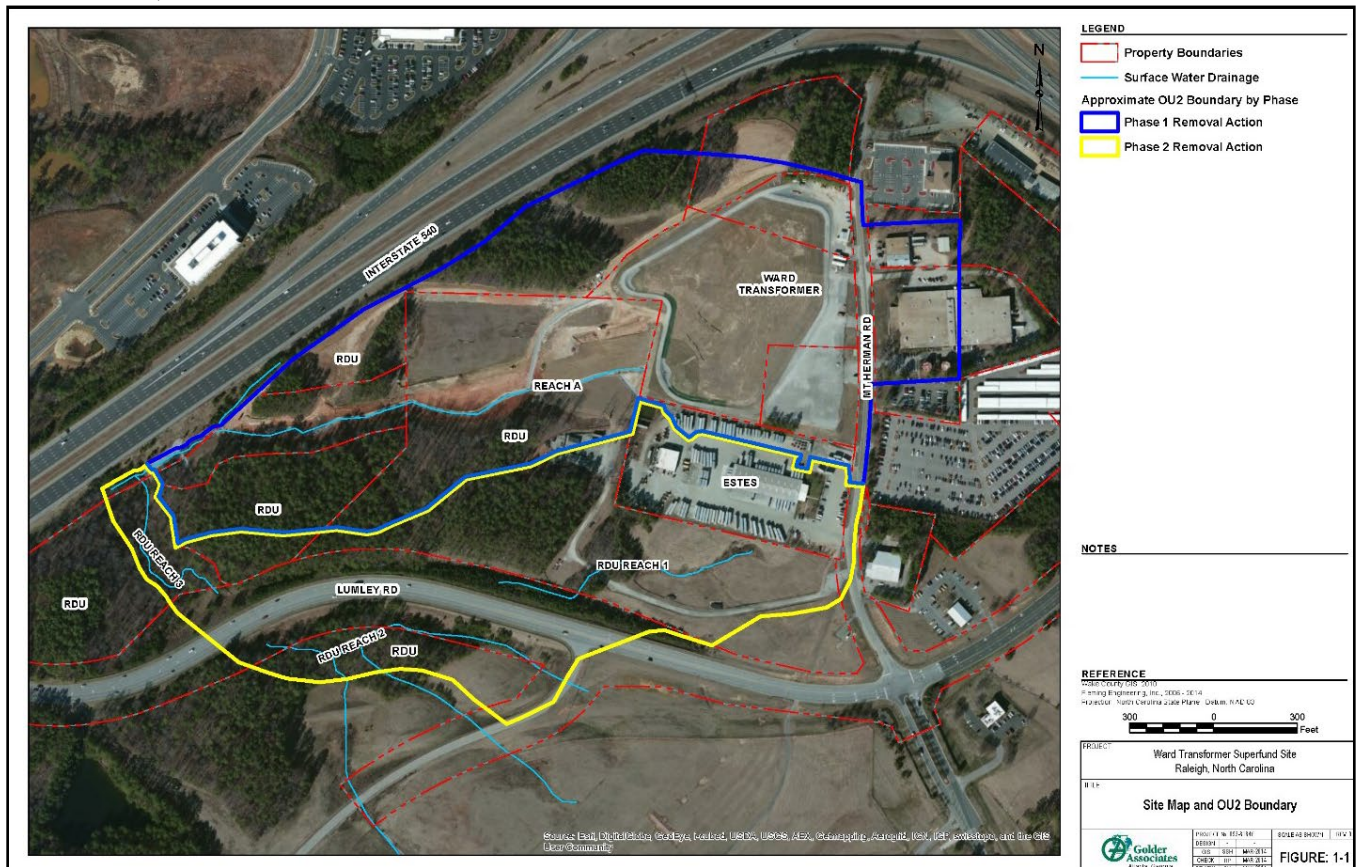
²⁴ USEPA, Ward Transformer Raleigh, NC, Cleanup Progress. Online: <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.schedule&id=0406082>. Accessed August 25, 2021.

EXHIBIT 3-3, OPERABLE UNIT 1 DOWNSTREAM REACH DESIGNATIONS AND WATER BODIES



Source: Weston Solutions, Inc., July 2007, Final Ward Transformer Site Feasibility Study Report for Operable Unit 1 Downstream Reaches.

EXHIBIT 3-4, OPERABLE UNIT 2 REMOVAL ACTION PHASES



Source: Golder Associates Inc., March 2014, Draft Sampling and Analysis Plan, Ward Transformer Superfund Site, Operable Unit 2, Supplemental Remedial Investigation/Focused Feasibility Study.

The cleanup for OU2 was conducted from July 2007 to May 2014 in two phases. Phase 1 was conducted from July 2007 to May 2011.^{25,26} Work consisted of excavating PCB-contaminated soil, structure/building demolition, low temperature thermal desorption (LTTD) treatment of soil to destroy the PCBs, offsite disposal of soils and debris, backfilling, and site restoration.²⁷ Phase 2 was conducted from December 2012 to May 2014.^{28, 29} Work consisted of excavating PCB-contaminated soil, disposing of the excavated material offsite, installing engineering controls (ECs) to eliminate the risk of uncontrolled runoff of PCB-impacted material where PCBs remained in place beneath excavated areas, plugging and abandoning a surface storm sewer beneath the former Estes facility and installing a

²⁵ Phase 1 included the affected Ward-entity properties and at properties west of the Ward-entity properties, along Reach A of the unnamed tributary to Little Brier Creek, along the portion of Reach A within the Interstate I-540 ROW, portions of Mt. Herman Road in front of the Ward properties, a portion of the Catalyst Manufacturing facility east of Mt. Herman Road, and the northeast portion of the Estes property immediately south of the Ward Transformer property.

²⁶ Golder Associates Inc., June 2012, Removal Action Completion Report, Ward Transformer Superfund Site, Phase 1, Raleigh, North Carolina.

²⁷ Golder Associates Inc., March 2018, Final Supplemental Remedial Investigation Report, Revision 1, Ward Transformer Superfund Site, Operable Unit 2, Supplemental Remedial Investigation/Focused Feasibility Study.

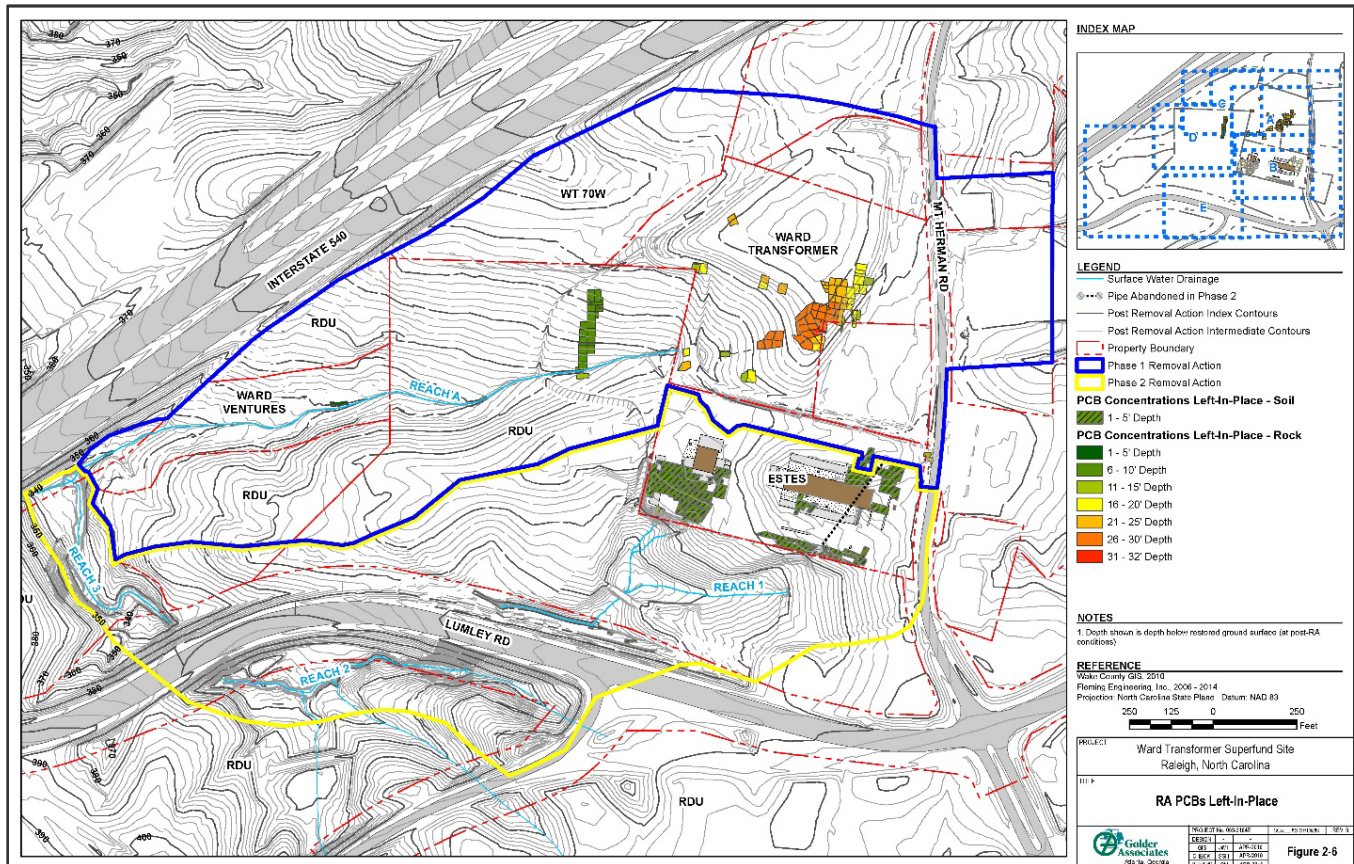
²⁸ Phase 2 included the Estes facility and the downstream surface water course (identified as Reaches 1, 2, and 3 during the RA) to I-540 that traverses Airport property, parts of the NCDOT ROW along Lumley Road and I-540, and Ward Ventures, LLC adjacent to I-540.

²⁹ Golder Associates Inc., July 2015, Removal Action Completion Report, Ward Transformer Superfund Site, Phase 2, Raleigh, North Carolina.

replacement drain pipe, backfilling excavated areas with offsite borrow and/or crushed stone, and site restoration. To reduce the impact to Estes' ongoing trucking operations, the cleanup focused on removing soil on the property with PCB concentrations at or greater than one part per million to a minimum depth of two feet at accessible impacted areas.

During the OU2 cleanup, over 480,000 tons of PCB-impacted soils, sediments and debris were excavated and treated by LTTD or disposed offsite.³⁰ Exhibit 3-5 illustrates the extent of PCB contamination remaining onsite at depth.

EXHIBIT 3-5, OPERABLE UNIT 2 PCB CONTAMINATION LEFT IN PLACE

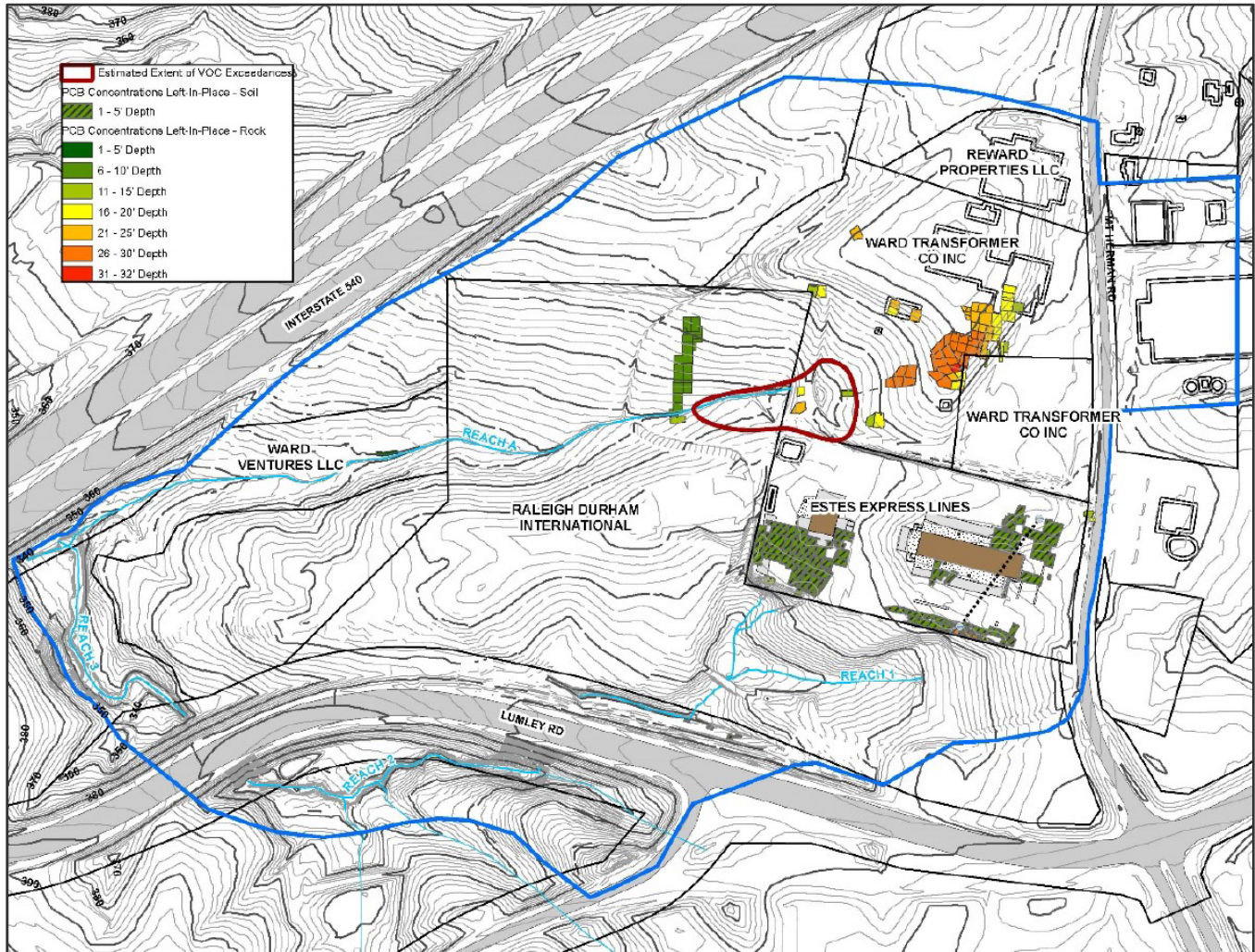


Source: Golder Associates Inc., March 2018, Final Supplemental Remedial Investigation Report Revision 1, Ward Transformer Superfund Site, Operable Unit 2, Supplemental Remedial Investigation/Focused Feasibility Study.

³⁰ Golder Associates Inc., July 2015, Removal Action Completion Report, Ward Transformer Superfund Site, Phase 2, Raleigh, North Carolina.

Exhibit 3-6 illustrates that VOC contamination remaining onsite is localized to the vicinity of the former lagoons at 30 to 45 feet below ground surface. The absence of PCBs in groundwater samples indicates that releases of PCBs to groundwater from the soil are not occurring at the Site.³¹

EXHIBIT 3-6, OPERABLE UNIT 2 GROUNDWATER VOC CONTAMINATION LEFT IN PLACE



Source: Golder Associates Inc., August 9, 2018, OU2 Update, Ward Transformer Superfund Site.

A Supplemental Remedial Investigation (SRI) was conducted for post-Removal Action (post-RA) conditions at OU2 as summarized in the March 2018 Final SRI Report.³² Results from SRI groundwater monitoring suggested that VOC contamination appeared to be localized to the vicinity of the former lagoons at a screen interval from 30 to 45 feet below ground surface. The absence of PCBs in groundwater samples indicated that releases of PCBs to groundwater from the soil were not occurring. Additionally, a Supplemental Baseline Risk Assessment (SBRA) was conducted and summarized in the March 2018 Final SRI Report. The PCBs left in place (addressed with institutional controls and/or engineering controls) and the VOCs benzene, chlorobenzene, 1,4-DCB and 1,2,4-TCB in groundwater

³¹ Golder Associates Inc., March 2018, Final Supplemental Remedial Investigation Report, Revision 1, Ward Transformer Superfund Site, Operable Unit 2, Supplemental Remedial Investigation/Focused Feasibility Study.

³² Golder Associates Inc., March 2018, Final Supplemental Remedial Investigation Report, Revision 1, Ward Transformer Superfund Site, Operable Unit 2, Supplemental Remedial Investigation/Focused Feasibility Study.

were evaluated as chemicals of potential concern in the SBRA. The SBRA results showed no human health chemicals of potential concern for potential current or future occupational exposures that exceeded a cancer risk of 1×10^{-4} or non-cancer risk significantly greater than 1.0 and no site-specific ecological risk. The RA reportedly removed the sources of PCBs and used ECs and institutional controls to address PCB-impacted material that remained above the cleanup criteria. The groundwater VOC contamination was found to be limited to the vicinity of the former Ward Transformer lagoons and was expected to decrease over time.³³ The former Ward transformer lagoons and facilities are shown on **Exhibit 3-7**.

EXHIBIT 3-7, FORMER WARD TRANSFORMER FACILITY SITE MAP



Source: Weston Solutions, Inc., July 2007, Final Ward Transformer Site Feasibility Study Report for Operable Unit 1 Downstream Reaches.

³³ Golder Associates Inc., March 2018, Final Supplemental Remedial Investigation Report, Revision 1, Ward Transformer Superfund Site, Operable Unit 2, Supplemental Remedial Investigation/Focused Feasibility Study.

USEPA’s Ward Transformer Raleigh, NC Cleanup Progress website indicates that the RI/FS for OU2 is estimated to be complete between July and September 2023.³⁴ The Cleanup Progress website indicates a ROD is anticipated between July and September 2023; Remedial Design is estimated to begin between January and March 2024 and be complete between March and May 2025; and Remedial Action is estimated to begin between September and November 2025 with no stated completion date.³⁵

RCRA Hazardous Waste Sites

Facilities with certain hazardous waste activities regulated under RCRA are required to provide information to the NCDEQ, Division of Waste Management that is then submitted to USEPA and maintained in a national program management and inventory system, known as RCRAInfo. Regulated hazardous waste activities include hazardous waste generators that generate or accumulate hazardous waste in amounts above thresholds for conditional exemption; transporters of hazardous waste; and permitted treatment, storage, or disposal facilities. A search of the RCRAInfo records using USEPA’s Enforcement and Compliance History Online (ECHO) tool identified no active facilities and two inactive facilities with regulated hazardous waste activities within the DSA. **Table 3-5** provides a list of the inactive sites. A review of the facilities’ RCRA enforcement and compliance history available in ECHO indicated one facility with violations within the previous five years or compliance issues in the previous three years. During an on-site compliance evaluation by NCDEQ on January 17, 2019, Asteelflash was found to be in violation of several generator standards; however, the violations were not associated with releases of hazardous waste. NCDEQ issued a written informal notice on March 11, 2019, and compliance was confirmed on May 22, 2019. The facility is currently listed as inactive for regulated hazardous waste activities.

TABLE 3-5, RCRA FACILITIES WITHIN THE DSA

ID	OWNER/ OPERATOR	ADDRESS	NCDEQ SITE ID	STATUS
H-1	Asteelflash	6833 Mt. Herman Road	NCR000167916	Inactive
H-2	Ward Transformer	6720 Mt. Herman Road	NCD003202603	Inactive

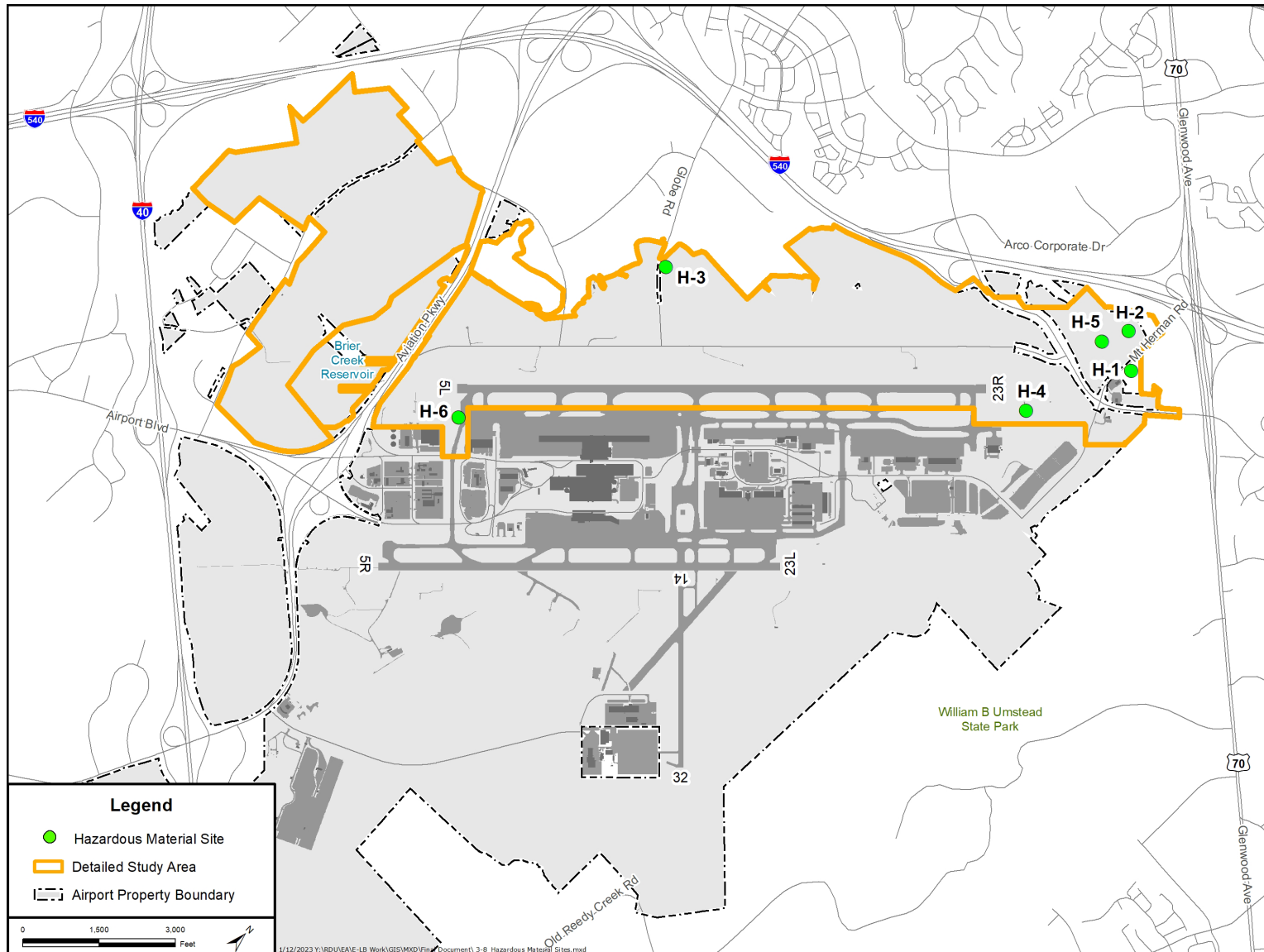
Source: USEPA ECHO. Accessed August 25, 2021

Their locations are presented on **Exhibit 3-8**.

³⁴ USEPA, Ward Transformer Raleigh, NC, Cleanup Progress. Online: <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.schedule&id=0406082>. Accessed November 28, 2022.

³⁵ USEPA, Ward Transformer Raleigh, NC, Cleanup Progress. Online: <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.schedule&id=0406082>. Accessed November 28, 2022.

EXHIBIT 3-8, HAZARDOUS MATERIAL SITES (INACTIVE, CLOSED, AND ONGOING)



Source: Gresham Smith, 2021; Landrum & Brown, 2021.

Toxic Release Inventory Sites

Facilities regulated by TSCA for producing, importing, using, or disposing of specific toxic substances are required to comply with USEPA requirements that include reporting, recordkeeping, and testing of identified toxic substances. No facilities within the DSA were identified through a search of the TSCA inventory using USEPA’s ECHO tool.

Facilities regulated by the Emergency Planning and Community Right to Know Act (EPCRA) that are subject to Toxic Release Inventory (TRI) reporting for manufacturing, processing or otherwise using specific toxic substances are required to report information to USEPA on the disposal or release of the substances. One facility was identified within the DSA through a search of the TRI database using USEPA’s ECHO tool. Asteelflash located at 6833 Mt. Herman Road (TRI identification number: 2756WSTLFL6833M) reported less than one pound of air emissions and other off-site transfers of lead in 2016 and 2017. In 2017, 2018, and 2019, the facility reported less than one pound of air emissions and other off-site transfers of nicotine and salts.³⁶

Underground Storage Tanks

Within North Carolina, underground storage tank (UST) systems must be registered with NCDEQ, unless a regulatory exemption applies. A review of the NCDEQ’s registered tanks database using the NCDEQ Division of Waste Management’s Site Locator Tool indicated two removed regulated UST systems within the DSA.^{37,38} In addition, a Phase 1 Environmental Site Assessment identified three additional removed UST systems (ID H-5) within the DSA that were not identified within NCDEQ’s database.³⁹ The locations of the sites are presented on Exhibit 3-8. Details on the UST system sites are provided in **Table 3-6**.

TABLE 3-6, UST FACILITIES WITHIN THE DSA

ID	OWNER/ OPERATOR	LISTED SITE NAME	ADDRESS	NCDEQ SITE ID	STATUS
H-3	City of Raleigh	Brier Creek Pump Station	10260 Globe Road	00-0-0000023458	Closed – UST removed, and site permanently closed on 11/21/03.
H-4	FAA/RDU SSC	Dmp Als	1000 Sawyer Circle	00-0-0000005731	Closed – UST removed, and site permanently closed on 2/18/98.
H-5	Estes Express Lines	Estes Express Lines	6848 Herman Road	00-0-0000005402	Closed – 3 USTs removed 5/8/92 and site permanently closed 8/17/06.

Sources: NCDEQ Site Locator Tool, NCDEQ Registered Tanks Database. Accessed August 25, 2021.
 The EI Group, Inc. Phase 1 Environmental Site Assessment. Estes Express Lines and Ward Transformer
 Company Inc. February 23, 2018.

³⁶ USEPA. ECHO. Online: <https://echo.epa.gov/facilities/facility-search/results>, Accessed August 20, 2021.
³⁷ NCDEQ Division of Waste Management. Site Locator Tool. Online: <https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=7dd59be2750b40bebebf49fc383f688>, Accessed: Accessed August 25, 2021.
³⁸ NCDEQ Division of Waste Management, Underground Storage Tank Section. Registered Tanks Database. Online: <https://deq.nc.gov/about/divisions/waste-management/ust/databases>, Accessed August 25, 2021.
³⁹ The EI Group, Inc. Phase 1 Environmental Site Assessment. Estes Express Lines and Ward Transformer Company Inc. February 23, 2018.

Release Incident Sites

Within North Carolina, reportable petroleum release incidents from UST systems and non-UST sources into soil and/or groundwater are monitored by NCDEQ, and information is maintained in the Regional Underground Storage Tank (RUST) database or the Regional Aboveground Storage Tank (RAST) database for UST systems and non-UST sources, respectively. A review of the databases using the NCDEQ Division of Waste Management’s Site Locator Tool identified two incidents from UST systems and one incident from a non-UST source within the DSA.^{40,41,42} Details on the incidents are provided in **Table 3-7**. The locations of the incidents are presented on Exhibit 3-8. The Airport Authority also maintains a record of reportable release incidents. A review of the record covering incidents from 2005 through 2018 identified no additional incidents within the DSA.⁴³

TABLE 3-7, NCDEQ-REGULATED PETROLEUM RELEASE INCIDENTS WITHIN THE DSA

ID	OWNER/ OPERATOR	LISTED SITE NAME	ADDRESS	INCIDENT NUMBER	RELEASE AND CLEANUP SUMMARY
H-4	FAA	RDU Airport	1000 Sawyer Circle	46662	Diesel release detected in soil on 1/29/20 upon removal of UST. Sample results were below the acceptable limit. Incident closed out by NCDEQ 11/12/20.
H-5	Estes Express Lines	Estes Express Lines	6848 Mt. Herman Road	9393	Diesel release detected in soil on 5/8/92 upon removal of 3 USTs. Contaminated soil was removed and disposed of on 8/31/92. Incident closed out by NCDEQ 8/17/06.
H-6	Raleigh-Durham Airport Authority	RDU Jet Fuel HPV Release	RDU Airport	92024	Jet fuel release of approximately 34,000 gallons was discovered on 7/29/05 due to a failed weld on a high point valve to the jet fuel hydrant system. Surface water, soils and groundwater were impacted. Cleanup activities included excavation of soil with off-site treatment, stormwater management and a groundwater remediation system that is active. Treated groundwater is discharged to a tributary of Brier Creek Reservoir. Ongoing monitoring activity requirements are incorporated into NPDES permit number NCG510523.

Source: NCDEQ Site Locator Tool, NCDEQ RUST Database, NCDEQ RAST Database. Accessed August 25, 2021.

Solid Waste

Solid waste collected from the terminal facilities and from aircraft is stored in numerous dumpsters and compactors on the Airport property. The majority of the dumpsters and compactors are emptied on a daily basis and others are emptied on an as-needed basis. Solid waste generated on the Airport is collected by a private contractor, GFL (formerly Waste Industries), and disposed of off-Airport, in

⁴⁰ NCDEQ Division of Waste Management. Site Locator Tool. Online: <https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=7dd59be2750b40bebebf49fc383f688>, Accessed August 25, 2021.

⁴¹ NCDEQ Division of Waste Management, Underground Storage Tank Section. RUST Database. Online: <https://deq.nc.gov/about/divisions/waste-management/ust/databases>, Accessed August 25, 2021.

⁴² NCDEQ Division of Waste Management, Underground Storage Tank Section. RAST Database. Online: <https://deq.nc.gov/about/divisions/waste-management/ust/databases>, Accessed August 25, 2021.

⁴³ RDU Airport Authority. Reportable Spills.xlsx February 28, 2019.

accordance with local waste disposal regulations. In addition, recycling bins for miscellaneous recyclables are maintained throughout the RDU Airport facilities, which are also collected by GFL and processed off-site at a materials recovery facility. In 2019, RDU generated approximately 2,800 tons of solid waste and 250 tons of materials that were recycled.

Several solid waste landfills with sufficient capacity to accept the remaining waste from the Airport exist in the vicinity of RDU. The local municipal solid waste landfill, Wake County South Wake Landfill has over 16,628,005 tons of remaining permitted capacity. The landfill was designed and permitted to have sufficient capacity to remain in operation for 37.9 more years. Nearby construction and demolition landfills also have the capacity to accept construction and demolition waste for numerous years. The landfills, their locations, and estimated remaining capacities, as reported by NCDEQ, are provided in **Table 3-8**.

TABLE 3-8, SOLID WASTE LANDFILL CAPACITY

LANDFILL	PERMITTED VOLUME REMAINING (TONS)	PERMITTED VOLUME REMAINING (YEARS)
Wake County South Wake	16,628,005	37.9
Red Rock Disposal C&D Landfill	8,505,311	62.9
Cobles C&D Landfill	3,675,038	109.6

Source: NCDEQ, Division of Waste Management Site Locator Tool. On-line <https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=7dd59be2750b40bebebfa49fc383f688>, Accessed August 11, 2021; NCDEQ: Waste Management Solid Waste Section, Landfill Capacity for Fiscal Year 2019-2020. On-line: <https://files.nc.gov/ncdeq/Waste%20Management/DWM/SW/Annual%20Reports/FY-19-20-Landfill-Capacity-Reports.pdf>, Accessed August 11, 2021.

Numerous other permitted municipal solid waste management landfills, land clearing and inert debris landfills, construction and demolition (C&D) landfills, and hazardous waste collection centers are located in Wake County and surrounding counties in North Carolina.⁴⁴ Currently, there are two active hazardous waste storage and disposal facilities identified in the region (Clean Harbors Reidsville, LLC and ECOFLO) with the capability of storing, treating, and disposing of PCB-contaminated waste.⁴⁵ Determination of the specific facility, if applicable for the Proposed Action, would be determined in the final design phase of the project, at which time the capacity available at each location would be determined. **Table 3-9** provides the hazardous waste commercial storage and disposal availability as of November 2022 of the Clean Harbors Reidsville, LLC facility.

TABLE 3-9, HAZARDOUS WASTE COMMERCIAL STORAGE AND DISPOSAL FACILITIES

LANDFILL	PERMITTED VOLUME REMAINING (GALLONS)	PERMITTED VOLUME REMAINING (YEARS)
Clean Harbors Reidsville, LLC	990,000	N/A

Source: USEPA, List of Approved Polychlorinated Biphenyl (PCB) Commercial Storage and Disposal Facilities. On-line: <https://www.epa.gov/pcbs/list-approved-polychlorinated-biphenyl-pcb-commercial-storage-and-disposal-facilities>, Accessed November 28, 2022; CleanHarbors Reidsville LLC, Transportation & Disposal Facility Facts. On-line: <https://www.cleanharbors.com/sites/g/files/bdczcs356/files/location/pdf/2019-02/final-reidsville-nc-facility-fs-072211.pdf>, Accessed November 28, 2011.

⁴⁴ NCDEQ, Solid Waste On-line: <https://deq.nc.gov/about/divisions/waste-management/sw/data>, Accessed August 11, 2021.

⁴⁵ USEPA, List of Approved Polychlorinated Biphenyl (PCB) Commercial Storage and Disposal Facilities. On-line: <https://www.epa.gov/pcbs/list-approved-polychlorinated-biphenyl-pcb-commercial-storage-and-disposal-facilities>, Accessed November 28, 2022.

Pollution Prevention

This section discusses the Airport Authority's existing pollution prevention measures as it relates to the affected environment. The Airport Authority ensures that the Airport remains in compliance with federal and state environmental regulations regarding pollution prevention. The Airport Authority maintains a Facility Response Plan and a Spill Prevention, Control, and Countermeasure (SPCC) plan that addresses the oils, containers, equipment, facilities, associated infrastructure, and operations at the facility that are regulated by or required under the SPCC rule and are owned by the Airport Authority. The SPCC plan details measures for preventing and responding to spills from regulated petroleum bulk storage containers or equipment and transfer operations. Tenants operating on Airport property are required to prepare and implement their own SPCC plan, if applicable. In addition, the Airport Authority maintains a Stormwater Pollution Prevention Plan that contains best management practices and Good Housekeeping requirements to prevent trash and other waste from entering the stormwater system.

3.7 Historic, Architectural, Archaeological, and Cultural Resources

3.7.1 Regulatory Setting

The National Historic Preservation Act (NHPA) is the primary federal law governing the preservation of historic and prehistoric resources, encompassing art, architecture, archaeological, and other cultural resources. Section 106, *Protection of Historic Properties* requires federal agencies to take into account the effects of their Proposed Actions referred to as undertakings on properties that are listed on or determined eligible for inclusion in the NRHP, and requires federal agencies to consult with the SHPO, Tribal Historic Preservation Officers (THPO), and other parties to develop and evaluate alternatives or modifications to the undertaking that could avoid, minimize, or mitigate adverse effects on historic properties.

3.7.2 Affected Environment

The Area of Potential Effects (APE) is "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties" (36 Code of Federal Regulations [CFR] § 800.16(d)). For purposes of Section 106, the term "historic properties" can include architectural, archeological, historical, or cultural resources. The determination of the APE considers the character of a project area and the potential for resources to be found. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36 CFR § 800.16(d)). The APE must include all direct and reasonably foreseeable indirect effects. Although the NHPA regulations do not define the term "indirect effect," the FAA typically uses the term to refer to noise and visual impacts that do not physically alter historic resources. Because this type of impact often covers a much larger area but does not have the potential to affect below-ground resources, the FAA frequently defines separate APEs for direct and indirect effects.

Determination of the APEs

The areas where there is the potential for ground disturbance due to construction activities, which is approximately 1,430 acres, were considered the Direct APE. The Direct APE is the same as the DSA shown in Exhibit 3-1. The Indirect APE boundary was developed using the Future (2033) No Action Alternative and the Proposed Action noise contours to identify where noise may increase due to the Proposed Undertaking. See Section 4.10 for additional information on these noise contours. In addition, the Indirect APE includes the Direct APE and adds a buffer of 200 feet where there is the potential for any tree clearing and for any potential change in visual character. The Indirect APE is shown on

Exhibit 3-9. The SHPO concurred with FAA's APEs for this project via letter on March 14, 2022 (see Appendix E).

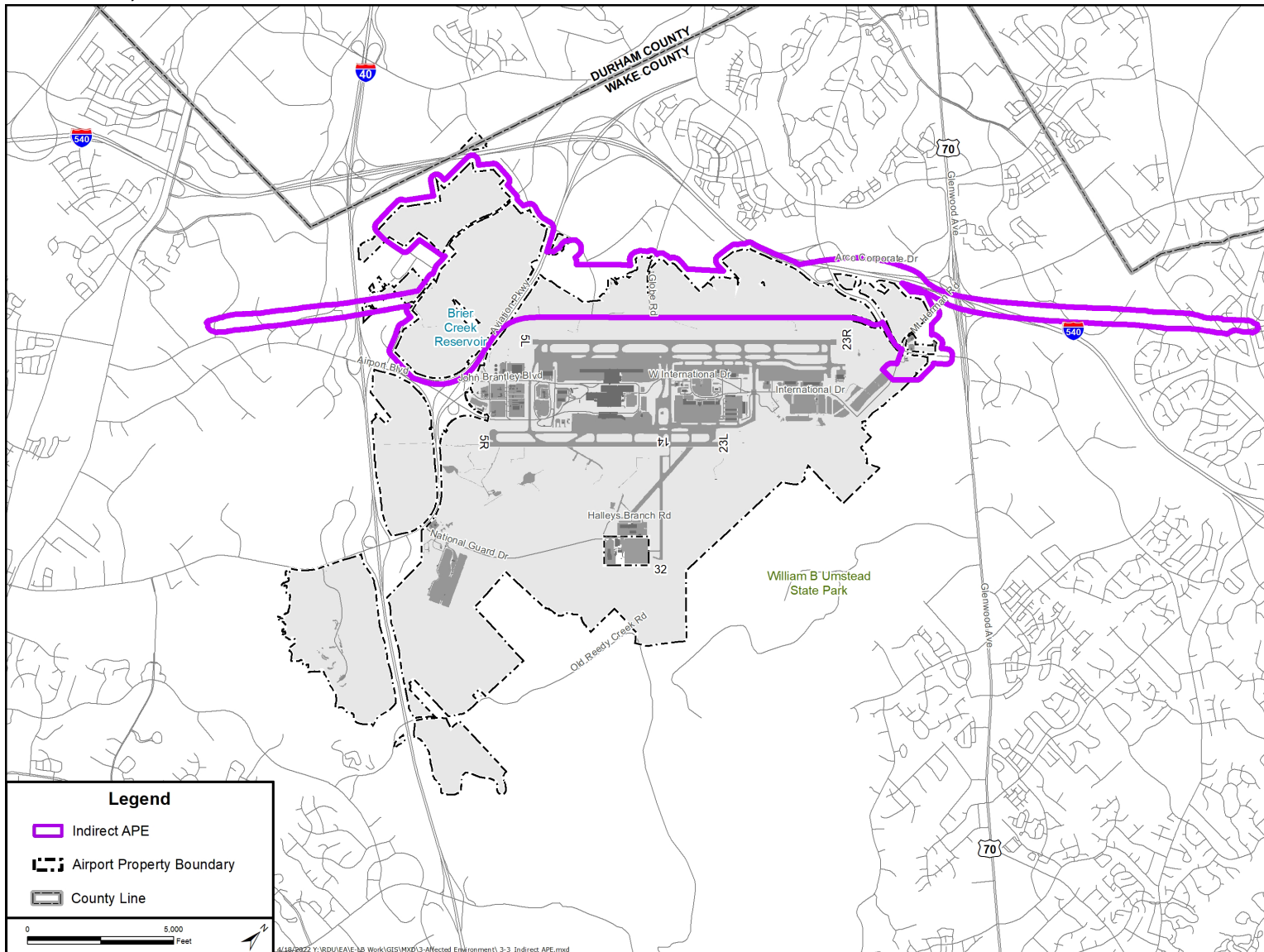
Identification of Historic Properties within the Direct APE

Background research was conducted to identify any historic properties that are listed or eligible for listing in the NRHP within the Direct APE. A review of the archeological survey reports on file at the North Carolina Office of State Archaeology (NCOSA) identified three previously recorded archaeological sites (31WA0081, 31WA0082, and 31WA0083) and two known burial areas (31WA0143 and 31WA0145) within the Direct APE. While these sites had been identified, they had not been previously evaluated for the NRHP. In addition to the background research, archaeological pedestrian field surveys were conducted between August 2021 and November 2021 to verify the presence or absence of historic properties in the Direct APE. The field survey found no evidence of the previously recorded sites 31WA0081, 31WA0083, and 31WA0143 at their mapped location. However, 31WA0143 (the R.A. Burgess Cemetery) may be located in an inaccessible area just north of the mapped location. The field survey revisited the previously recorded sites 31WA0082 and 31WA0145. The field survey also resulted in identifying 36 new archaeological sites including one new burial area. The FAA has concluded that these sites are not eligible for the NRHP and the SHPO has concurred. See Appendix E for more information.

An architectural and historical property evaluation of the Direct APE was also conducted. The only report that determined a resource eligible for listing in the NRHP was the architectural report for buildings that would be demolished as part of the Proposed Action. One resource, consisting of two structures, was determined by an architectural historian, as potentially eligible. This resource, identified as WA 7949, the former Estes Express Lines Terminal and Maintenance Shop, is located north of the proposed runway. These buildings are located on Airport property and have already been vacated by the Estes Express Lines. While the architectural historian made this eligibility determination, the FAA disagrees with the conclusion in the report. While these structures were for a trucking facility in the Southeast, it was not the original Estes Express location nor the Headquarters for the company. The facility was constructed circa 1973, at the end of the era when trucking was growing in this region. It played an insignificant role in the development and expansion of the trucking industry and is just coming to its 50 years in age, which is a factor in determining eligibility. Also, this facility was not associated with any individuals who played a major role in the development of the trucking industry in the Southeast. For these reasons and with the information submitted in the report, FAA did not support the conclusion that the former Estes Express Lines facility was eligible for listing in the NRHP. The SHPO concurred with FAA's conclusion by letter dated December 1, 2022. See Appendix E for the report and FAA and SHPO coordination.

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EXHIBIT 3-9, INDIRECT APE



Source: Airport Authority and Landrum & Brown, 2021

Identification of Historic Properties within the Indirect APE

An evaluation of the Indirect APE was also conducted. All above ground buildings within the Indirect APE were identified. There were 132 total structures identified within the Indirect APE. Wake County Auditor data was then used to identify structures that were 50 years of age or older and that may potentially be impacted by the Proposed Action. Only 11 of those structures met the criteria for age. Eight of the 11 structures would have no physical disturbance, no change in noise, and/or no change in setting or character. For the remaining three structures an evaluation was conducted. A reconnaissance level survey was conducted for one single family house and one mobile home to provide description, discussion of integrity and significance, and eligibility assessment. In addition, an intensive level survey was conducted for the Sorrell Grove Baptist Church. The FAA concluded that these structures are not eligible for the NRHP. The SHPO concurred with this determination. See Appendix E.

3.8 Land Use

3.8.1 Regulatory Setting

Special guidance relevant to land use is given in the NEPA implementing regulations, which require consideration of “[p]ossible conflicts between the proposed action and the objectives of federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned.”⁴⁶ The regulations recognize that certain inconsistencies may exist between the proposed federal action and any approved state or local plan or law. Where an inconsistency exists, the NEPA document should describe the extent to which the agency would reconcile its action with the plan or law (see Title 40 CFR Part 1506.2(d)).

3.8.2 Affected Environment

The Airport encompasses approximately 4,800 acres. The Airport is located in north central North Carolina, in Wake County, with small portions of the Airport property in Durham County. The Airport is located 11 miles northwest of downtown Raleigh and ten miles southeast of downtown Durham. Existing land use in the GSA consists of the Airport property, residential uses, commercial and industrial land uses, and vacant or undeveloped forested land, as shown in **Exhibit 3-10**.

Land to the north of the Airport is largely commercial and manufacturing/production land uses with some single family and multifamily residential uses north of Interstate 540. Land use to the west and southwest in the immediate vicinity of the Airport includes the Brier Creek Reservoir, residential housing, and commercial and manufacturing/production land uses. Residential land uses to the west of the Airport include single family and multifamily residential homes west of the Brier Creek Reservoir on Pleasant Grove Church Road and north of the Brier Creek Reservoir on Nelson Road east of Pleasant Grove Church Road. Land to the east and southeast is largely undeveloped natural areas including the William B. Umstead State Park.

Summaries of the housing units and population affected by noise levels exceeding 65 Day-Night Average Sound Level (DNL) for the existing conditions noise exposure contours are provided in Section 3.10, *Noise and Noise-Compatible Land Use*. There are 17 housing units with an estimated population of 45 people within the 65+ DNL. There are no public schools, churches/places of worship, nursing homes, hospitals, or libraries within any of the existing conditions contours.

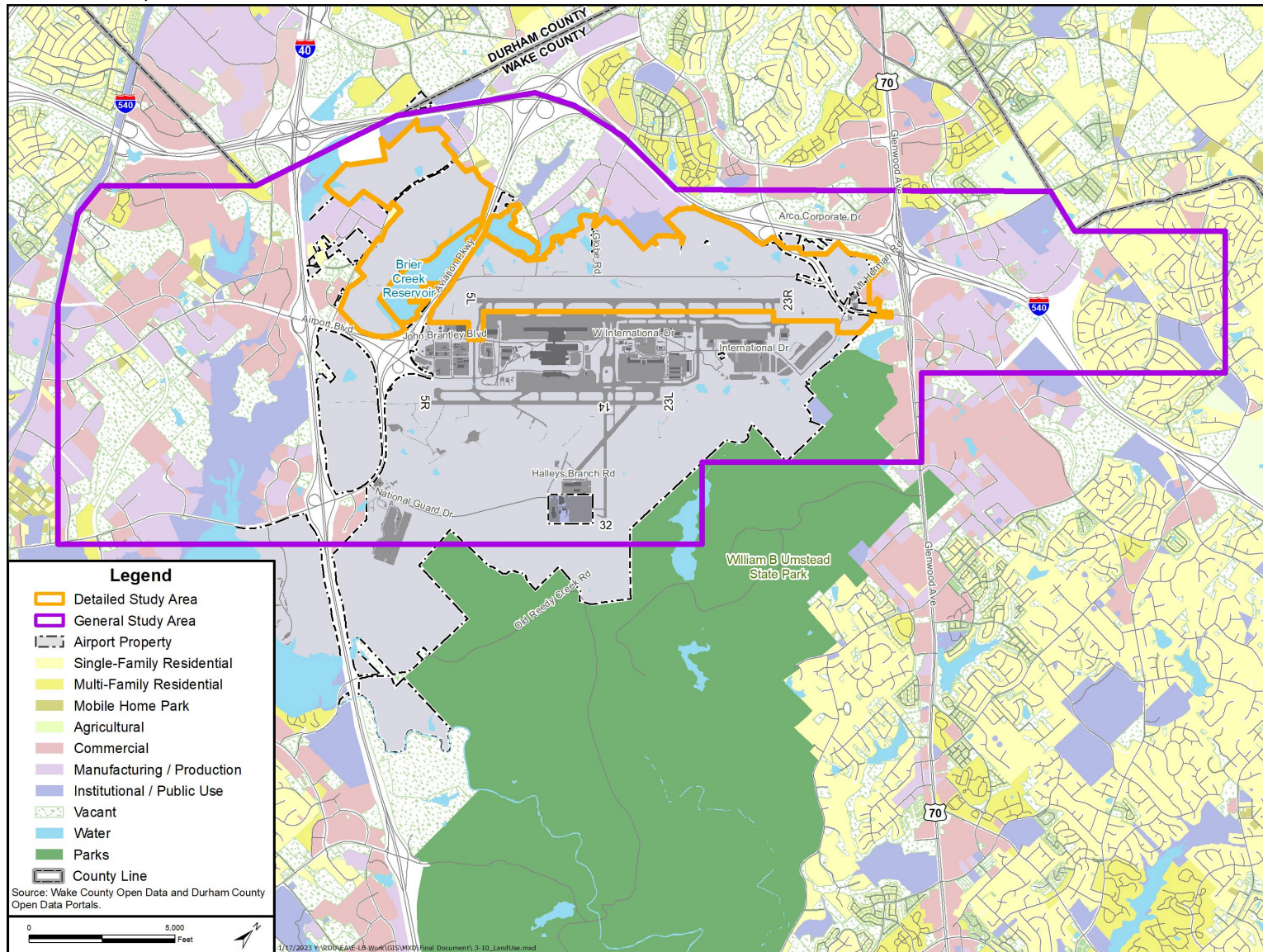
⁴⁶ Title 40 CFR Part 1502.16(c)

Local Land Use Restrictions

A review of land use and airport compatibility requirements set forth in the Unified Development Ordinances (UDO) of local governments surrounding RDU was conducted. In the early 1990's, the Airport Authority developed a set of composite noise contours to depict the noise environment around RDU. The composite noise contours led to the development of airport overlay districts by local municipalities to supplement underlying zoning that regulates residential, commercial, industrial, and other land uses as shown in **Exhibit 3-11**. The airport overlay districts are used by the City of Raleigh, the Town of Morrisville, Town of Cary, and Durham County to apply land use restrictions in areas near RDU to ensure that future land use and development within a geographic area is compatible with airport activities. The Airport Authority has worked closely with the local municipalities to ensure appropriate land use regulations are adopted and enforced in accordance with 49 U.S.C. § 47107(a)(10) to make sure land uses are compatible with airport operations. A copy of the land use assurance letter dated June 27, 2022 is included in **Appendix I**.

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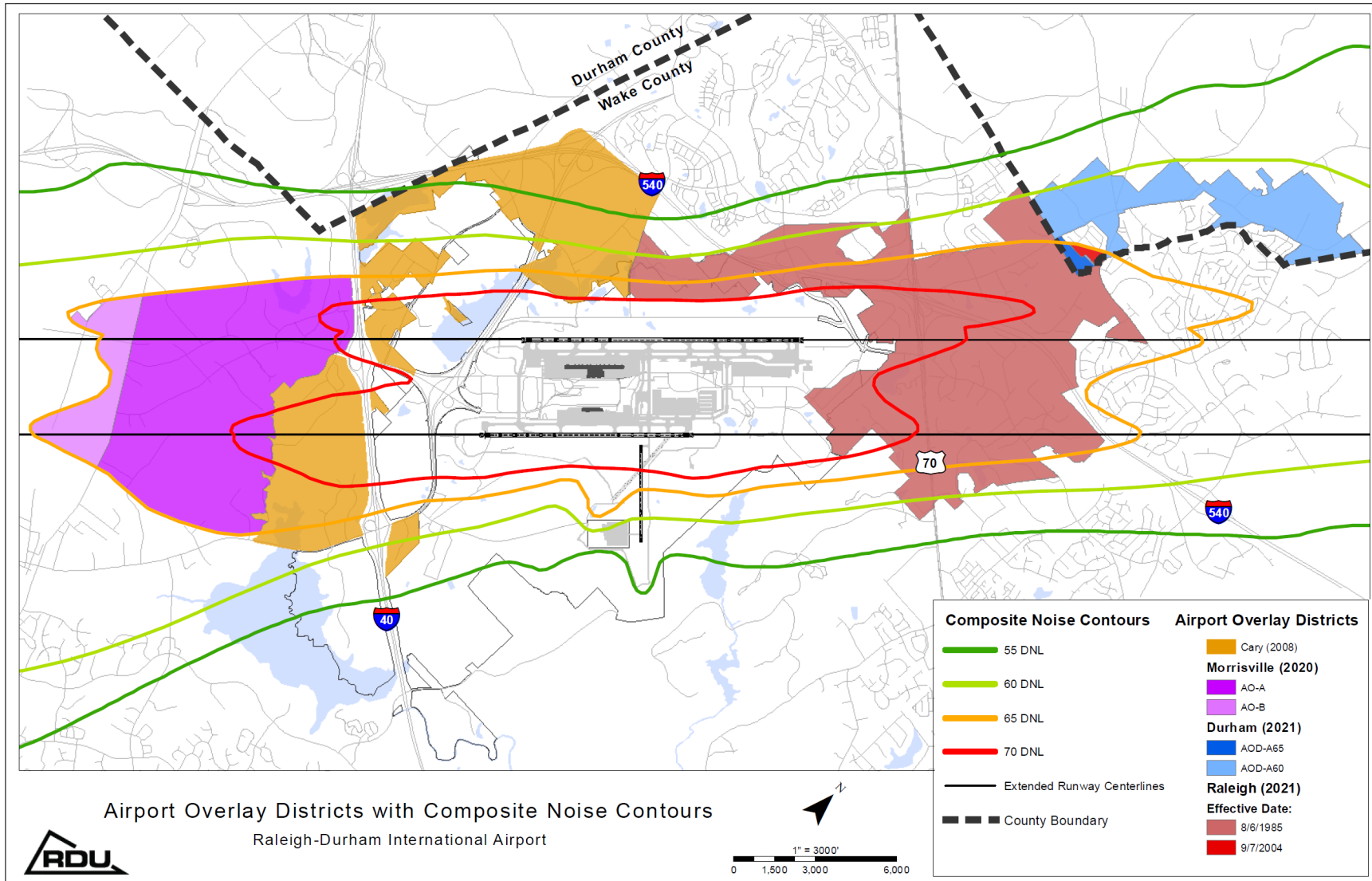
EXHIBIT 3-10, LAND USE



Source: Airport Authority, Wake County, Durham County, and Landrum & Brown, 2021

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EXHIBIT 3-11, AIRPORT OVERLAY DISTRICTS



Source: Airport Authority, 2021.

3.9 Natural Resources and Energy Supply

3.9.1 Regulatory Setting

FAA Order 1050.1F requires that federal agencies consider energy requirements and natural depletable resources. Consumption of natural resources and use of energy supplies may result from construction and operation of the Airport.

3.9.2 Affected Environment

Natural Resources

Materials currently used by the Airport and expected to be used for the Proposed Action include aggregate, concrete, gravel, asphalt, steel, sand, and water. These materials are not in short supply in the Raleigh area. Asphalt, cement, sand, gravel, and aggregate can be found at multiple vendor locations near the Airport, including the Martin Marietta – Raleigh-Durham Quarry, Hanson Aggregates, and other sources. Concrete is provided by several entities, including Concrete Supply Company and Chandler Concrete Company.

Energy Supply

There are two primary sources of energy consumption at an airport – stationary facilities and aircraft operations. Stationary facilities use utility energy (electricity and natural gas) to provide lighting, cooling, heat, and hot water to buildings, the airfield, and parking areas. Duke-Progress Energy provides electricity to RDU.⁴⁷ The Airport's annual electricity consumption is approximately 60,225,100 kilowatt hours. Natural gas is provided to RDU by Dominion Energy. The Airport's annual natural gas usage is approximately 633,000 therms. RDU is located in an urban area with a sufficient supply of electricity and natural gas.

Aircraft operations and ground support equipment (GSE) consume fuel energy including jet fuel, low-lead aviation gasoline (AvGas), unleaded gasoline, and diesel fuel to operate the aircraft and power GSE. Jet fuel is delivered to the Airport through the Colonial Pipeline which feeds the Airport's bulk fuel facility and is distributed through an underground aviation fuel distribution system and through mobile refuelers.⁴⁸ Annual jet fuel consumption at RDU is over 75 million gallons. AvGas, unleaded gasoline, and diesel fuel consumption at the Airport is supplied by Fixed-Base Operators and other sources, with demand being able to be met as needed.

3.10 Noise and Noise-Compatible Land Use

3.10.1 Regulatory Setting

For aviation noise analyses, the FAA has determined that the cumulative noise energy exposure of individuals to noise resulting from aviation activities must be established in terms of annual DNL, the FAA's primary noise metric. To evaluate aircraft noise, the FAA has an approved computer model, the AEDT, that simulates aircraft activity at an airport.

The FAA uses the Title 14 CFR Part 150, *Airport Noise Compatibility Planning*, land use compatibility guidelines to determine compatibility with most land uses. These guidelines are consistent with land use compatibility guidelines developed by other federal agencies such as the USEPA and the U.S. Department of Housing and Urban Development. A DNL of 65 decibels (dB) is the noise level at which

⁴⁷ Raleigh-Durham International Airport Master Plan Study, December 2017.

⁴⁸ Ibid.

noise-sensitive land uses (residences, churches, schools, libraries, and nursing homes) become significantly impacted. According to the FAA guidelines, below DNL 65 dB, all land uses are determined to be compatible with airport noise. Special consideration is given to noise sensitive areas within Section 4(f) properties (including, noise sensitive areas within national parks, national wildlife and waterfowl refuges and historic sites, including traditional cultural properties) where the land use compatibility guidelines in Title 14 CFR Part 150 are not relevant to the value, significance, and enjoyment of the area in question.

The FAA has created guidelines regarding the compatibility of land uses with various aircraft noise levels measured using the DNL metric. These guidelines are defined in Appendix A of Title 14 CFR Part 150. The land use compatibility table is reproduced and provided in **Appendix F**. These guidelines show the compatibility parameters for residential, public (schools, churches, nursing homes, hospitals, and libraries), commercial, institutional, and recreational land uses.

3.10.2 Affected Environment

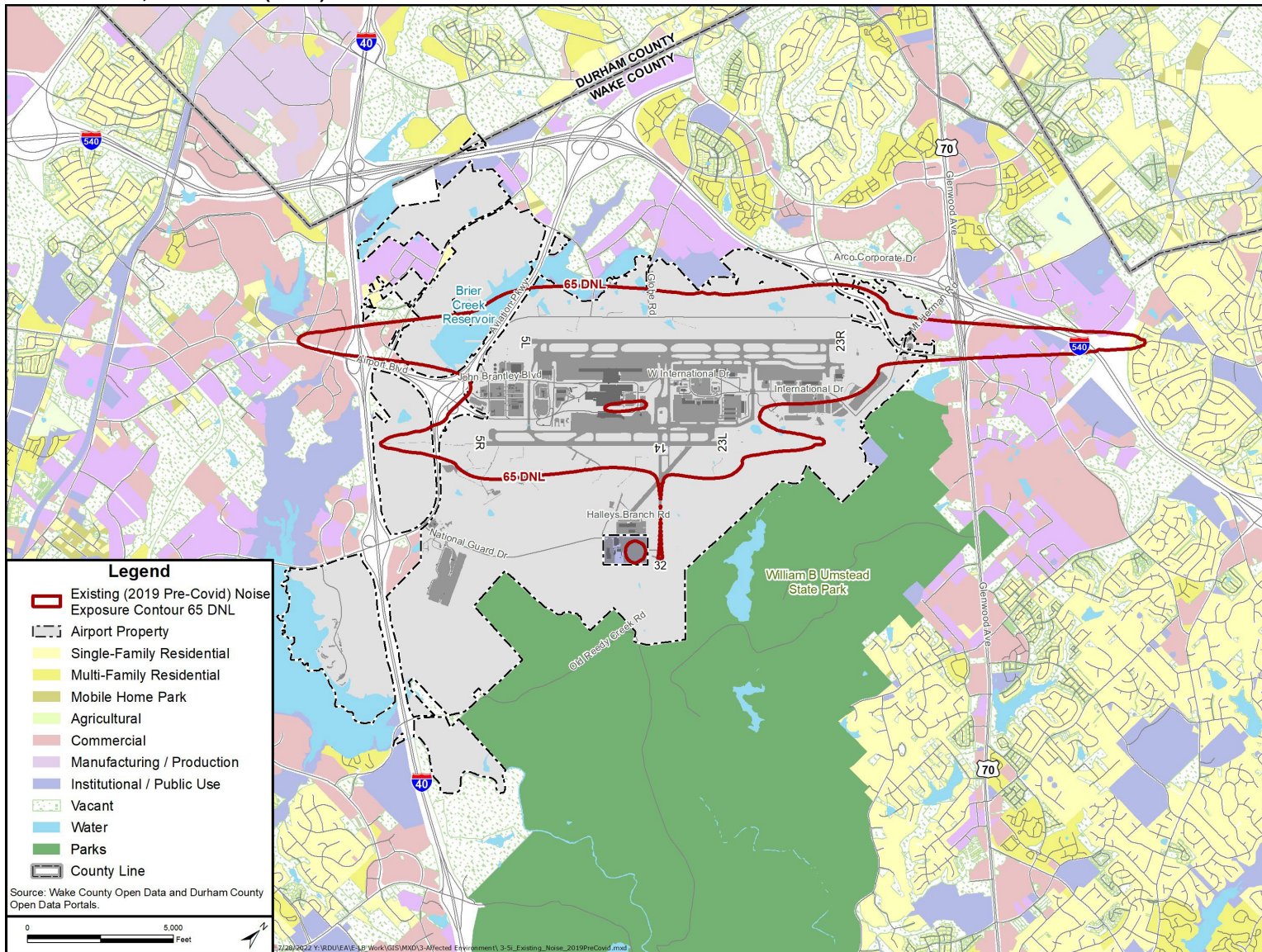
In 2019, there were 223,249 annual operations at RDU. In 2020, the number of aircraft operations at RDU decreased dramatically to 131,777 annual operations.⁴⁹ The decrease in operations were due to the impacts to aviation associated with the COVID-19 (COVID) public health emergency. For the existing conditions, the 2019 conditions are presented; however, a full comparison of the 2019 Pre-COVID conditions and the 2020 COVID conditions are provided in Appendix F. See also Chapter 1, Section 1.2 for the future forecast of aircraft operations.

The Existing (2019) Conditions noise exposure contour for the DNL 65 dB is shown in **Exhibit 3-12**. Appendix F presents the methodology, a discussion of noise, and inputs used to prepare the existing conditions noise contours. These contours reflect the DNL levels in areas surrounding RDU on an average annual day. A DNL noise contour does not represent the noise levels present on any specific day but represents the energy-average of all 365 days of operation during the year with an added penalty of noise during night operations. Noise contour patterns extend from the Airport along each extended runway centerline, reflective of the flight tracks used by all aircraft. The relative distance of a contour from the airport along each route is a function of the frequency of use of each runway end for total arrivals and departures, as well as its use at night, and the type of aircraft assigned to it.

⁴⁹ The number of annual operations at RDU for 2020 was based on Air Traffic Control Tower (ATCT) counts for the period from June 2020 through May 2021.

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EXHIBIT 3-12, EXISTING (2019) CONDITIONS 65 DNL NOISE EXPOSURE CONTOUR



Source: Airport Authority and Landrum & Brown, 2021

Table 3-10 summarizes the land area within each noise contour.

TABLE 3-10, AREAS WITHIN THE EXISTING CONDITIONS NOISE EXPOSURE CONTOUR (SQUARE MILES)

CONTOUR RANGE	EXISTING CONDITIONS NOISE EXPOSURE (SQUARE MILES)
65-70 DNL	2.32
70-75 DNL	0.69
75 + DNL	0.55
Total 65 + DNL	3.57

Source: Landrum & Brown, 2021

Summaries of the housing units and population affected by noise levels exceeding 65 DNL for the existing conditions noise exposure contours are provided in **Table 3-11**. There were 17 housing units with an estimated population of 45 people within the 65+ DNL. There are no public schools, churches/places of worship, nursing homes, hospitals, or libraries within any of the existing conditions contours.

TABLE 3-11, NON-COMPATIBLE LAND USE HOUSING AND POPULATION – EXISTING CONDITIONS PRE-COVID

	65-70 DNL	70-75 DNL	75+ DNL	TOTAL
RESIDENTIAL				
Single-Family Units	17	0	0	17
Duplex/Triplex Units	0	0	0	0
Mobile Home Units	0	0	0	0
Total	17	0	0	17
ESTIMATED POPULATION				
Single-Family Units	45	0	0	45
Duplex/Triplex Units	0	0	0	0
Mobile Home Units	0	0	0	0
Total	45	0	0	45
NOISE-SENSITIVE FACILITIES				
Schools	0	0	0	0
Churches/Places of Worship	0	0	0	0
Day Care Facilities	0	0	0	0
Fire Stations	0	0	0	0
Total	0	0	0	0

Notes: Population numbers are estimates based on the U.S. Census average household size per number of housing units.
 Source: Landrum & Brown analysis, 2022.

3.11 Socioeconomics, Environmental Justice, and Children’s Environmental Health and Safety Risks

3.11.1 Regulatory Setting

Socioeconomics

Socioeconomics is an umbrella term used to describe aspects of a project that are either social or economic in nature. Section 1508.14 of the CEQ Regulations requires all federal agencies to conduct a socioeconomic analysis in the event that economic or social and natural environmental effects are interrelated as a result of the Proposed Action and alternative(s). This would include an evaluation of how elements of the human environment such as population, employment, housing, and public services might be affected by the Proposed Action and alternative(s). The Uniform Relocation Assistance and Real Property Acquisitions Policy Act of 1970, 42 U.S.C. § 61 et seq., and implementing regulations found at Title 49 CFR Part 24, provides standards if acquisition of real property or displacement of people would occur as a result of implementing the Proposed Action.

Environmental Justice

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

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

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

EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, requires all federal agencies to address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. USDOT Order 5610.2(a) defines a minority population as any readily identifiable group of minority persons living in geographic proximity to a proposed USDOT program, policy or activity including, if circumstances warrant, geographically dispersed or transient persons (such as migrant workers or Native Americans) who will be similarly affected by the proposed program, policy, or activity.

Requirements for meaningful public involvement by minority and low-income populations are addressed in Paragraph 2-5.2.b of FAA Order 1050.1F. As stated in the Order, the FAA must provide for meaningful public involvement by minority and low-income populations. In accordance with USDOT Order 5610.2(a), this public involvement must provide an opportunity for minority and low-income populations to provide input on the analysis, including demographic analysis that identifies and

addresses potential impacts on these populations that may be disproportionately high and adverse. The public involvement process can also provide information on subsistence patterns of consumption of fish, vegetation, or wildlife. This information should be disclosed to potentially affected populations for proposed actions and alternative(s) that are likely to have a substantial effect and for CERCLA sites.

Children’s Environmental Health and Safety Risks

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

3.11.2 Affected Environment

Socioeconomics

RDU is located in Wake County, North Carolina and is within the Raleigh-Durham-Cary Combined Statistical Area. **Table 3-12** presents a comparison of the socioeconomic and demographic characteristics of Wake County and the Raleigh-Durham-Cary Combined Statistical Area, including income, unemployment and poverty rates, population by race, ethnicity, and age.

TABLE 3-12, EXISTING SOCIOECONOMIC AND DEMOGRAPHIC DATA

CHARACTERISTIC / CATEGORY	WAKE COUNTY	RALEIGH-DURHAM-CARY COMBINED STATISTICAL AREA
Median Income	\$80,591	\$70,356
Unemployment Rate¹	4.0%	4.4%
Percent Below Poverty Level²	9.1%	11.4%
Population	1,069,079	2,003,485
Not Hispanic	960,700	1,789,844
White	641,723	1,179,558
Black / African American	212,353	445,239
Native American / Alaskan Native	2,726	5,838
Asian	74,111	103,922
Native Hawaiian or Pacific Islander	403	748
Other	29,384	54,539
Hispanic	108,379	213,641
Percent Total Minority	40.0%	41.1%
Percent of Population Under 18 Years Old	24.2%	23.2%
Percent of Population 18 Years Old and Over	75.8%	76.8%

Note: Minority population refers to any readily identifiable group of minority persons (Black, Hispanic or Latino, Asian American, American Indian, Alaskan Native, Native Hawaiian, other Pacific Islander, or other non-White populations). Low-income is defined as a person whose median household income is at or below the Department of Health and Human Services poverty guidelines.

¹ Unemployment rate was calculated from the number of unemployed people as a percentage of the labor force.

² For 2019, the U.S. Census Bureau determined the poverty threshold to be an income of \$13,011 for an individual and \$26,172 for a family of four.

Source: Population and race/ethnicity data was obtained from the U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates; Landrum & Brown analysis, 2021.

Environmental Justice

EJ populations are composed of minority and/or low-income populations. Based on the FAA 1050.1F Desk Reference, the identification of minority populations must be pursuant to USDOT Order 5610.2(a) definitions. Minority population refers to any readily identifiable group of minority persons (Black, Hispanic or Latino, Asian American, American Indian, Alaskan Native, Native Hawaiian, other Pacific Islander, or other non-White populations).

To define low-income populations, the FAA relies on the Census statement that the best approximation for the number of people below the Department of Health and Human Services poverty guidelines in a particular area would be the number of persons below the Census Bureau poverty thresholds in that area.⁵⁰ The identification of minority and low-income communities in the GSA was initiated through a use of the AEDT and an assessment of U.S. Census Bureau data. Based on FAA guidance, the AEDT Version 3d was used to identify the census block groups within and adjacent to the GSA. The U.S. Census Bureau's American Community Survey (ACS) 5-Year Estimates were used to identify demographic data for each census block group. This data was used to estimate the percentage of minority populations and percentage of low-income populations within each census block group. Fifteen census block groups were identified within or directly adjacent to the GSA.

Based on EO 12898, the percentage of low-income and minority populations are compared to that of a reference general community or area in order to identify if a *meaningfully greater* minority and/or low-income population is present when compared to a general population. According to the *Promising Practices for EJ Methodologies in NEPA Reviews*, a reference area is a larger scale community or area used to identify and accurately reflect the existence of a minority population in the geographic unit.

For the purpose of this analysis, Wake County was used as the reference area because the Airport is located in Wake County and its community is relevant to the demographic of the surrounding census block groups. The reference area, Wake County, contains 9.1 percent low-income and 40.0 percent minority populations. In order to identify if a census block group contained EJ populations, the percentage of low-income and minority populations for Wake County was used as a threshold.

The percentage of low-income and minority populations for each of the 15 census block groups are presented in **Table 3-13**. If a census block group's percentage of low-income and minority populations exceeds those of Wake County, the census block group was identified as potentially containing an EJ population. As shown in **Exhibit 3-13** and **Exhibit 3-14**, only two census block groups containing EJ populations are located within the GSA (Map ID 3 and 6).

The data for the census block group in Map ID 3 indicated 10.6 percent of the population is low-income (living below the poverty level). In order to understand the specific demographics of the potential minority groups, further review of the census data was conducted. **Table 3-14** provides a detailed breakdown of the minority groups within the census block groups. The data for the census block group in Map ID 3 indicated the potential EJ populations are composed of Black/African American (17.2 percent), Asian (31.3 percent), and Hispanic (11.5 percent) for a total minority population in this area of 60.0 percent. The data for the census block group in Map ID 6 indicated the potential EJ populations are composed of Black/African American (23.5 percent), Asian (9.7 percent), Hispanic (12.8 percent), and other non-Hispanic (4.4 percent) for a total minority population in this area of 50.4 percent.

⁵⁰ FAA. Guidance on Using the Aviation Environmental Design Tool (AEDT) to Screen for Potential Environmental Justice Populations and Identify Populations of Limited English Proficiency, December 17, 2018.

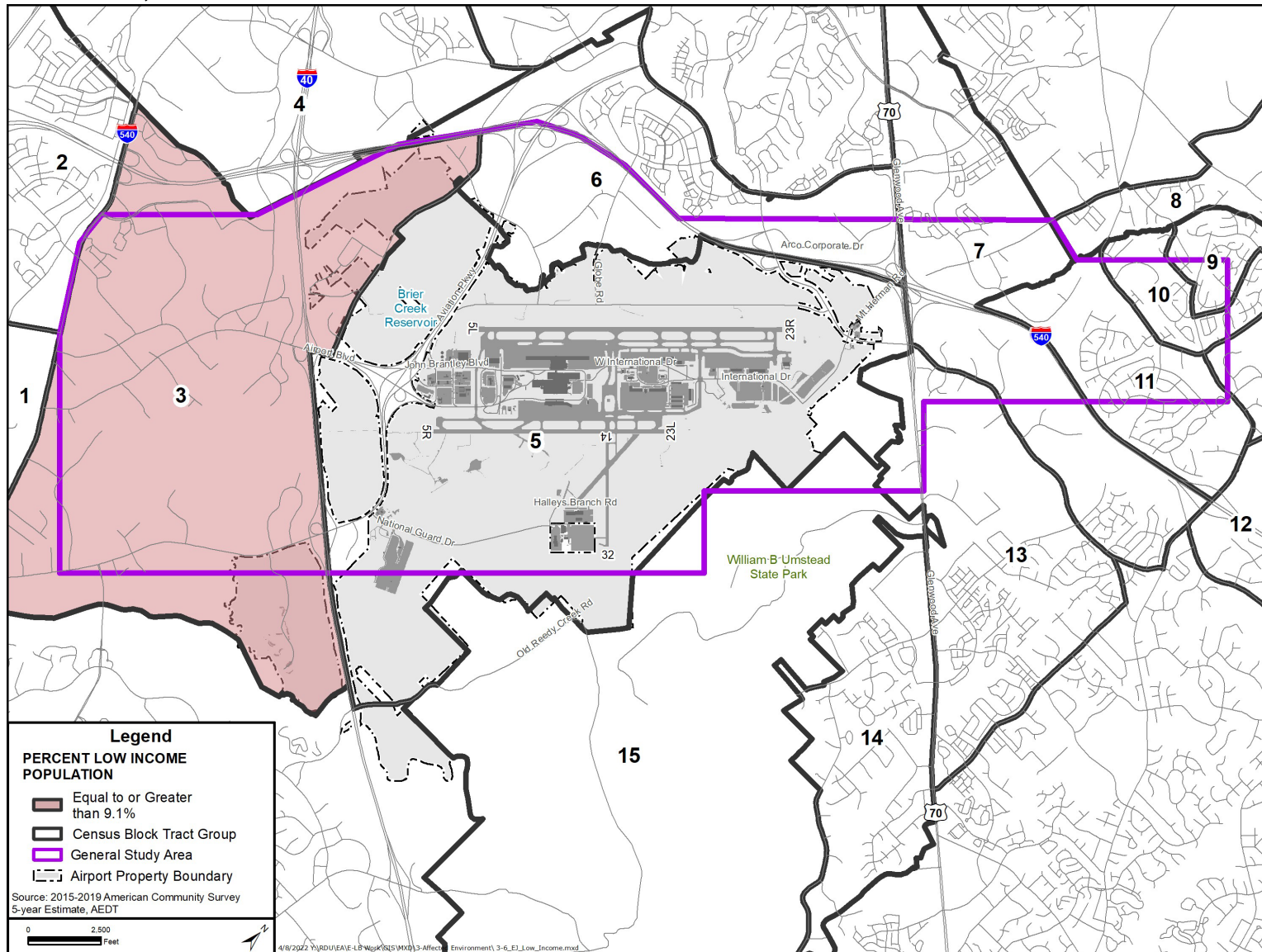
Therefore, this analysis identified environmental justice populations (both low-income and minority) located southwest of the Airport within the GSA.

TABLE 3-13, DEMOGRAPHIC DATA BY CENSUS BLOCK GROUP

MAP ID	CENSUS BLOCK GROUP	PERCENT LOW INCOME POPULATION	PERCENT MINORITY POPULATION	ENVIRONMENTAL JUSTICE POPULATION?
1	Block Group 1, Census Tract 536.07, Wake County, North Carolina	7.5%	69.3%	YES
2	Block Group 1, Census Tract 536.08, Wake County, North Carolina	8.1%	66.2%	YES
3	Block Group 1, Census Tract 536.09, Wake County, North Carolina	10.6%	60.0%	YES
4	Block Group 3, Census Tract 20.28, Durham County, North Carolina	2.3%	62.8%	YES
5	Block Group 1, Census Tract 9801, Wake County, North Carolina	0.0%	0.0%	NO
6	Block Group 2, Census Tract 536.10, Wake County, North Carolina	4.3%	50.4%	YES
7	Block Group 1, Census Tract 537.17, Wake County, North Carolina	7.4%	38.2%	NO
8	Block Group 2, Census Tract 19, Durham County, North Carolina	6.7%	26.4%	NO
9	Block Group 2, Census Tract 537.19, Wake County, North Carolina	1.0%	15.7%	NO
10	Block Group 1, Census Tract 537.19, Wake County, North Carolina	1.1%	12.2%	NO
11	Block Group 1, Census Tract 537.18, Wake County, North Carolina	3.4%	22.6%	NO
12	Block Group 1, Census Tract 537.21, Wake County, North Carolina	2.8%	16.3%	NO
13	Block Group 1, Census Tract 537.24, Wake County, North Carolina	4.8%	36.6%	NO
14	Block Group 3, Census Tract 537.09, Wake County, North Carolina	6.6%	37.0%	NO
15	Block Group 1, Census Tract 9802, Wake County, North Carolina	0.0%	0.0%	NO

Source: Population and race/ethnicity data was obtained from the U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates; Landrum & Brown analysis, 2021.

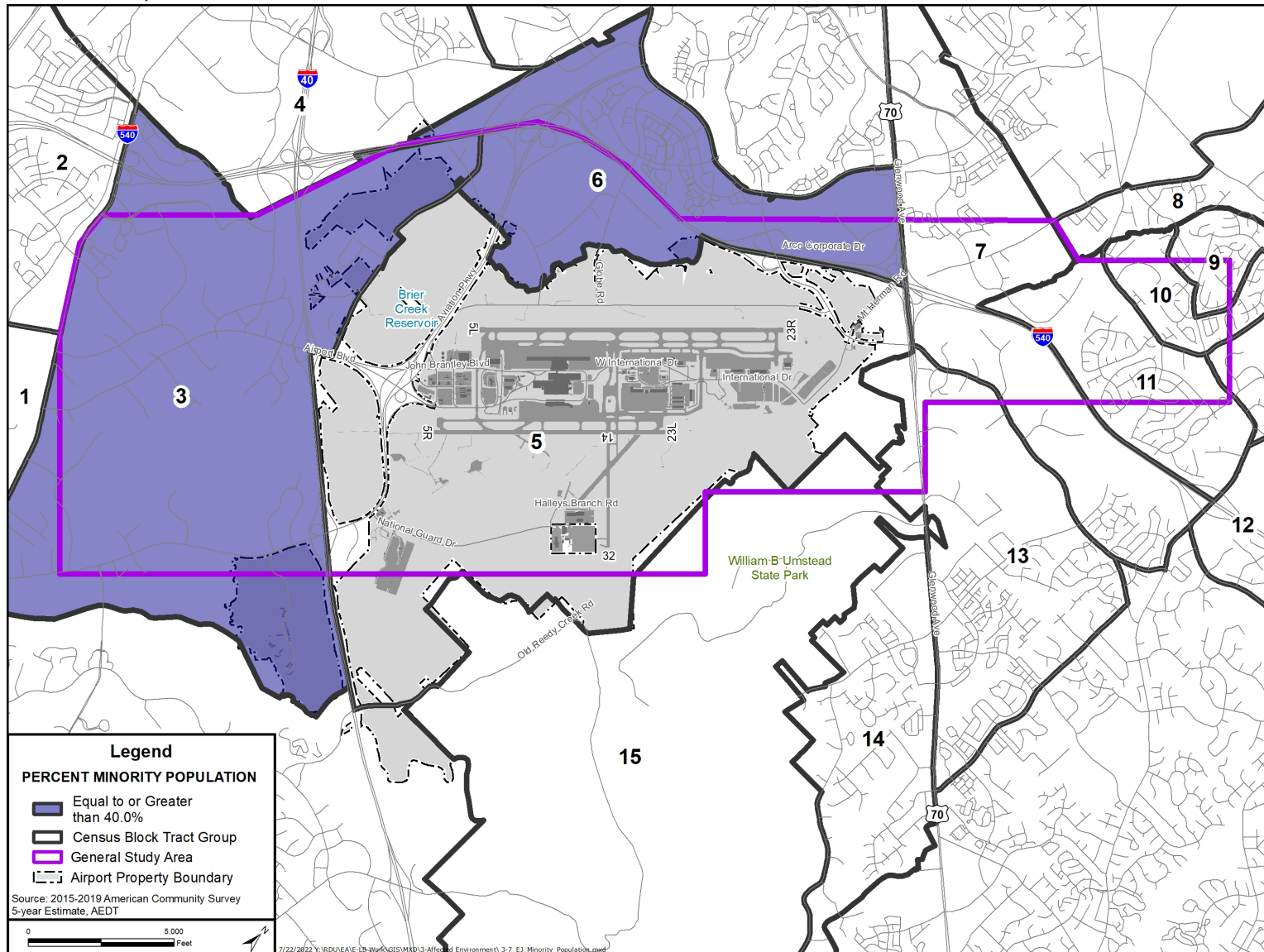
EXHIBIT 3-13, POTENTIAL LOW-INCOME POPULATION BY CENSUS BLOCK GROUP WITHIN THE GSA



Source: U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates. Landrum & Brown, 2021

Note: Wake County contains 9.1 percent low-income. Census Block Group 3 contains greater than 9.1 percent low-income populations.

EXHIBIT 3-14, POTENTIAL MINORITY POPULATION BY CENSUS BLOCK GROUP WITHIN THE GSA



Source: U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates. Landrum & Brown, 2021.

Note: Wake County contains 40 percent minority populations. Census Block Group 3 and 6 contains greater than 40 percent minority populations.

TABLE 3-14, MINORITY GROUP IDENTIFICATION

MAP ID	CENSUS BLOCK GROUP	NOT HISPANIC						HISPANIC	TOTAL MINORITY
		WHITE	BLACK / AFRICAN AMERICAN	NATIVE AMERICAN / ALASKAN NATIVE	ASIAN	NATIVE HAWAIIAN OR PACIFIC ISLANDER	OTHER		
1	Block Group 1, Census Tract 536.07, Wake County, North Carolina	30.7%	11.6%	1.6%	49.0%	0.0%	5.1%	2.0%	69.3%
2	Block Group 1, Census Tract 536.08, Wake County, North Carolina	33.8%	14.9%	0.4%	43.9%	0.0%	3.4%	3.7%	66.2%
3	Block Group 1, Census Tract 536.09, Wake County, North Carolina	40.0%	17.2%	0.0%	31.3%	0.0%	0.0%	11.5%	60.0%
4	Block Group 3, Census Tract 20.28, Durham County, North Carolina	37.2%	32.9%	0.0%	15.8%	0.0%	5.4%	8.8%	62.8%
5	Block Group 1, Census Tract 9801, Wake County, North Carolina	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
6	Block Group 2, Census Tract 536.10, Wake County, North Carolina	49.6%	23.5%	0.0%	9.7%	0.0%	4.4%	12.8%	50.4%
7	Block Group 1, Census Tract 537.17, Wake County, North Carolina	61.8%	24.2%	0.0%	10.3%	0.0%	1.9%	1.7%	38.2%
8	Block Group 2, Census Tract 19, Durham County, North Carolina	73.6%	12.5%	0.0%	5.8%	0.0%	3.0%	5.1%	26.4%
9	Block Group 2, Census Tract 537.19, Wake County, North Carolina	84.3%	0.7%	0.0%	2.4%	0.0%	4.1%	8.4%	15.7%
10	Block Group 1, Census Tract 537.19, Wake County, North Carolina	87.8%	3.8%	0.3%	2.2%	0.0%	2.3%	3.6%	12.2%
11	Block Group 1, Census Tract 537.18, Wake County, North Carolina	77.4%	10.7%	0.0%	3.9%	0.0%	3.8%	4.2%	22.6%
12	Block Group 1, Census Tract 537.21, Wake County, North Carolina	83.7%	5.0%	2.1%	2.0%	0.9%	3.7%	2.6%	16.3%
13	Block Group 1, Census Tract 537.24, Wake County, North Carolina	63.4%	9.5%	0.9%	11.8%	0.0%	4.5%	10.0%	36.6%
14	Block Group 3, Census Tract 537.09, Wake County, North Carolina	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
15	Block Group 1, Census Tract 9802, Wake County, North Carolina	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Population and race/ethnicity data was obtained from the U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates. Landrum & Brown, 2021.

Children’s Environmental Health and Safety Risks

Schools and day care centers are locations where the potential for a child to be exposed to environmental health risks is increased because a higher concentration of children are located in one place during the day. Currently, there is one school (Franciscan Catholic School) and one day-care (Kiddie Academy of Morrisville) within the GSA as presented in **Table 3-15** and shown in **Exhibit 3-15**. As stated in Section 3.9.2, no schools are located within the Existing (2019) Conditions Noise Exposure Contour DNL 65+ dB. As shown previously in Table 3-11, approximately 24 percent of the population (approximately 259,000 people) in Wake County are children.

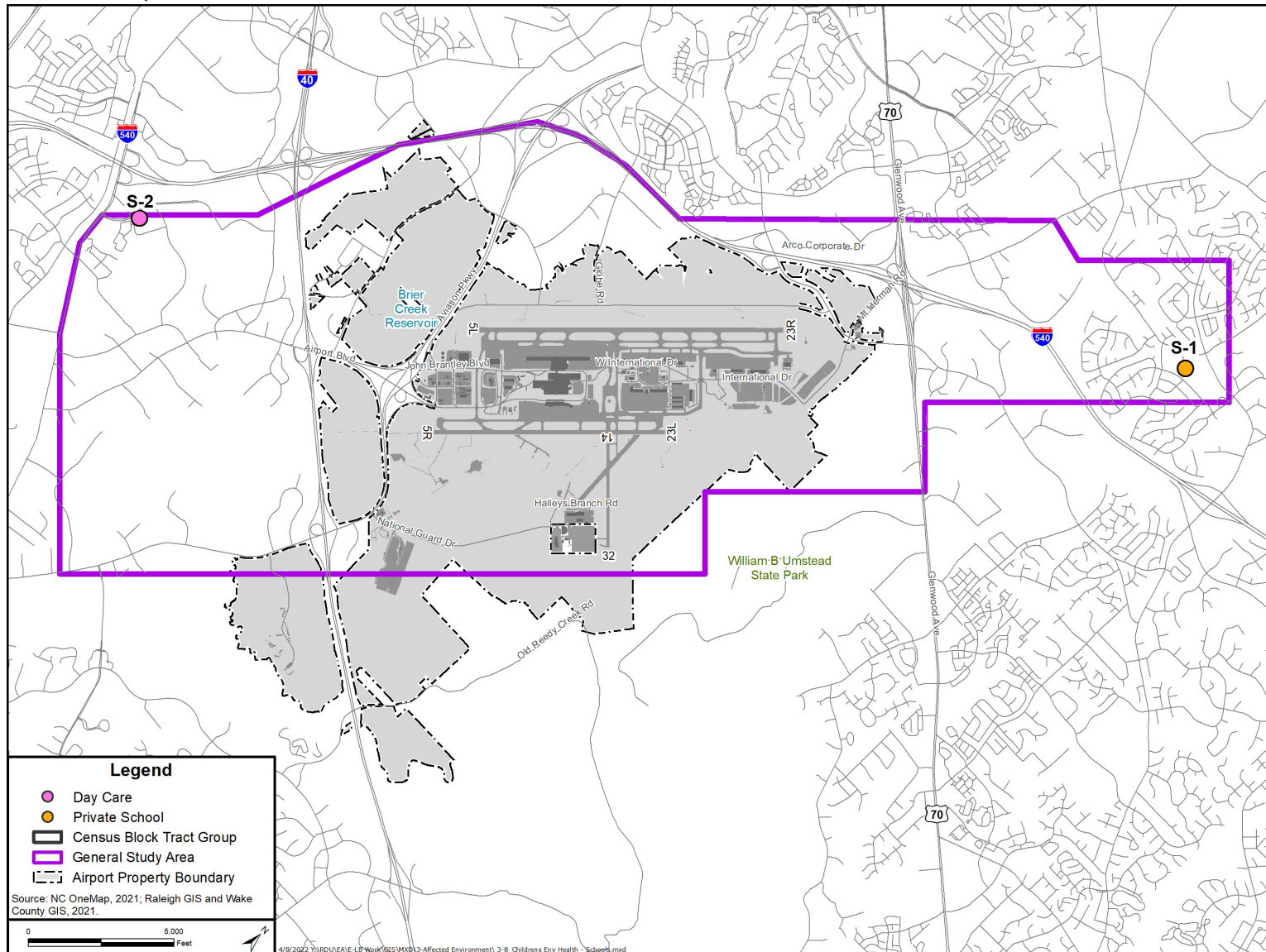
TABLE 3-15, SCHOOLS AND DAY CARE CENTERS WITHIN THE GSA

MAP ID	NAME OF SCHOOL OR DAY CARE CENTER
S1	Franciscan Catholic School
S2	Kiddie Academy of Morrisville

Source: NC OneMap, 2021. Raleigh GIS and Wake County GIS, 2021

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EXHIBIT 3-15, SCHOOLS AND DAY CARE CENTERS IN THE GSA



Source: NC OneMap, 2021. Raleigh GIS and Wake County GIS, 2021. Landrum & Brown, 2021.

3.12 Visual Effects (including light emissions)

3.12.1 Regulatory Setting

FAA Order 1050.1F states that the Visual Effects environmental impacts category deals with the extent to which the Proposed Action would have the potential to either 1) produce light emissions that create annoyance or interfere with normal activities; or 2) affect the nature of the visual resources or visual character of the area, including the importance, uniqueness and aesthetic value of the affected visual resources, including by contrasting with, or detracting from, the visual resources and/or the visual character of the existing environment or blocking or obstructing the views of visual resources, including whether those resources would still be viewable from other locations.⁵¹ Although there are no special-purpose laws or requirements for visual effects or light emissions, the analysis for proposed projects must consider other special-purpose laws and requirements that may be relevant. Regulations that may provide protection to visual resources include Section 106 of the NHPA for impacts to historic and cultural resources, Section 4(f) of the USDOT Act for impacts to parks, wildlife and waterfowl refuges, the ESA for impacts to light-sensitive species, and applicable state and local regulations, policies, and zoning.

3.12.2 Affected Environment

Light Emissions

According to the FAA Order 1050.1F Desk Reference, light emissions “include any light that emanates from a light source into the surrounding environment. Examples of sources of light emissions include airfield and apron flood lighting, navigational aids, terminal lighting, parking facility lighting, roadway lighting, safety lighting on launch pads, additional lighting to support nighttime commercial space launches, and light generated from such launches.”

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

RDU is located in an urbanized area which is comprised of other development that is also lighted and contributes to the overall light emissions in the area. Residential neighborhoods, which are generally considered sensitive to light emissions, are located north and west of the Airport. However, industrial development and heavily vegetated areas surround the Airport. Because land uses surrounding the Airport property include heavy vegetation and industrial and commercial development, most potentially light-sensitive resources do not currently have a direct line of sight to runways, taxiways, terminals, or other Airport facilities.

Visual Resources/Visual Character

According to the FAA Order 1050.1F Desk Reference, visual resources include “buildings, sites, traditional cultural properties, and other natural or manmade landscape features that are visually important or have unique characteristics” and “visual character” refers to the overall visual makeup of the existing environment where the proposed action and alternative(s) would be located.”

⁵¹ FAA, 2015, Order 1050.1F, *Environmental Impacts: Policies and Procedures*, Exhibit 4-1, page 4-10.

The existing visual character of the GSA would be considered an airport setting. The Airport is adjacent to industrial and commercial land uses to the north that are occupied by large structures separated by open land. To the west, the Airport is adjacent to heavily vegetated areas and the Brier Creek Reservoir. To the east and south, the Airport is adjacent to the William B. Umstead State Park, which spans approximately 5,574 acres, is heavily vegetated, and is utilized for various recreational activities. Residential land uses are adjacent to the west of the DSA, including single family residential homes west of the Brier Creek Reservoir on Pleasant Grove Church Road and north of the Brier Creek Reservoir on Nelson Road east of Pleasant Grove Church Road.

3.13 Water Resources (including wetlands, floodplains, surface waters, and groundwater)

3.13.1 Regulatory Setting

Water resources are surface waters and groundwater that are vital to society; they are important in providing drinking water and in supporting recreation, transportation and commerce, industry, agriculture, and aquatic ecosystems. Resources including surface water (wetlands, streams, lakes etc.), groundwater, and floodplains, do not function as separate and isolated components of the watershed, but rather as a single, integrated natural system. Federal primary laws passed governing water resources include the Federal Water Pollution Control Act, Safe Drinking Water Act (SDWA), Fish and Wildlife Coordination Act of 1980, EO 11990, *Protection of Wetlands*, USDOT Order 5660.1A, *Preservation of the Nation's Wetlands*, and EO 11988, *Floodplain Management* and USDOT Order 5650.2, *Floodplain Management and Protection*.

3.13.2 Affected Environment

Pedestrian field surveys were conducted between July and October 2021 and again in August 2022 to verify the presence or absence of potential wetlands, streams, or other surface water features in the DSA. The following sections and tables summarize the water resources identified from the field surveys. See **Appendix H** for additional information, additional tables, and the detailed maps and locations of the water resources.

U.S. Army Corps of Engineers (USACE) Jurisdictional Determinations

Water resources identified within a 1,218-acre subset of the DSA (referred to as the Jurisdictional Determination [JD] Review Area) were reviewed by the U.S. Army Corps of Engineers (USACE) on August 25 and 26, 2022. The JD Review area was identified because not all areas of the DSA would be potentially impacted. Each wetland or other water resource potentially within either USEPA CWA or EO 11990 jurisdiction are summarized in this EA document and appendix. Field data sheets for each water resource feature were incorporated into the JD package submitted to USACE. The USACE issued a hybrid Preliminary Jurisdictional Determination (PJD)/Approved Jurisdictional Determination (AJD) for the JD Review Area on November 22, 2022 (Action ID No. SAW-2022-01559). The remaining portions of the DSA outside of the JD Review Area have not been verified by regulatory agencies. If required in the future, it is anticipated that these areas would also be covered under a similar hybrid PJD/AJD.

Wetlands

For regulatory purposes under the CWA, the term “wetlands” means areas that are inundated or saturated by surface or ground water 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. Wetlands generally include swamps, marshes, bogs, and similar areas. Areas covered with

water for such a short time that there is no effect on moist-soil vegetation are not considered wetlands, nor are the waters of streams, reservoirs, and deep lakes.

Potentially Jurisdictional Wetlands per Section 404

Fifty-one potentially jurisdictional wetlands consisting of 20.93 acres were identified within the DSA as provided in **Table 3-16**. An overall map of the locations of the wetlands is shown on **Exhibit 3-16**. However, the specific Map IDs and locations are found in Appendix H.

TABLE 3-16, POTENTIALLY JURISDICTIONAL WETLANDS WITHIN THE DSA

MAP ID	NORTH CAROLINA WETLAND ASSESSMENT METHOD CLASSIFICATION	WITHIN THE JD REVIEW AREA	AREA (ACRES)
W2	Nontidal Freshwater Marsh	Yes	0.01
W3	Floodplain Pool	Yes	< 0.01
W5	Nontidal Freshwater Marsh	Yes	0.01
W7	Headwater Forest	No	0.06
W8	Headwater Forest	Yes	0.04
W9	Headwater Forest	No	0.44
W10	Bottomland Hardwood Forest	No	0.12
W11	Headwater Forest	Yes	0.07
W12	Headwater Forest	Yes	0.11
W13	Headwater Forest	Yes	0.17
W14	Nontidal Freshwater Marsh	Yes	2.25
W15	Nontidal Freshwater Marsh	Yes	0.05
W16	Headwater Forest	Yes	0.07
W17	Nontidal Freshwater Marsh	Yes	0.01
W18	Nontidal Freshwater Marsh	Yes	0.02
W19	Nontidal Freshwater Marsh	Yes	0.07
W20	Nontidal Freshwater Marsh	Yes	0.02
W21	Nontidal Freshwater Marsh	Yes	0.15
W22	Nontidal Freshwater Marsh	Yes	0.08
W23	Nontidal Freshwater Marsh	Yes	0.03
W24	Nontidal Freshwater Marsh	Yes	0.04
W25	Nontidal Freshwater Marsh	Yes	0.17
W26	Headwater Forest	Yes	0.23
W27	Headwater Forest	Yes	0.31
W28	Nontidal Freshwater Marsh	Yes	0.23
W30	Nontidal Freshwater Marsh	Yes	0.01
W31	Headwater Forest	Yes	0.05
W32	Nontidal Freshwater Marsh	No	0.07
W33	Headwater Forest	No	0.32
W34	Bottomland Hardwood Forest	No	2.61
W35	Nontidal Freshwater Marsh	Yes	0.54
W36	Nontidal Freshwater Marsh	Yes	0.2
W37	Nontidal Freshwater Marsh	Yes	0.01

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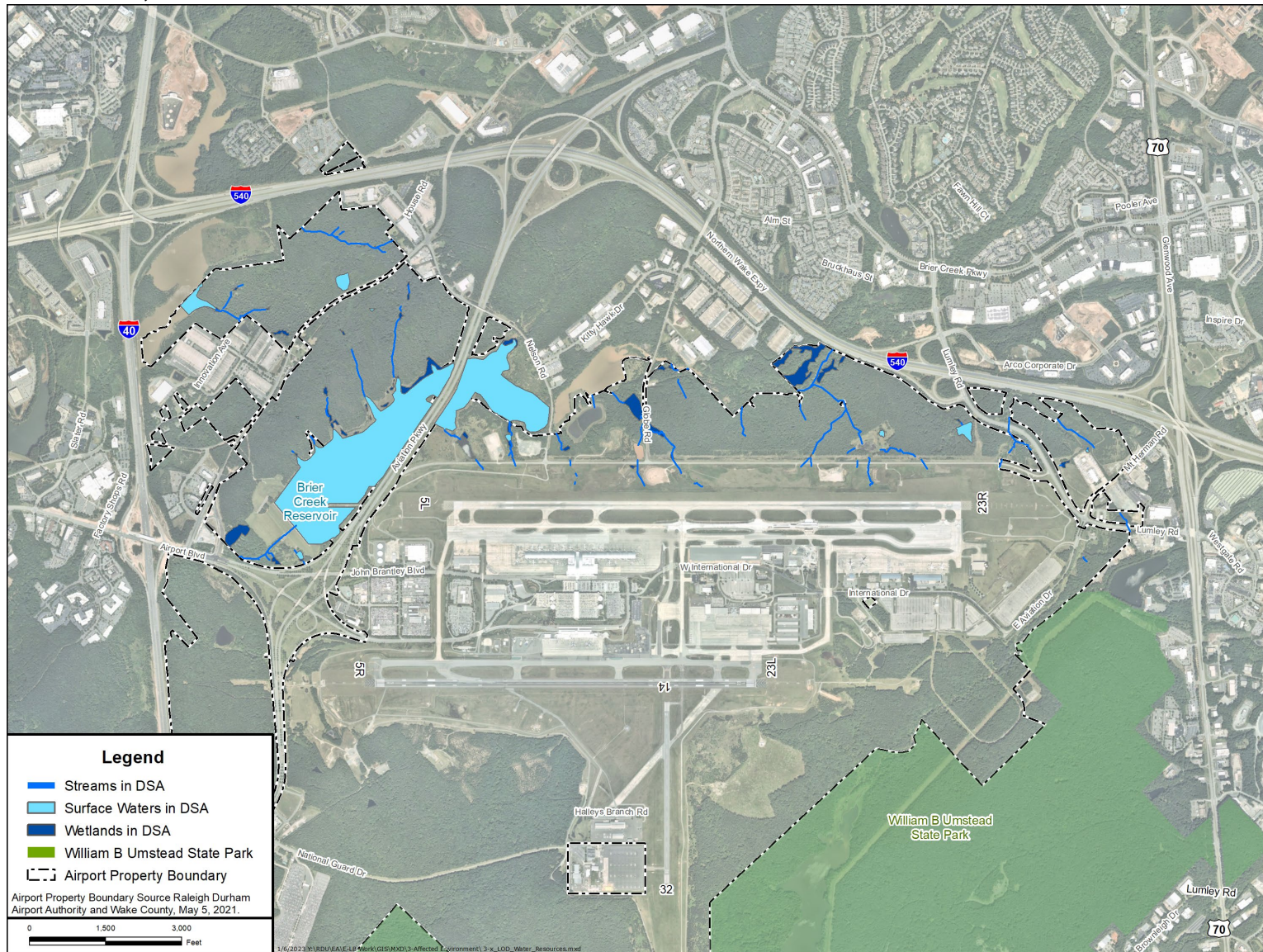
MAP ID	NORTH CAROLINA WETLAND ASSESSMENT METHOD CLASSIFICATION	WITHIN THE JD REVIEW AREA	AREA (ACRES)
W38	Headwater Forest	Yes	0.02
W39	Nontidal Freshwater Marsh	Yes	0.19
W40	Nontidal Freshwater Marsh	Yes	0.31
W41	Headwater Forest	Yes	0.2
W42	Nontidal Freshwater Marsh	Yes	0.12
W43	Riverine Swamp Forest	Yes	0.98
W44	Nontidal Freshwater Marsh	Yes	2.53
W45	Nontidal Freshwater Marsh	No	< 0.01
W46	Bottomland Hardwood Forest	No	0.24
W47	Bottomland Hardwood Forest	No	0.07
W48	Bottomland Hardwood Forest	No	0.02
W49	Headwater Forest	Yes	0.03
W50	Headwater Forest/Riverine Swamp Forest/Nontidal Freshwater Marsh	No	5.88
W51	Floodplain Pool	No	1.1
W52	Bottomland Hardwood Forest	No	0.22
W55	Headwater Forest	Yes	0.07
W57	Headwater Forest	Yes	0.26
W59	Headwater Forest	Yes	0.11
TOTAL			20.93

Note: There are no Wetland features W53, W56, or W58. Wetland features W1, W4, W6, W29, and W54 were removed from the JD Review Area during the JD site visit.

Source: Three Oaks Engineering, 2021

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EXHIBIT 3-16, OVERALL MAP OF WATER RESOURCES



Source: Three Oaks Engineering, 2023

Wetlands Protected Under EO 11990

In addition to the potentially jurisdictional wetland features covered under the CWA, there were three additional features not considered Section 404 jurisdictional features but are protected under federal EO 11990. The three features as provided in **Table 3-17** associated with this project are located in the JD Review Area and are stormwater/sediment basins that USACE deemed as already permitted features since they were present on as-built construction plans from previous Airport activities. However, at least portions of these features did meet all three wetland criteria and, therefore, are protected under the EO. The map of the locations of the wetlands is found in Appendix H.

TABLE 3-17, WETLANDS PROTECTED UNDER EXECUTIVE ORDER 11990

MAP ID	AREA (ACRES)
W60	0.10
W61	1.00
W62	1.53
TOTAL	2.63

Source: Three Oaks Engineering, 2021

Surface Open Waters (including streams)

Potentially Jurisdictional Streams

Thirty-eight potentially jurisdictional stream features with a total of 22,308 linear feet were identified within the DSA. The linear footage of each potentially jurisdictional streams and their locations within the DSA are provided in Appendix H.

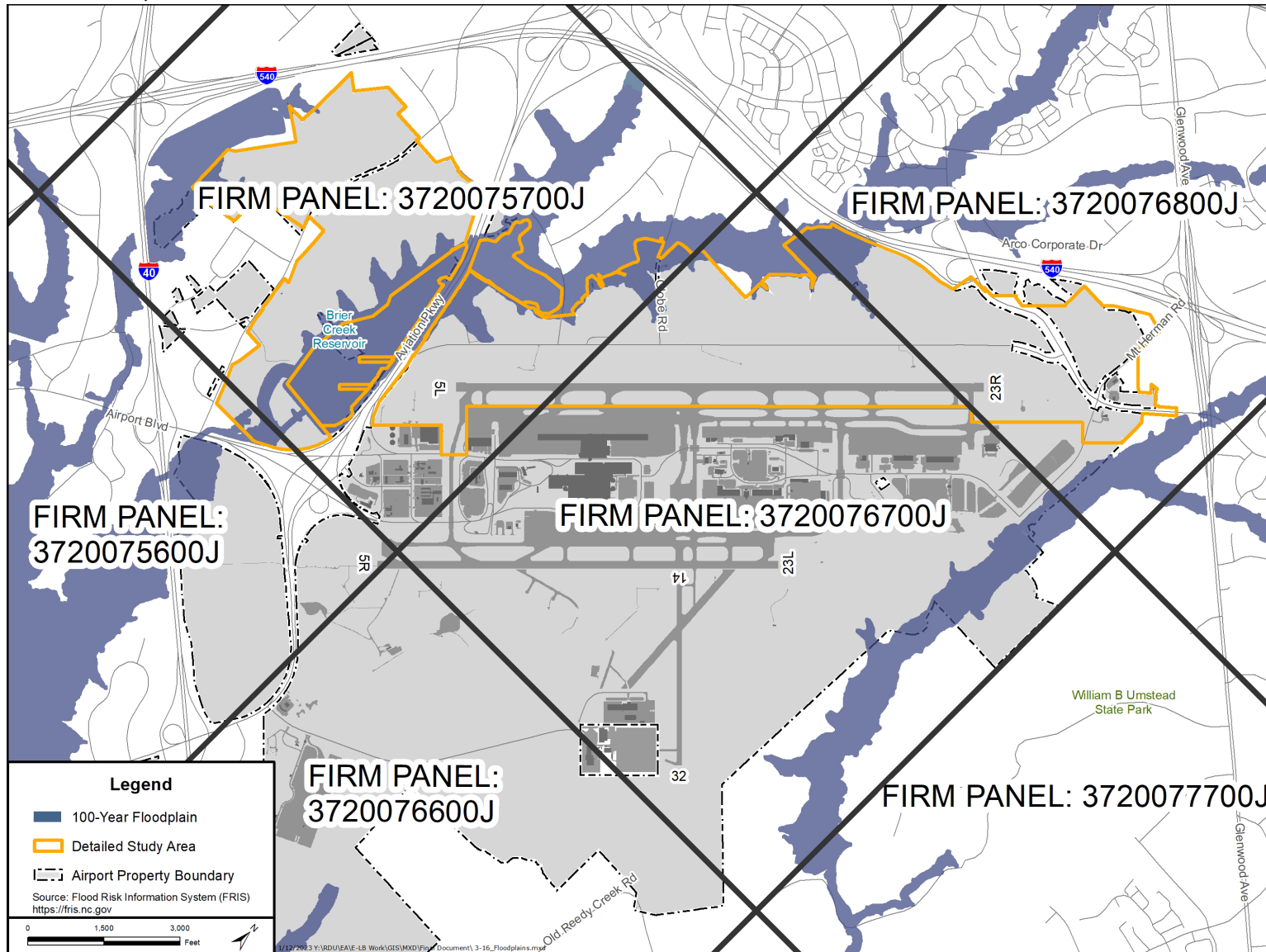
Non-Stream Surface Waters

Eleven non-stream surface waters (ponds, basins, or tributaries) consisting of 141.09 acres were identified within the DSA. Of those 11 features, six were determined to be potentially jurisdictional. The remaining five were located within the JD Review Area and determined to be non-Section 404 ponds constructed in uplands by USACE during their field verification site visit. These five features were excluded under the Approved JD for the project. The areas of each non-stream surface waters and their locations is found in Appendix H.

Floodplains

Floodplains are defined as the lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year (i.e., 100-year floodplain). Floodplains within the DSA are depicted on the FEMA Flood Insurance Rate Map Panels 3720075600J, 3720075700J, 3720076700J, and 3720076800J. The latest available information on the location of the floodplains within the DSA was obtained from Wake County and is shown on **Exhibit 3-17**. The summary acreage of the 100-year floodplains (AE and Floodway) in the DSA is provided in **Table 3-18**.

EXHIBIT 3-17, FLOODPLAINS



Source: FEMA Flood Insurance Rate Map Panels 2022.

TABLE 3-18, FEMA-REGULATED FLOODPLAINS WITHIN THE DSA

NAME	FLOODPLAIN AREA (ACRES)
Brier Creek	167.36
Little Brier Creek	53.06
Stirrup Iron Creek	4.12
Total	224.54

Source: FEMA Flood Insurance Rate Map Panels.

Groundwater

RDU is in the “Piedmont” physiographic province that covers the central portion of North Carolina, between the Blue Ridge province to the west and Coastal Plain to the east. The Piedmont region features rolling hills and low ridges with an elevation variation of a few hundred feet between hills and valleys. RDU falls within the Durham-Sanford subbasins of the Triassic Basins geological belt, which consists of sedimentary rock that was formed from mud, silt, sand, and gravel carried by streams from highlands into adjacent valleys.^{52,53} Specifically, the bedrock in the DSA is classified by the North Carolina Geological Survey (NCGS) as “Trcs/c”, which is sandstone with interbedded conglomerate rock.⁵⁴ Local groundwater resources in Wake County are predominantly fractured bedrock aquifers.⁵⁵

Nearly one quarter of Wake County residents, and the majority of unincorporated areas of Wake County, rely on groundwater wells for their water supply.^{56,57} The NCDEQ, Division of Water Resources manages a statewide monitoring well network to ensure that the State has an adequate water supply for its citizens.⁵⁸ Additionally, select wells considered “drought indicator wells” are closely monitored to identify areas experiencing drought conditions.⁵⁹ As of January 2023, a total of 38 counties in North Carolina were reported to experience drought conditions.⁶⁰ Neither Wake County nor Durham County are classified as experiencing drought conditions.

⁵² North Carolina Geological Survey, 1985, Geologic Map of North Carolina. Online: <https://ncdenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a8281cbd24b84239b29cd2ca798d4a10>. Accessed August 23, 2021.

⁵³ North Carolina Geological Survey. North Carolina Generalized Geologic Map Description. Online: https://files.nc.gov/ncdeq/Energy%20Mineral%20and%20Land%20Resources/Geological%20Survey/NC_Generalized_Geologic_Map_Description.pdf. Accessed August 23, 2021.

⁵⁴ North Carolina Geological Survey, 2004, Preliminary Bedrock Geologic Map of the Raleigh 30’ x 60’ Quadrangle, North Carolina. Online: https://files.nc.gov/ncdeq/Energy%20Mineral%20and%20Land%20Resources/Geological%20Survey/OFRs_Geological_Survey/NCGS_OFR_2004-02_Raleigh_100k_bedrock_geopdf.pdf. Accessed August 23, 2021.

⁵⁵ USGS, Wake County Groundwater Assessment: Home. Online: <https://www2.usgs.gov/water/southatlantic/nc/projects/wake-county-groundwater/study.php>. Accessed August 23, 2021.

⁵⁶ Wake County Department of Environmental Services, 2007, Wake County Groundwater Sustainability Stakeholder Committee Report. Online: https://s3.us-west-2.amazonaws.com/wakegov.com.if-us-west-2/prod/documents/2020-10/06%20L5%20-%20GWSustainabilityCommitteeReport_FinalApril07.pdf. Accessed August 23, 2021.

⁵⁷ USGS, Scientific Investigations Report 2010-5219: Fluctuations in Groundwater Levels Related to Regional and Local Withdrawals in the Fractured-Bedrock Groundwater System in Northern Wake County, North Carolina, March 2008-February 2009. Online: <https://pubs.usgs.gov/sir/2010/5219/pdf/sir2010-5219.pdf>. Accessed August 23, 2021.

⁵⁸ North Carolina Division of Water Resources Groundwater Resources Section Groundwater Management Branch, 2022 Annual Report. Online: https://www.ncwater.org/Publications/gwms/annual/fy2021-22_network_ann_report.pdf

⁵⁹ North Carolina Division of Water Resources , Drought Indicator Wells. Online: <https://www.ncwater.org/?page=345> Accessed January 13, 2023.

⁶⁰ North Carolina Drought Management Advisory Council, Current Conditions. Online: <https://www.ncdrought.org/> Accessed January 13, 2023.

There are no sole source aquifers in Wake County, as designated by USEPA.⁶¹ Based on a review of the City of Raleigh and Wake County online GIS “iMAPS” system, there is one well located within the DSA.⁶² The well is located northwest of Runway 5L/23R adjacent to Globe Road. This well is on Airport property and is not used by the public as a drinking water source. According to Wake County, groundwater in most of the community water system areas is “void of contaminants that would prevent or restrict its use as drinking water.” However, treatment is occasionally provided to comply with drinking water standards.⁶³

⁶¹ USEPA, Sole Source Aquifers. Online: <https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=9ebb047ba3ec41ada1877155fe31356b>. Accessed August 23, 2021.

⁶² City of Raleigh and Wake County, iMAPS. Online: <https://maps.raleighnc.gov/imaps/>. Accessed August 23, 2021.

⁶³ Wake County Department of Environmental Services, June 2003, Wake County Comprehensive Groundwater Investigation. Online: https://s3.us-west-2.amazonaws.com/wakegov.com.if-us-west-2/prod/documents/2020-10/06%20L5%20-%20WakeCountyCGIFinalReport_web.pdf. Accessed August 23, 2021.