1 Purpose and Need

1.1 Introduction

This Environmental Assessment (EA) analyzes the potential environmental effects of the Proposed Runway 5L/23R Replacement Project (Proposed Action) at the Raleigh-Durham International Airport (the Airport or RDU). The Airport property is located in Wake and Durham Counties, North Carolina. The Proposed Action includes relocating Runway 5L/23R approximately 537 feet northwest of existing Runway 5L/23R and, after construction is complete, converting the existing Runway 5L/23R to a taxiway. The project also includes use of fill material from Airport borrow sites, use of water from Brier Creek Reservoir, construction of drainage improvements, relocation of a portion of Lumley Road, utility relocations, demolition of four airport-owned buildings, relocation of aircraft navigational aids, acquisition of property, and removal and/or mitigation of obstacles in accordance with Federal Aviation Administration (FAA) safety standards. This EA has been prepared pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA), implementing NEPA regulations issued by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] Parts 1500-1508), and the Airport and Airway Improvement Act of 1982 (Public Law 97-248), as amended.

This EA will identify and assess the potential environmental impacts of the Proposed Action and its reasonable alternatives. Depending upon whether certain environmental thresholds of significance are exceeded, this EA may lead either to a Finding of No Significant Impact (FONSI) or the need to prepare an Environmental Impact Statement (EIS). The FAA is the lead federal agency ensuring compliance with NEPA for this Proposed Action; therefore, this EA is consistent with FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* (including the 1050.1F Desk Reference), and FAA Order 5050.4B, *NEPA Implementing Instructions for Airport Actions*. The FAA invited the United States Army Corps of Engineers (USACE) to participate as a cooperating agency as described under 40 CFR § 1501.8 and the USACE has accepted. Therefore, this EA has also been prepared pursuant to the requirements in USACE's NEPA regulations (33 CFR Part 230). The USACE will also evaluate the project and decide whether to issue, conditionally issue, or deny the proposed work pursuant to applicable procedures of Section 404 of the Clean Water Act (33 United States Code [U.S.C.] 1344). This EA provides concise conclusions and relies on data, survey results, inventories, and other information that support these conclusions. The EA is organized in the following manner:

Chapter 1 – Purpose and Need: This chapter describes the underlying purpose and need for the Proposed Action. It presents the problem being addressed and describes what is trying to be achieved with the Proposed Action. It also lists the federal actions that FAA and USACE must take in order for the Proposed Action to proceed.

Chapter 2 – Alternatives: This chapter provides a comparative analysis of the No Action Alternative, the Proposed Action, and other reasonable alternatives capable of fulfilling the purpose and need to sharply define the issues and provide a clear basis for choice among options by the approving officials. This chapter provides an overview of the alternatives considered, the process used to screen and evaluate reasonable alternatives, the reasons why alternatives were dismissed, and identification of the alternatives carried forward for detailed environmental evaluation.

Chapter 3 – Affected Environment: This chapter describes the existing environmental conditions within the project Study Area(s), including the regulatory setting and description of each environmental resource that may be affected by the Proposed Action.

Chapter 4 – Environmental Consequences and Mitigation Measures: This chapter forms the analytical basis for comparing the potential environmental impacts of the No Action Alternative, the Proposed Action, and other alternatives retained for detailed analysis. This chapter also describes the special conditions that could be required by the FAA to mitigate or minimize any potential impacts.

Chapter 5 – Coordination and Public Involvement: This chapter discusses coordination and public involvement associated with this EA process. The coordination and public involvement conducted for this EA complies with public involvement requirements and policies including NEPA, CEQ Regulations for Implementing the Procedural Provisions of NEPA (40 CFR §§ 1503.1(a) and 1506.6), FAA Order 1050.1F, FAA Order 5050.4B, 33 CFR Part 230, and Section 404 of the Clean Water Act (33 U.S.C. 1344).

Chapter 6 – List of Preparers: This chapter identifies the individuals that were primarily responsible for preparing the EA or associated environmental studies.

Appendices: The appendices contain information about the agency and public involvement conducted for the EA (**Appendix A**). Appendices also contain a variety of technical reports that support the EA analysis.

1.2 Background Information

The Raleigh-Durham Airport Authority (Airport Authority) is a public authority created, established, and empowered by the North Carolina General Assembly pursuant to Chapter 168 of the Public-Local Laws of 1939, as amended. The Airport Authority is legislatively vested with the power and mandate to control, lease, maintain, improve, operate, and regulate RDU, with complete authority over the Airport.

RDU has three existing runways configured as a set of two parallel runways (Runways 5L/23R and 5R/23L) and one cross wind runway (Runway 14/32). Runway 5L/23R is 10,000 feet long and 150 feet wide and is the primary runway at RDU. Runway 5R/23L is 7,500 feet long and 150 feet wide, and Runway 14/32 is 3,570 feet long and 100 feet wide.

Vision 2040 Master Plan and Initiation of an EIS

In 2017, the Airport Authority prepared the Airport's Vision 2040 Master Plan (Master Plan). The Master Plan identified a number of deficiencies (needs) that exist at RDU and identified a number of projects that would be needed to accommodate future aviation demand throughout the planning period (through 2040) that would be responsive to the needs of the communities served by the Airport, maximize revenue-generating opportunities while effectively managing land uses and development, and optimize Airport infrastructure and resources in an operationally, financially, and environmentally sustainable manner.

Following the completion of the Master Plan, the Airport Authority submitted an Airport Layout Plan (ALP) to the FAA. The ALP depicted potential future development, including the Runway 5L/23R replacement runway and future land use at RDU. The FAA conditionally approved the ALP in November 2017. The condition requires the Airport Authority to obtain FAA environmental approval for the proposed projects depicted on the ALP over which the FAA has regulatory authority. The next step toward implementing the development projects depicted on the ALP was to conduct an environmental review as required by NEPA. In 2018, the Airport Authority started the process for environment review

for select projects depicted on the ALP.[1] The FAA initially considered preparing an EIS for the implementation of these select projects. The FAA reviewed the proposed project elements and determined that, due to Section 163 of the FAA Reauthorization Act of 2018, it did not have regulatory authority over some projects including the proposed Park Economy 3 expansion and proposed Consolidated Rental Car Facility (CONRAC).[2] The FAA also agreed that the proposed Federal Inspection Station expansion in Terminal 2 had independent utility and could be reviewed in a separate environmental document. Therefore, these projects are not evaluated as part of the Proposed Action but are included in Chapter 4 Section 4.14, Cumulative Impacts.

COVID-19 Impacts on Future Development

In early 2020, the COVID-19 public health emergency began and severely impacted the aviation industry and RDU. As a result, the Airport Authority reviewed the timing of all the various projects within the Master Plan and those identified on the ALP. The Airport Authority determined several of the select projects, including any potential terminal expansion, extension of Runway 5L/23R to an ultimate length of 11,500 feet, and extension of Runway 5R/23L needed additional planning efforts, should be delayed, and were not ready for environmental review. The FAA concurred that these projects need further development and planning before they are ready for environmental review. When the Airport Authority decides to move forward with any of these future development projects, additional coordination with FAA and potential NEPA documentation would be required.

Decision to Prepare an Environmental Assessment

In 2021, the FAA determined that an EA, rather than an EIS in the first instance, could be prepared for the proposed Runway 5L/23R Replacement Project in order to determine whether an EIS is necessary on condition that 1) the Proposed Action does not include construction activities near the William B. Umstead State Park, a historical and 4(f) resource, 2) the FAA has the discretion to determine the appropriate level of public outreach, and 3) the FAA remains actively involved throughout the development of the EA consistent with the CEQ's Regulations for Implementing NEPA. The Airport Authority agreed and began the EA process.

Preparation of an Aviation Activity Forecast

After initiating the EA process, the Airport Authority prepared a forecast of aviation activity for RDU. Forecasts of aviation activity were developed as part of the EA process to provide the information required to quantify the potential environmental impacts based on future activity levels. The aviation activity forecast included annual enplaned passengers and aircraft operations through 2033. Domestic enplaned passengers are forecast to reach approximately 10 million in 2033. International enplaned passengers are forecast to reach approximately 467,100 in 2033. **Table 1-1** presents the passenger forecast through 2033.

[1] Not all potential projects listed on the ALP were ready for implementation. The projects initially considered for environmental review included the relocation and extension of Runway 5L/23R, relocation of FAA navigational aids, conversion of the existing Runway 5L/23R to a full length parallel and connecting taxiway after the replacement runway was completed, construction of associated drainage improvements, relocation of a portion of Lumley Road out of the replacement Runway 5L/23R's safety areas, construction of a replacement airport perimeter road, extension of Runway 5R/23L (proposed to be 9,000 feet long by 150 feet wide), expansion of Park Economy 3, the construction of a Consolidated Rental Car Facility (CONRAC) and providing additional gates at Terminal 1 and Terminal 2.

[2] Because the FAA does not have regulatory authority, the FAA does not have an action subject to the NEPA. The Airport Authority must still comply with other environmental laws and regulations as applicable for these projects.

TABLE 1-1, ENPLANED PASSENGER FORECAST

YEAR	DOMESTIC	INTERNATIONAL	TOTAL
2019	6,869,849	253,585	**7,123,434**
2020	2,397,555	38,481	**2,436,036**
2021	4,118,021	78,868	**4,196,889**
2022	6,174,673	216,806	**6,391,479**
2023	6,893,262	252,417	**7,145,679**
2024	7,575,700	277,400	**7,853,100**
2025	8,046,200	294,600	**8,340,800**
2026	8,298,000	303,800	**8,601,800**
2027	8,552,100	313,100	**8,865,200**
2028	8,808,800	322,500	**9,131,300**
2029	8,991,144	417,856	**9,409,000**
2030	9,251,600	430,000	**9,681,600**
2031	9,514,700	442,200	**9,956,900**
2032	9,780,800	454,600	**10,235,400**
2033	10,050,100	467,100	**10,517,200**

Note: Forecast based on calendar year.
Source: Raleigh-Durham Airport Authority, Raleigh-Durham International Airport: Activity Statistics. Landrum & Brown Analysis. See also Appendix B.

Total aircraft operations include passenger (both domestic and international) operations, freighter, air taxi and GA, and military aircraft operations. **Table 1-2** presents the aircraft operations forecast through 2033. Total aircraft operations are projected to increase to 287,850 in 2033.

TABLE 1-2, AIRCRAFT ACTIVITY FORECAST

YEAR	DOMESTIC	INTERNATIONAL	TOTAL	FREIGHTER	AIR TAXI / GENERAL AVIATION	MILITARY	GRAND TOTAL
2019	139,632	4,466	**144,098**	6,110	68,837	2,581	**221,626**
2020	65,278	1,038	**66,316**	6,362	54,742	2,990	**130,410**
2021	101,296	2,010	**103,306**	6,430	61,790	2,990	**174,516**
2022	123,200	3,580	**126,780**	6,660	63,120	2,990	**199,550**
2023	137,260	4,120	**141,380**	6,890	64,450	2,990	**215,710**
2024	149,280	4,640	**153,920**	7,120	65,780	2,990	**229,810**
2025	157,720	4,980	**162,700**	7,350	67,110	2,990	**240,150**
2026	161,800	5,140	**166,940**	7,580	68,440	2,990	**245,950**
2027	165,880	5,320	**171,200**	7,810	69,770	2,990	**251,770**
2028	169,940	5,540	**175,480**	8,040	71,100	2,990	**257,610**
2029	172,880	6,680	**179,560**	8,260	72,430	2,990	**263,240**
2030	177,300	6,840	**184,140**	8,490	73,760	2,990	**269,380**
2031	181,720	7,000	**188,720**	8,720	75,090	2,990	**275,520**
2032	186,160	7,140	**193,300**	8,940	76,420	2,990	**281,650**
2033	190,640	7,300	**197,940**	9,170	77,750	2,990	**287,850**

Note: Forecast based on calendar year.
Sources: Raleigh-Durham Airport Authority, Raleigh-Durham International Airport: Activity Statistics. Landrum & Brown Analysis. See also Appendix B.

The FAA publishes its own forecast annually for each United States (U.S.) airport, including RDU. The Terminal Area Forecast (TAF) is "prepared to assist the FAA in meeting its planning, budgeting, and staffing requirements. In addition, state aviation authorities and other aviation planners use the TAF as a basis for planning airport improvements."[3] The EA forecast is consistent with the most recently published TAF in both the five-year forecast period and the ten-year forecast period.[4] See **Appendix B** for the detailed aviation activity forecast, comparison to the TAF, and FAA's approval of the forecast.

[3] Federal Aviation Administration, Terminal Area Forecast Summary: Fiscal Years 2020-2045, May 2021.
[4] The FAA Terminal Area Forecast published in 2021 was the most recently published TAF at the time that the forecast for RDU EA was prepared.

Runway Length Analysis and Critical Aircraft for RDU

In addition to preparing the aviation activity forecast, the Airport Authority also conducted a runway length analysis to confirm the length needed for a runway to be the primary runway at RDU. In order to determine runway length needed at an airport, a critical aircraft needs to be identified. The critical aircraft is the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the airport.[5] Alaska Airlines currently operates a Boeing 737-900 to Seattle, Washington (SEA). This aircraft was considered the critical aircraft for RDU. The runway length analysis determined a runway takeoff length of between 10,000 feet to 12,300 feet was needed to act as the primary runway at RDU. See Appendix B for the runway length analysis and identification of the critical aircraft.

The next step in the process was to address obstruction issues and to make sure the primary runway would comply with Runway Safety Area (RSA), Object Free Area (OFA), and Runway Protection Zone (RPZ) criteria. The analysis reviewed potential declared distances which are the maximum usable lengths of a runway that are declared available to meet performance requirements for aircraft operating on a runway. The declared distances are Takeoff Run Available (TORA),[6] Takeoff Distance Available (TODA),[7] Landing Distance Available (LDA),[8] and Accelerate Stop Distance Available (ASDA).[9] Declared distances can be used to obtain a full RSA and/or OFA length. A displaced threshold is a threshold that is located at a point on the runway other than the designated end of the physical runway pavement. A displaced threshold is applied to arriving aircraft and reduces the LDA. The physical runway end can be used for departing aircraft operation, as a displaced threshold does not affect the TORA, TODA, or ASDA.

The existing Runway 5L/23R has a 10,000-foot-long TORA, TODA, LDA, and ASDA. Due to site constraints to both the north and south, the proposed replacement runway would utilize displaced landing thresholds on each runway end to meet FAA safety area standards. Therefore, additional physical pavement length is needed beyond 10,000 feet for the replacement runway to provide similar operational lengths available in the existing Runway 5L/23R.

In order to provide landing distance closest to the 10,000 feet in length of the existing runway and meet FAA safety area standards, the replacement runway would require a 10,639-foot-long physical runway pavement as shown on **Exhibit 1-1**. While there would be displaced thresholds on both ends of the runway, this configuration would eliminate encroachments to the Runway 23R end RPZ but not to the Runway 5L end.[10] However, the encroachment to the Runway 5L end would not increase beyond what it is for the existing runway.

5 Per FAA AC 150/5000-17, *Critical Aircraft and Regular Use Determination*, regular use is 500 annual operations, including both itinerant and local operations but excluding touch-and-go operations.

6 Takeoff Run Available (TORA) is the runway length declared available and suitable for the ground run of an aircraft taking off.

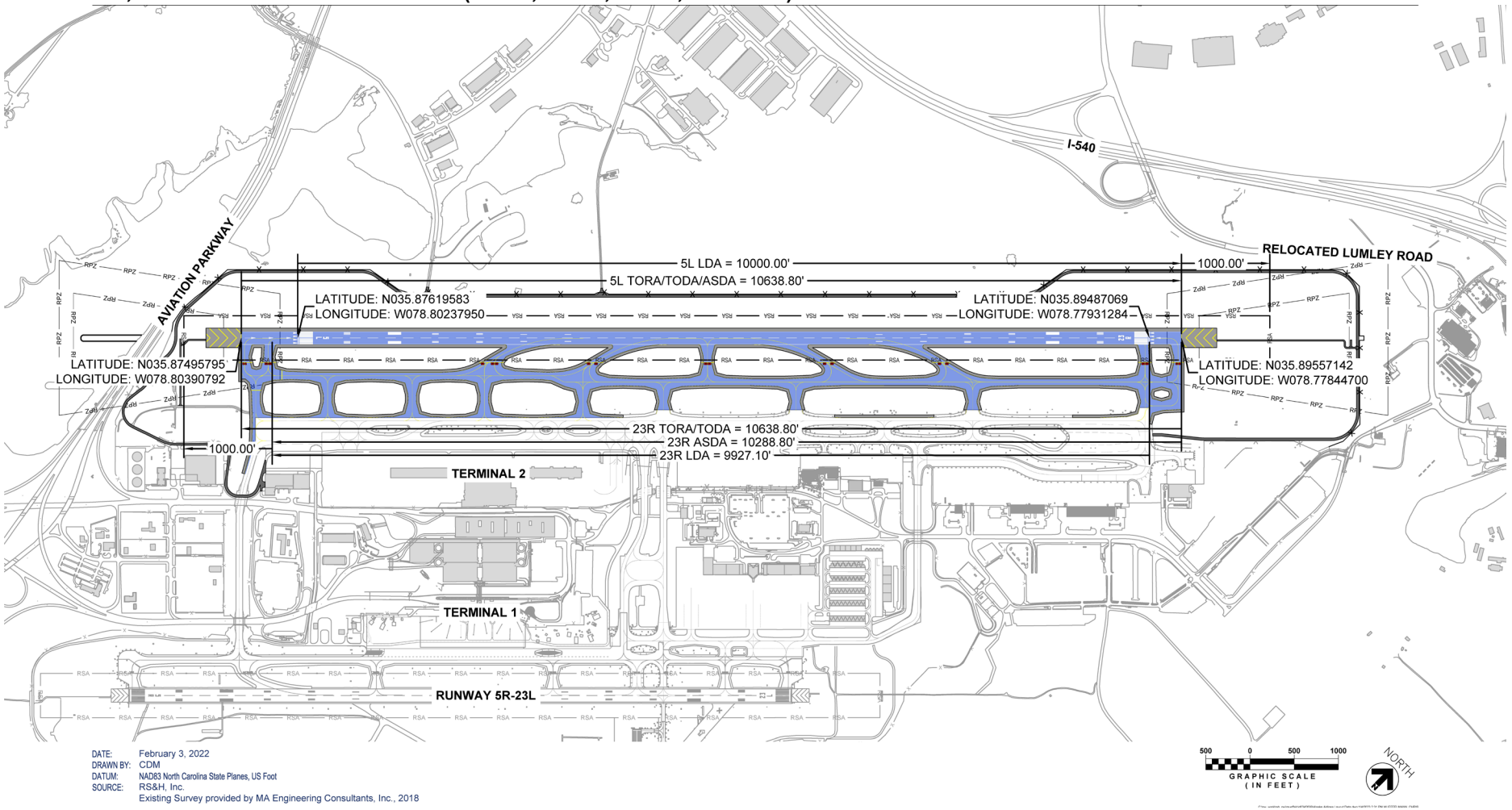
7 Takeoff Distance Available (TODA) is the TORA plus the length of any remaining runway or clearway beyond the far end of the TORA. The full length of TODA may need to be reduced because of obstacles in the departure area.

8 Landing Distance Available (LDA) is the runway length declared available and suitable for landing an aircraft.

9 Accelerate Stop Distance Available (ASDA) is the runway plus stopway length declared available and suitable for the acceleration and deceleration of an aircraft aborting a takeoff

10 RS&H, Runway 5L-23R Replacement Program Runway Length Design Assessment, October 13, 2021.

EXHIBIT 1-1, PROPOSED RUNWAY LENGTH (TORA, TODA, ASDA, AND LDA)



Source: Airport Authority and RS&H, 2021

Once the replacement runway length of 10,639 feet was identified, the FAA requested that the Airport Authority work with Alaska Airlines to conduct a runway performance and obstacle analysis because Alaska Airlines operates the critical aircraft for runway length for Runway 5L/23R.[11] The FAA requested that Alaska Airlines conduct a performance engineering analysis to make sure the proposed runway replacement length meets FAA criteria in FAA Advisory Circular (AC) 150/5325-4B, *Runway Length Requirements for Airport Design*.

Alaska Airlines confirmed the proposed runway length meets FAA criteria. In addition, the 10,639 feet of total pavement length would provide Alaska Airlines the potential to increase payload weights on the departing flights. Currently, Alaska Airlines must reduce the total allowable payload on its flights from RDU to SEA. This means the aircraft cannot takeoff fully loaded because of the existing runway length. With the 10,639 feet of total pavement length, its existing flights could operate more efficiently, filling more seats and adding more cargo. While flights from RDU to SEA could have up to 16 addition people on board, this would not induce a change in the number or type of aircraft operations at RDU. These flights are already operating with empty seats. Passenger data from the Department of Transportation indicate passengers currently unable to board Alaska Airlines flights connect on other flights to SEA. The potential increase in passengers on the Alaska Airlines flight to SEA would represent a shifting of passengers from other flights connecting service to SEA not an overall increase. See Appendix B for the Alaska Airlines' response to FAA.

1.3 Description of the Proposed Action

The elements of the Proposed Action evaluated in this EA are described in the following sections and shown on **Exhibit 1-2**.

Relocate Runway 5L/23R northwest of the existing runway

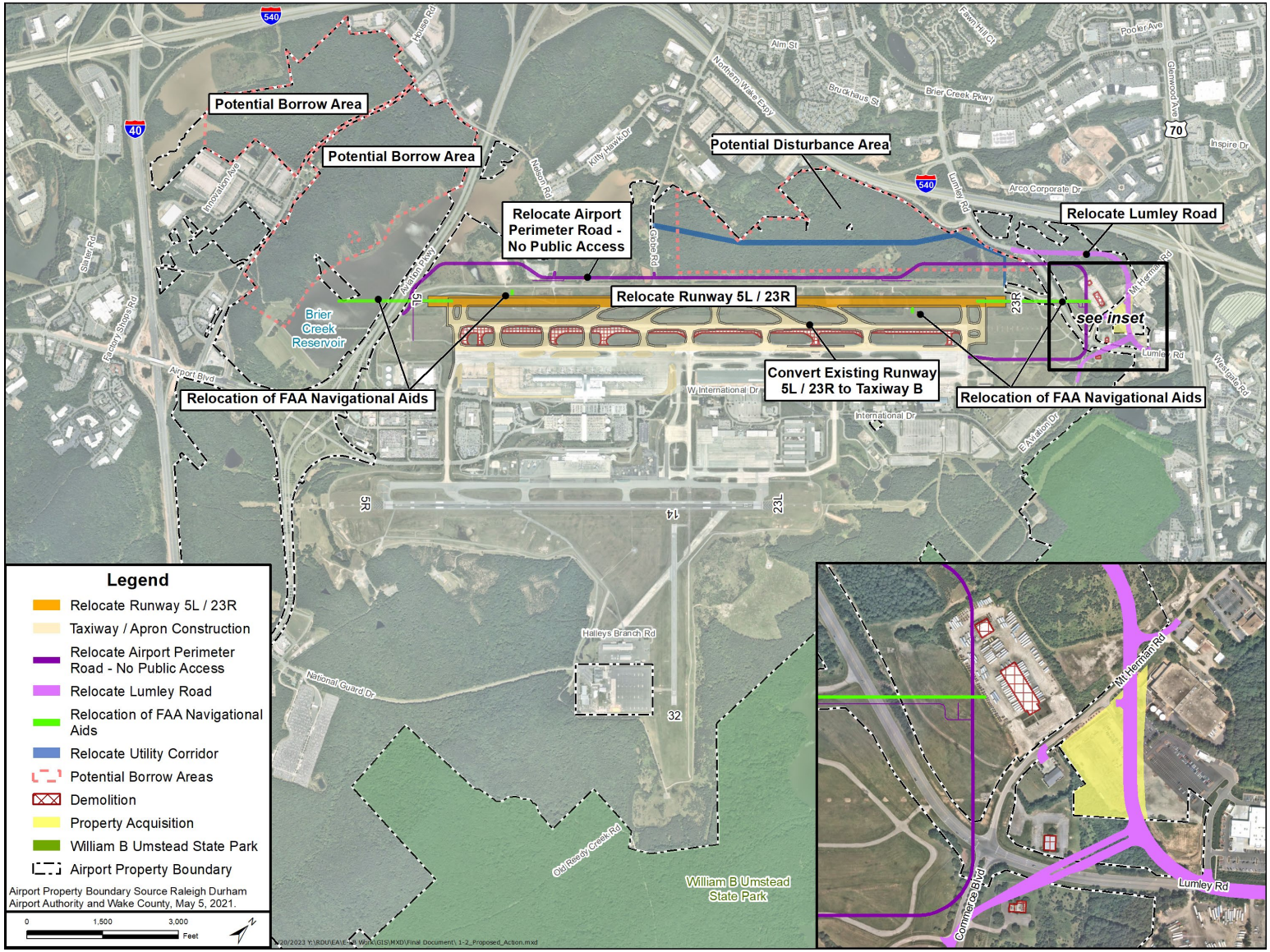
This element proposes to relocate the existing Runway 5L/23R approximately 537 feet to the northwest at the location depicted on the conditionally approved ALP with a 10,639-foot-long physical runway pavement. The Proposed Runway 5L would have 10,000 feet for LDA and 10,639 feet for the ASDA, TORA, and TODA. The Proposed Runway 23R would have 9,927 feet for LDA, 10,289 feet for the ASDA, and 10,639 feet for the TORA and TODA.

Convert the existing Runway 5L/23R to a taxiway and construct associated and connecting taxiways to the relocated Runway 5L/23R

This element proposes to convert the existing Runway 5L/23R to a full-length parallel and connecting taxiway, after the replacement runway is completed. Therefore, there would be the same number of runways after the project as before the project. The proposed taxiway will be designed according to the criteria in FAA AC 150/5300-13B, *Airport Design*.

[11] The B737-900ERW aircraft traveling to Seattle, Washington (SEA) is the critical aircraft for RDU runway length per FAA Advisory Circular (AC) 150/5000-17, *Critical Aircraft and Regular Use Determination.*

EXHIBIT 1-2, PROPOSED ACTION



Source: Airport Authority and Landrum & Brown, 2023

Place up to five million cubic yards of fill for the relocated runway

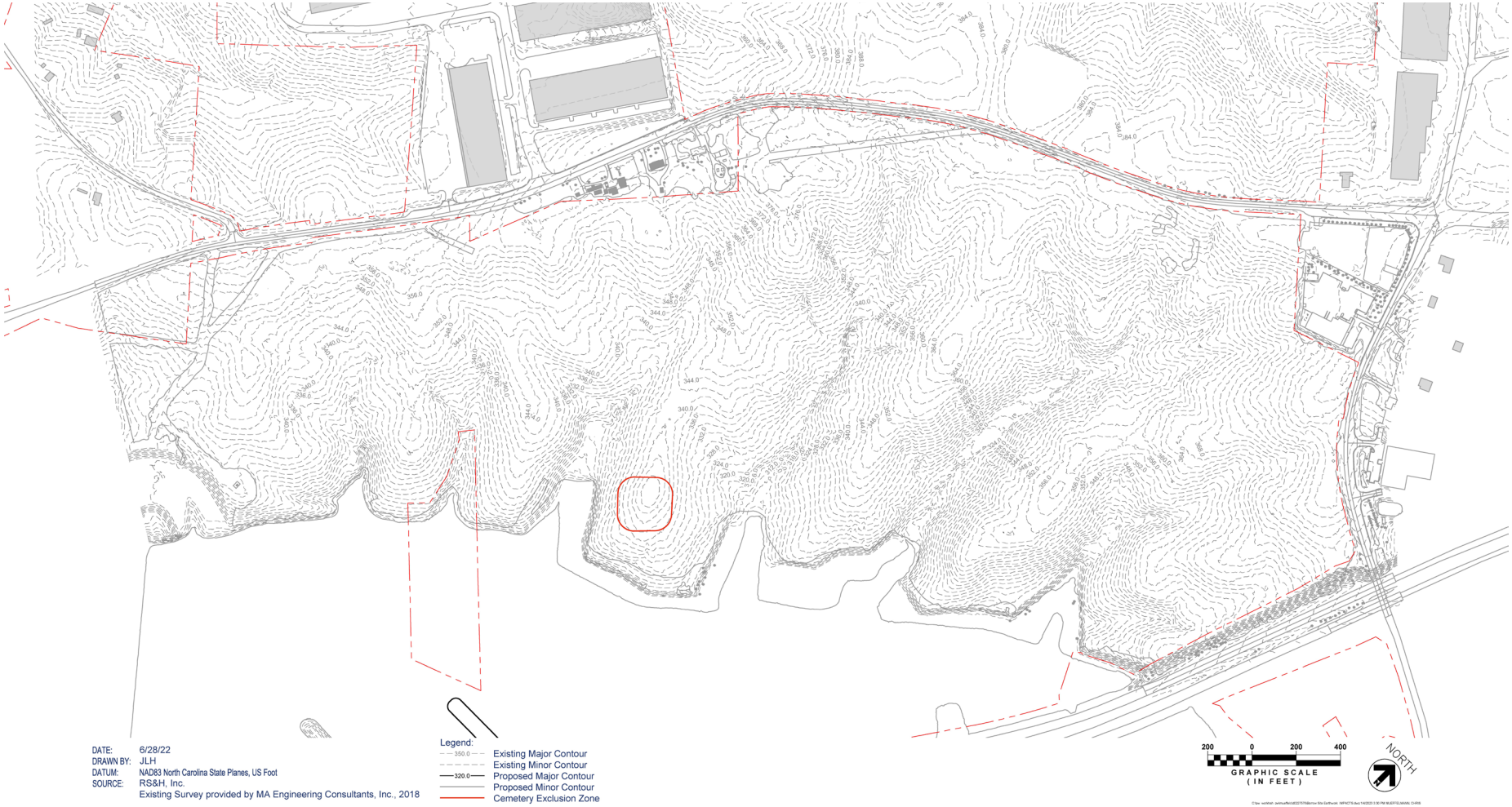
Due to the topography of the site for the relocated runway, fill material would be needed to level the area of the relocated runway prior to construction. The Airport Authority has identified two potential borrow sites to obtain the fill material on existing Airport property. These proposed borrow sites are located south and west of the airfield near Brier Creek Reservoir (see Exhibit 1-2). The borrow sites are located both east and west of Pleasant Grove Church Road. These borrow sites are not adjacent to William B. Umstead State Park.

In order to get the fill material, the proposed borrow sites would be cleared of vegetation and trees. The Airport Authority would leave 100 feet of the existing trees and vegetation in place as a buffer for residential homes west of the Brier Creek Reservoir on Pleasant Grove Church Road.

The existing contours at the borrow site located east of Pleasant Grove Church Road are shown on **Exhibit 1-3**. A contour line is a line drawn on a topographic map to indicate ground elevation. A contour interval is the vertical distance or difference in elevation between the contour lines. The proposed contours at the borrow site located east of Pleasant Grove Church Road are shown on **Exhibit 1-4**. Cross sections of the proposed excavation at the borrow site located east of Pleasant Grove Church Road are shown on **Exhibit 1-5**. Fill dirt would be excavated at the borrow site located east of Pleasant Grove Church Road to the approximate depths as shown on **Exhibit 1-6**. The excavation would not exceed a four-to-one slope. This means that for every four feet horizontally there is a one-foot vertical change. Blasting would occur in this area to break up the rock and dirt material, however, it is anticipated during daytime hours. After the fill material is excavated, the area would be graded and planted with appropriate ground cover vegetation approved by the State to prevent erosion.

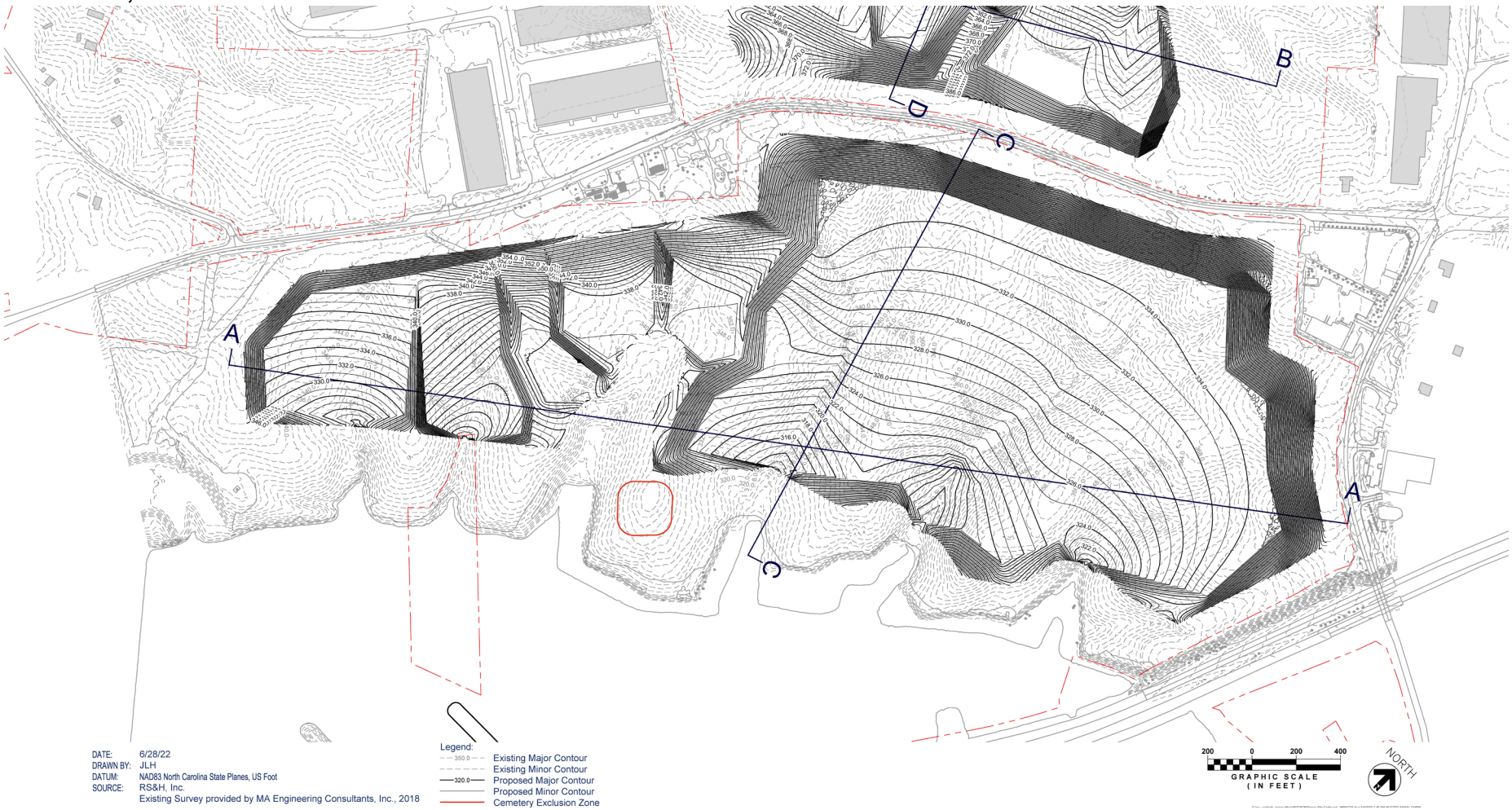
The existing contours at the borrow site located west of Pleasant Grove Church Road are shown on **Exhibit 1-7**. The proposed contours at the borrow site located west of Pleasant Grove Church Road are shown on **Exhibit 1-8**. Cross sections of the proposed excavation at the borrow site located west of Pleasant Grove Church Road are shown on **Exhibit 1-9**. Fill dirt would be excavated at the borrow site located west of Pleasant Grove Church Road to the approximate depths as shown on **Exhibit 1-10**. The excavation would not exceed a four to one slope. Blasting would occur in this area to break up the rock and dirt material, however, it is anticipated during daytime hours. After the fill material is excavated, the area would be graded and planted with appropriate ground cover vegetation approved by the State to prevent erosion.

EXHIBIT 1-3, EXISTING CONTOURS BORROW SITE EAST OF PLEASANT GROVE CHURCH ROAD



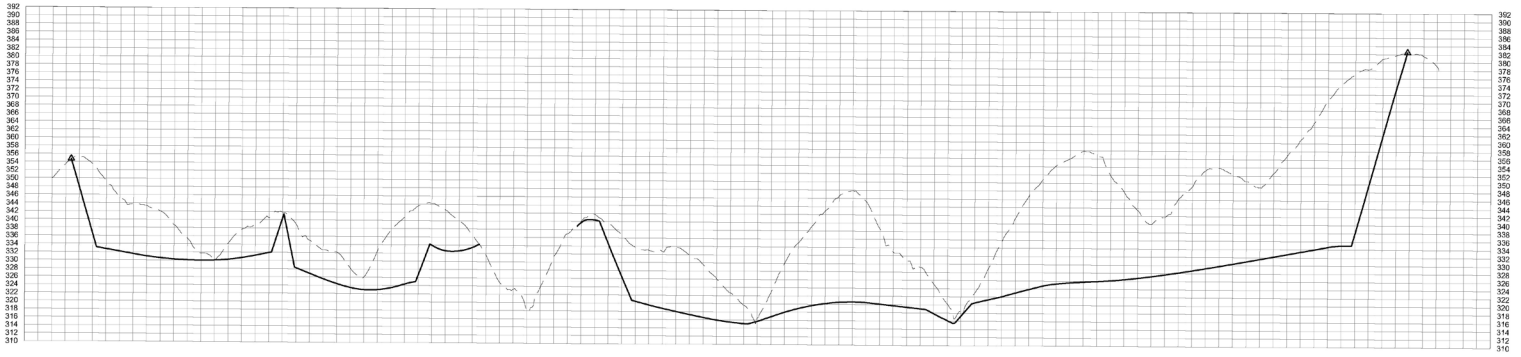
Note: The solid red line indicates a cemetery. See Chapter 4 Section 4.7 for additional information.
Source: Airport Authority and RS&H, 2023.

EXHIBIT 1-4, PROPOSED CONTOURS BORROW SITE EAST OF PLEASANT GROVE CHURCH ROAD

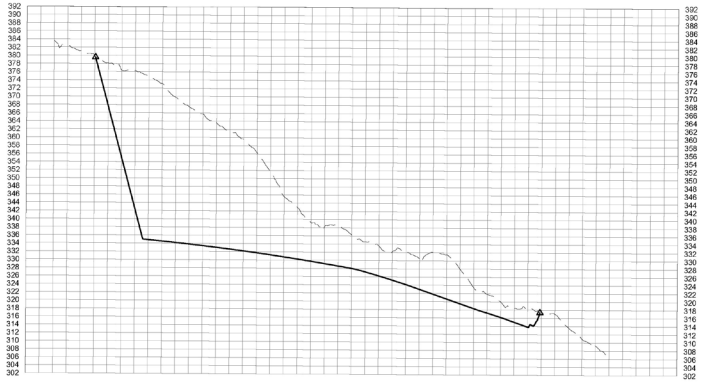


Note: The solid red line indicates a cemetery. See Chapter 4 Section 4.7 for additional information.
Source: Airport Authority and RS&H, 2023.

EXHIBIT 1-5, PROPOSED CROSS SECTION BORROW SITE EAST OF PLEASANT GROVE CHURCH ROAD



BORROW SITE 1A - SECTION A-A PROFILE



BORROW SITE 1A - SECTION C-C PROFILE

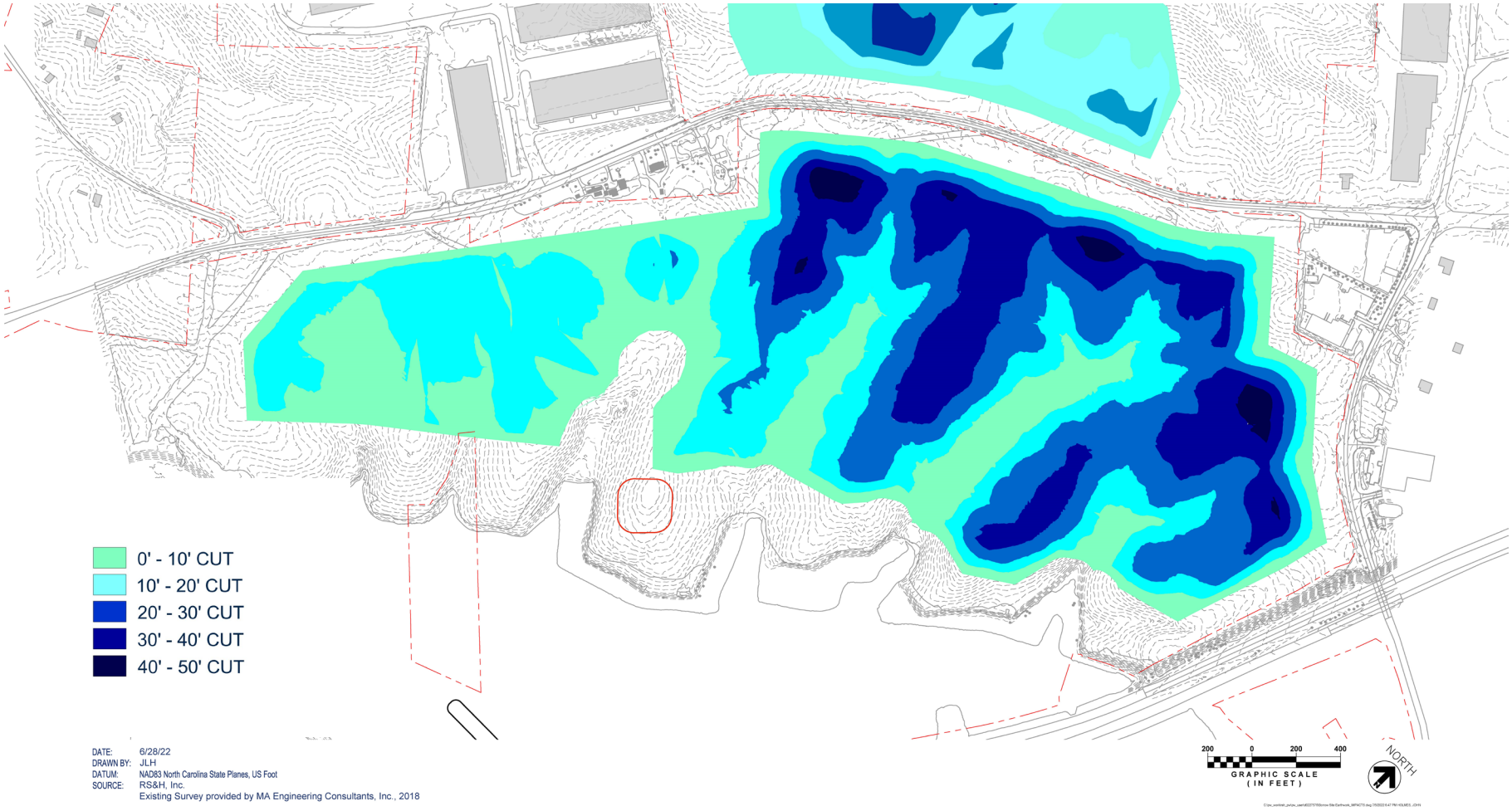
DATE: 6/28/22
DRAWN BY: JLH
DATUM: NAD83 North Carolina State Planes, US Foot
SOURCE: RS&H, Inc.
Existing Survey provided by MA Engineering Consultants, Inc., 2018

200 0 200 400
GRAPHIC SCALE
(IN FEET)

NORTH

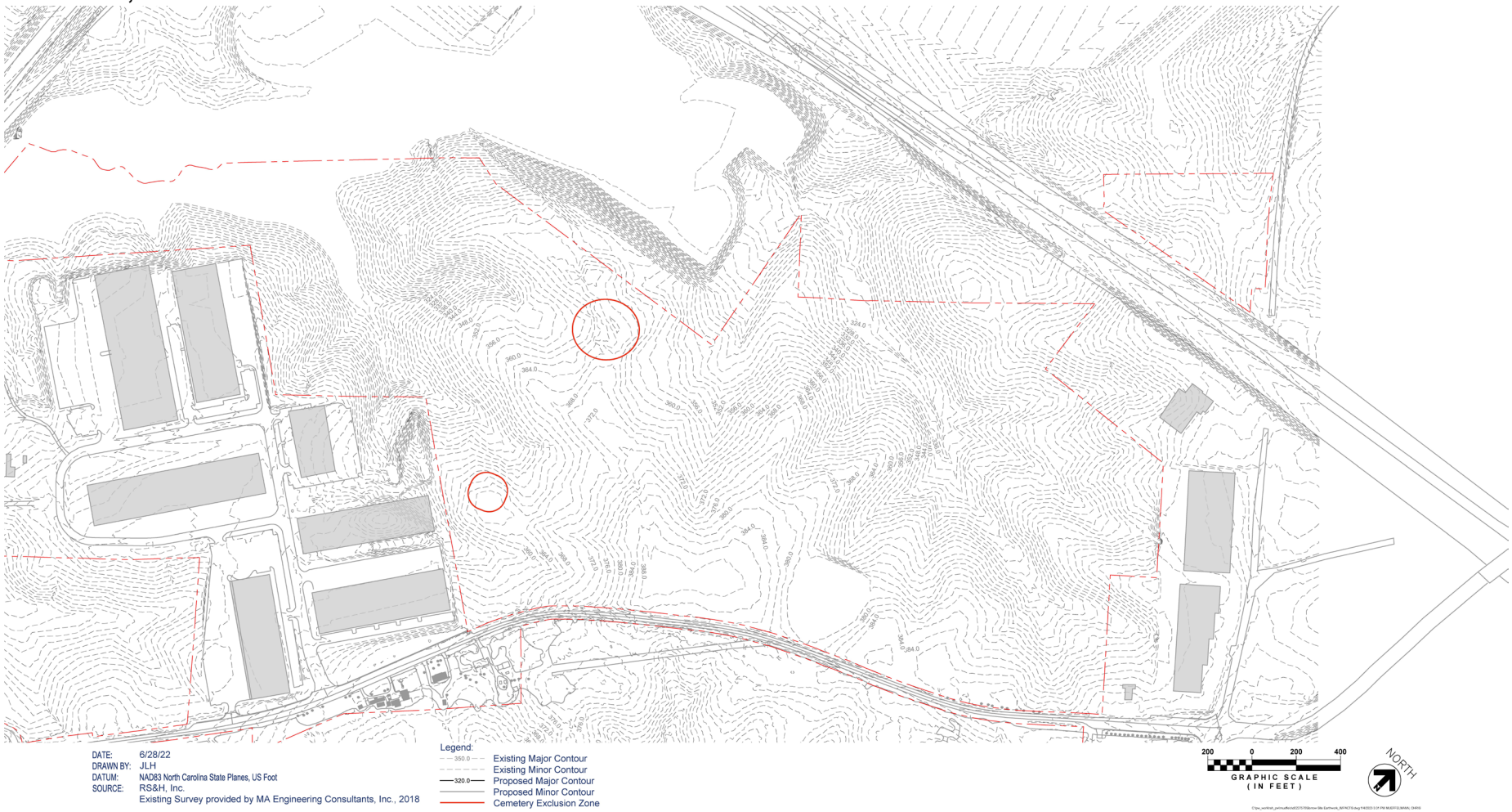
Source: Airport Authority and RS&H, 2023.

EXHIBIT 1-6, PROPOSED DEPTH OF CUT BORROW SITE EAST OF PLEASANT GROVE CHURCH ROAD



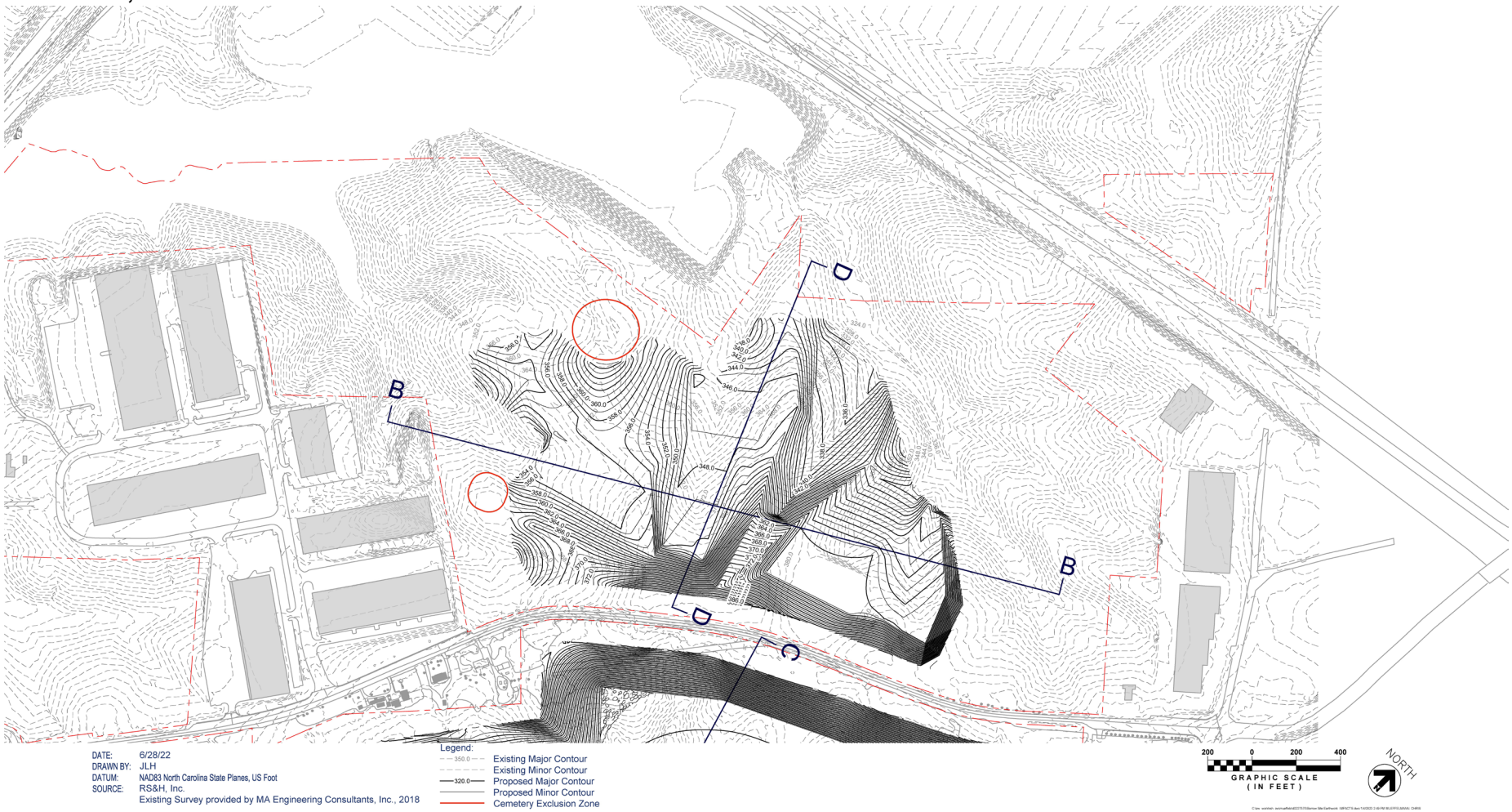
Note: The solid red line indicates a cemetery. See Chapter 4 Section 4.7 for additional information.
Source: Airport Authority and RS&H, 2023.

EXHIBIT 1-7, EXISTING CONTOURS BORROW SITE WEST OF PLEASANT GROVE CHURCH ROAD



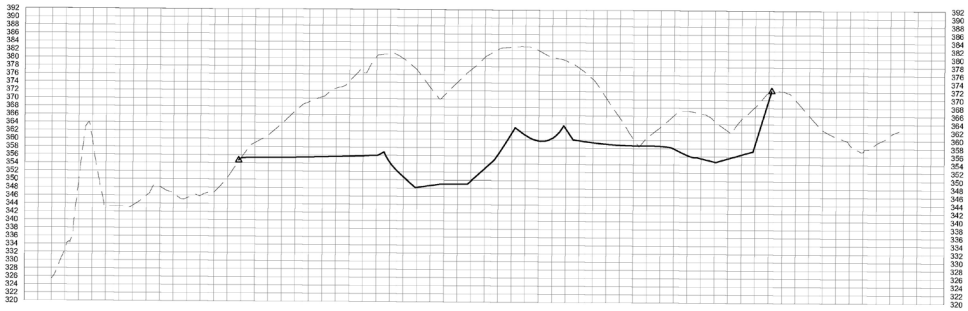
Note: The solid red line indicates a cemetery. See Chapter 4 Section 4.7 for additional information.
Source: Airport Authority and RS&H, 2023.

EXHIBIT 1-8, PROPOSED CONTOURS BORROW SITE WEST OF PLEASANT GROVE CHURCH ROAD

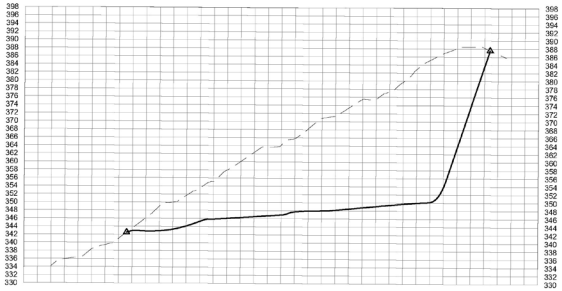


Note: The solid red line indicates a cemetery. See Chapter 4 Section 4.7 for additional information.
Source: Airport Authority and RS&H, 2023.

EXHIBIT 1-9, PROPOSED CROSS SECTION BORROW SITE WEST OF PLEASANT GROVE CHURCH ROAD



BORROW SITE 1B - SECTION B-B PROFILE



BORROW SITE 1B - SECTION D-D PROFILE

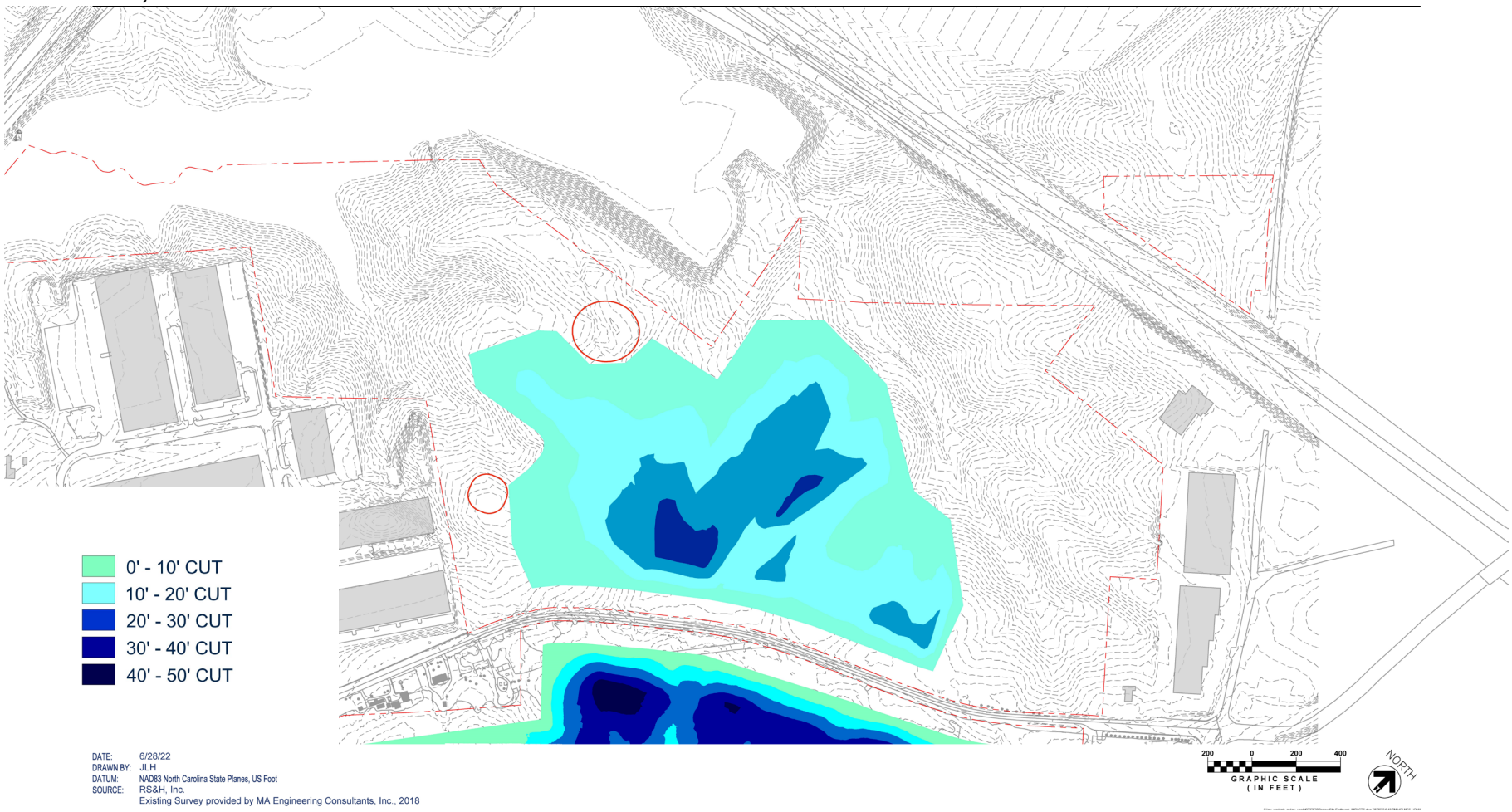
DATE: 6/28/22
DRAWN BY: JLH
DATUM: NAD83 North Carolina State Planes, US Foot
SOURCE: RS&H, Inc.
Existing Survey provided by MA Engineering Consultants, Inc., 2018

200 0 200 400
GRAPHIC SCALE
(IN FEET)

NORTH

Source: Airport Authority and RS&H, 2023.

EXHIBIT 1-10, PROPOSED DEPTH OF CUT BORROW SITE WEST OF PLEASANT GROVE CHURCH ROAD



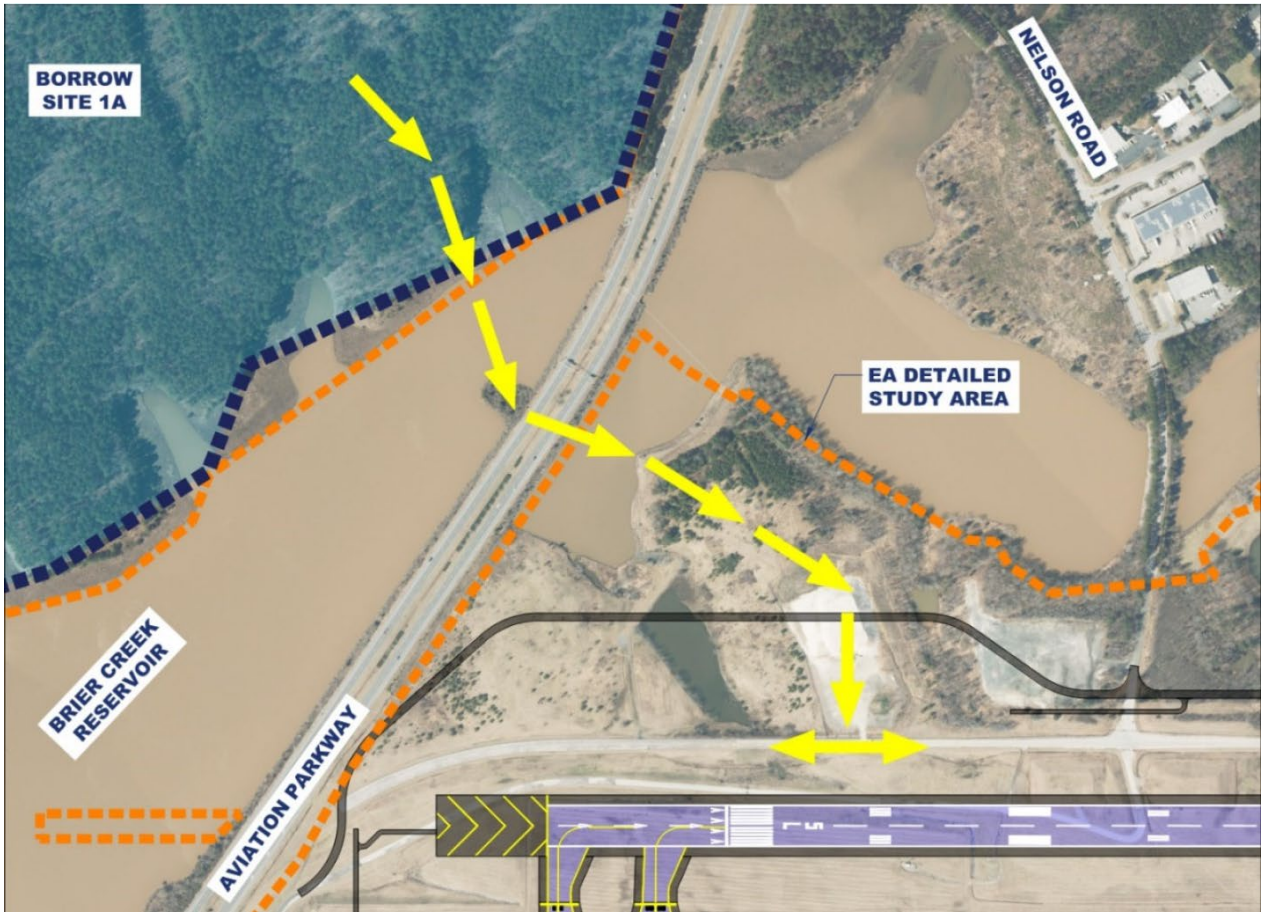
Note: The solid red line indicates a cemetery. See Chapter 4 Section 4.7 for additional information.
Source: Airport Authority and RS&H, 2023.

Transportation of Fill Material

Design of the Proposed Action is ongoing. There are two ways that may be used to transport the fill to the site of the relocated runway 1) traditional trucking or 2) use of a conveyor system. For traditional trucking, fill material is anticipated to be taken to the runway construction site by dump truck utilizing Pleasant Grove Church Road and Nelson Road.

The use of a conveyor system is also being reviewed by the Airport Authority to transport the fill material to the site of the relocated runway. The potential route would be from Airport property, across Brier Creek Reservoir and Aviation Parkway, and then back onto Airport property as shown on **Exhibit 1-11**. If the conveyor system is used, the Airport Authority would have to get an easement to cross over Aviation Parkway from North Carolina Department of Transportation (NCDOT). The conveyor system would be supported by temporary piers and be elevated off the ground. The height of the conveyor system would vary; however, it would be at a sufficient height to permit traffic to pass under where it would cross Aviation Parkway. It is anticipated that the Airport Authority would construct a full conveyor enclosure over Aviation Parkway to protect vehicular traffic from any potential material slippage. The potential conveyor system would need to cross approximately 625 linear feet of Brier Creek Reservoir water. Temporary pier supports would be removed after use and would not require fill or dredge material to be placed in Waters of the U.S. The use of a conveyor versus traditional trucking will ultimately be determined during final design.

EXHIBIT 1-11, POTENTIAL CONVEYOR LOCATION



Source: Airport Authority and RS&H, 2022.

Use up to 150,000,000 gallons of water for hydrocompression

Because fill material is needed to level the site, water would be needed for hydrocompression. Hydrocompression is the use of water to settle and compact the fill material. The Airport Authority plans to use water from Brier Creek Reservoir due to its proximity to the construction site. The water would be removed from Brier Creek Reservoir and applied to the fill material over a period of approximately two years to compact the soil. This process would also allow for Brier Creek Reservoir to be naturally recharged with water. Water would be collected near the surface of the water column in Brier Creek Reservoir to not disturb sediment to the extent practicable. If conditions occur such as a drought during construction activities, and water from Brier Creek Reservoir is not sufficiently available, it is anticipated that water would come from local municipal sources such as the Town of Cary.

Construct safety areas associated with the relocated runway and taxiway development and remove/mitigate tree/vegetation/obstacles for Runway Object Free Area (ROFA), Runway Protection Zone (RPZ), Taxiway Object Free Area (TOFA), Approach and Departure Siting Surfaces, Part 77, and Object Free Zones (OFZ)

This element constructs the FAA-required safety areas beyond the replacement runway ends including the ROFA, TOFA, and RPZs. This would also clear and/or mitigate any obstacles, including vegetation, trees, and/or buildings/towers/antennas that may cause safety issues with the relocated runway. The runway safety areas, object free areas, and approach and departure siting surfaces are described in FAA AC 150/5300 13B, *Airport Design* and 14 CFR Part 77, *Objects Affecting Navigable Airspace.*

Part 77 defines the standards by which obstructions are identified within the navigable airspace in and around airports. This is accomplished by first defining specific airspace areas (siting surfaces) around the airport and then making sure there are no objects that penetrate those areas. An object, whether it is a tree or built structure, is an obstruction to air navigation if it penetrates or is higher than the specific siting surfaces as described in Part 77. The dimensions of the specific airspace area or Part 77 surfaces vary depending on the type of runway approach, which is dependent on the type of instrumentation and lighting available on the runway.

The FAA has determined that certain siting surfaces are more critical than others and must be cleared of obstructions prior to operation of a runway. The obstacle free zone (OFZ)[12] and the threshold siting surface (TSS) (34:1)[13] have been identified that need to be clear of obstructions which are referred herein as "Priority One Obstacles". The TSS (34:1) extends outward and upward along the extended runway centerline with a slope of one unit vertically for every 34 units horizontally (34:1). Based on Airport Authority data,[14] there are 22 obstructions in the OFZ and 10 obstructions within the TSS (34:1) surfaces as shown on **Exhibit 1-12**. All of these obstructions are trees. There are no Priority One Obstacles that are built structures. Due to the proposed relocation of the airport perimeter road and Lumley Road, 30 of these trees would be cut down or trimmed below the critical surface. Two trees are off Airport property and would require the Airport Authority to negotiate removal of the trees with the current landowner.

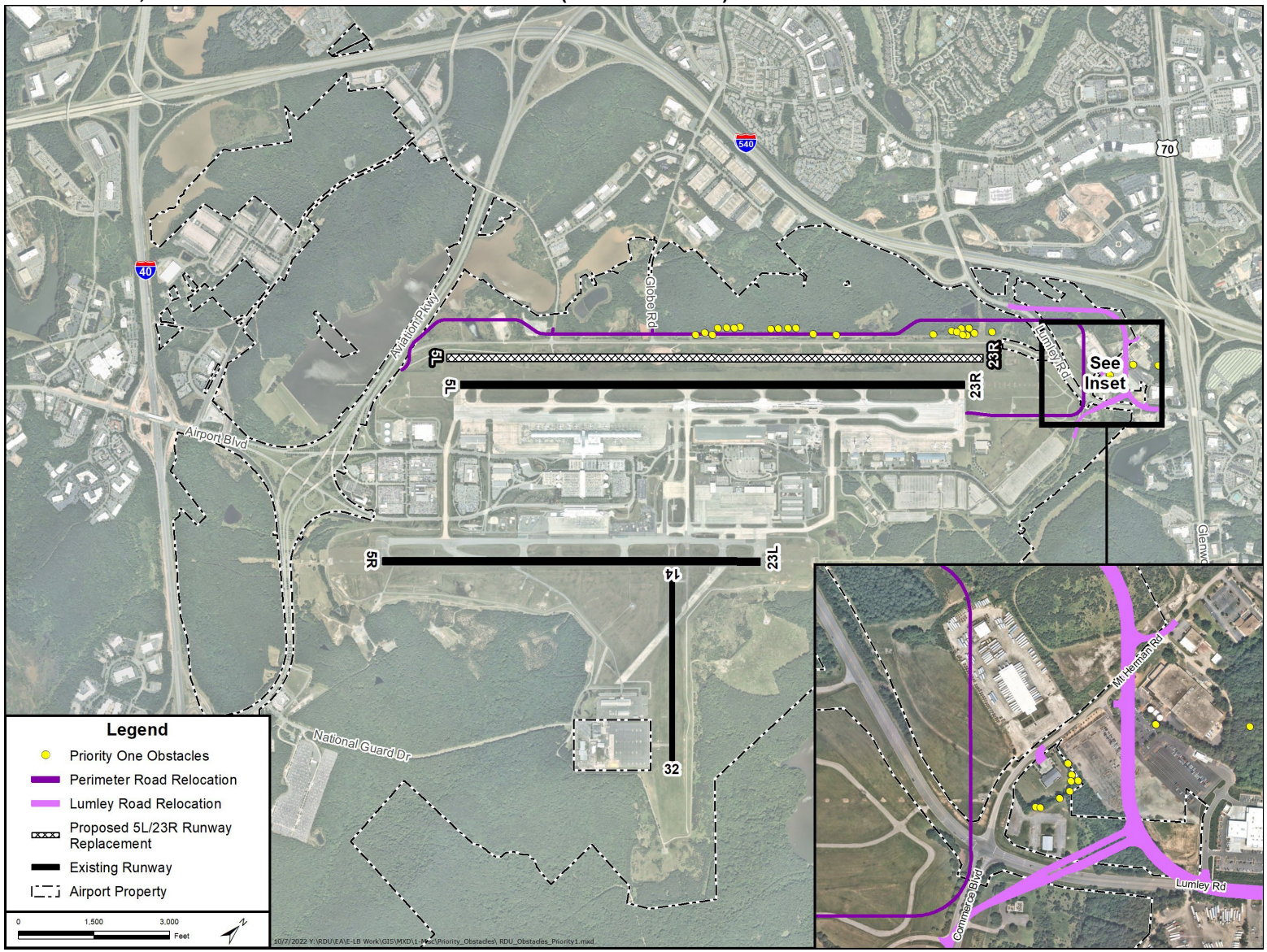
Although the FAA can determine which structures are obstructions to air navigation; the FAA is not authorized to limit structure height or determine which structures should be lighted and marked. Local authorities have control over the appropriate use of property beneath an airport's airspace. The Airport Authority is responsible to protect the approach and departure surfaces. In addition to the OFZ and the TSS (34:1), there are 348 trees and 21 buildings/towers/antennas located within the Part 77 and Departure (40:1) surfaces which are referred herein as "Priority Two Obstacles". These obstructions are located both on and off Airport property, as shown in **Exhibit 1-13**. An obstacle action plan will be developed by the Airport Authority on how to either remove or accommodate/mitigate these obstructions after the FAA issues a decision on this EA and when final design is complete.

12 AC 150-5300-13B Chapter 3.11. The OFZ is the three-dimensional airspace along the runway and extended runway centerline that must be clear of obstacles for the protection of aircraft landing or taking off from the runway and for missed approaches. The OFZ consists of four distinct surfaces: Runway OFZ, Precision OFZ, InnerTransitional OFZ, and the Inner-Approach OFZ. The OFZ being applied for the proposed relocated runway is for operations on runways by large aircraft with lower than ¾ statute mile (1.2 km) approach visibility minimums.

13 AC 150-5300-13B Chapter 3.5.

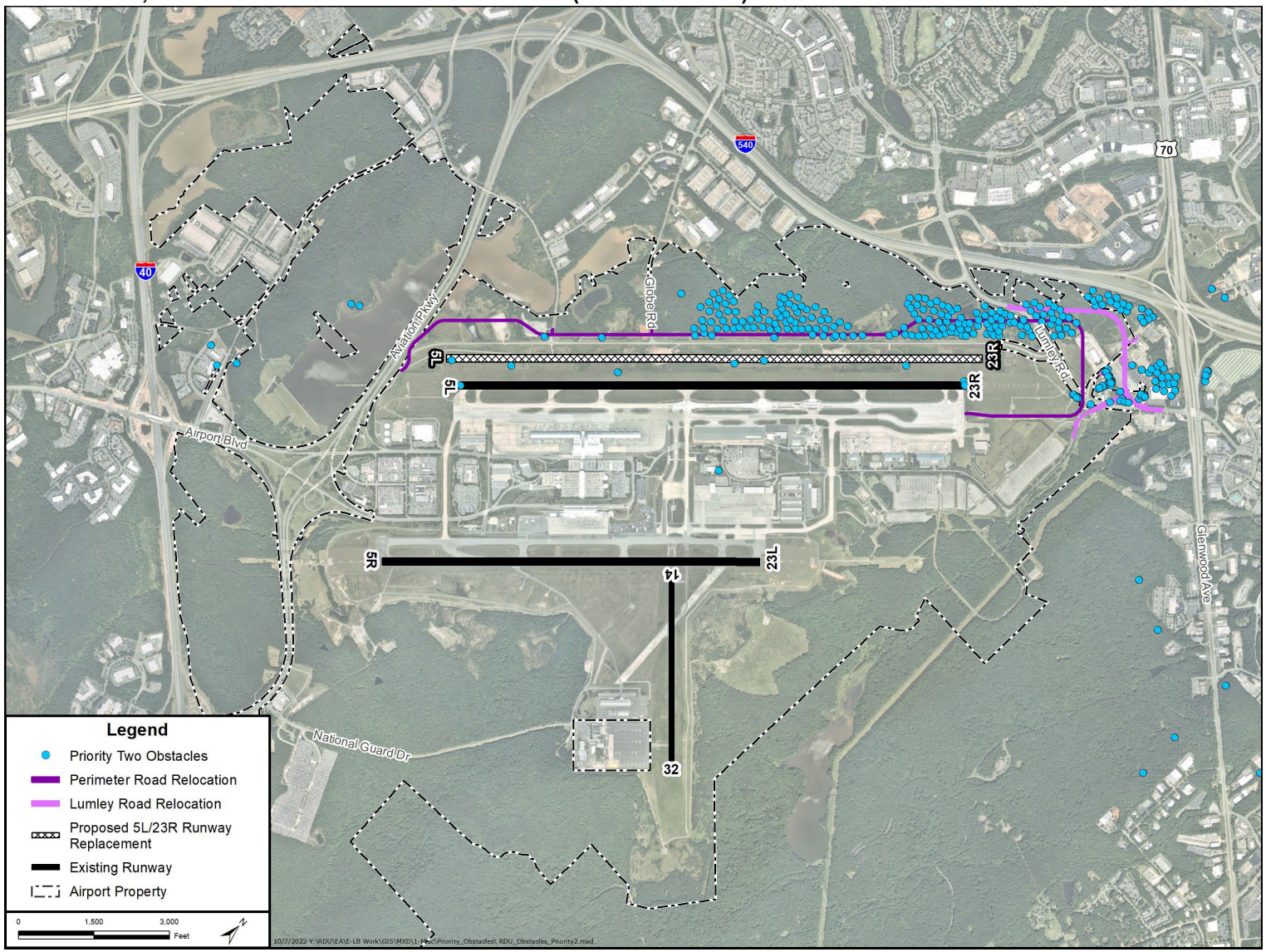
14 Data is from 2015. An estimated tree growth value was added to the data to determine current height. The tree growth value was added as defined in FAA Engineering Brief 91 (EB91) as 2.5 feet per year.

EXHIBIT 1-12, PROPOSED OBSTRUCTION REMOVAL (PRIORITY ONE)



Source: Airport Authority and Landrum & Brown, 2022

EXHIBIT 1-13, PROPOSED OBSTRUCTION REMOVAL (PRIORITY TWO)



Source: Airport Authority and Landrum & Brown, 2022

Relocate and/or install lighting systems associated with runway and taxiway development

This element constructs the lighting systems associated with the relocated runway according to the most current FAA-required safety standards.

Construct associated drainage improvements

This element provides additional drainage infrastructure for additional impervious pavement areas associated with the relocated runway. Existing stormwater drainage pipes would be replaced/rehabilitated under the existing runway and connected to new infrastructure for the relocated runway. Existing stormwater retention areas would be modified and or increased and new stormwater retention areas added as needed to maintain storage and accommodate increases in peak stormwater runoff.

Relocate a portion of Lumley Road out of the relocated Runway 5L/23R's safety areas, to include necessary property acquisitions and utility relocations, and demolition of four buildings

In order to meet FAA safety area standards for RPZs as defined in AC 5300-13B *Airport Design*, a portion of Lumley Road which is a five-lane undivided road must be removed from the Runway 23R approach RPZ as shown on **Exhibit 1-14**. The Lumley-Commerce intersection would also have to be relocated to remove it from the RPZ.

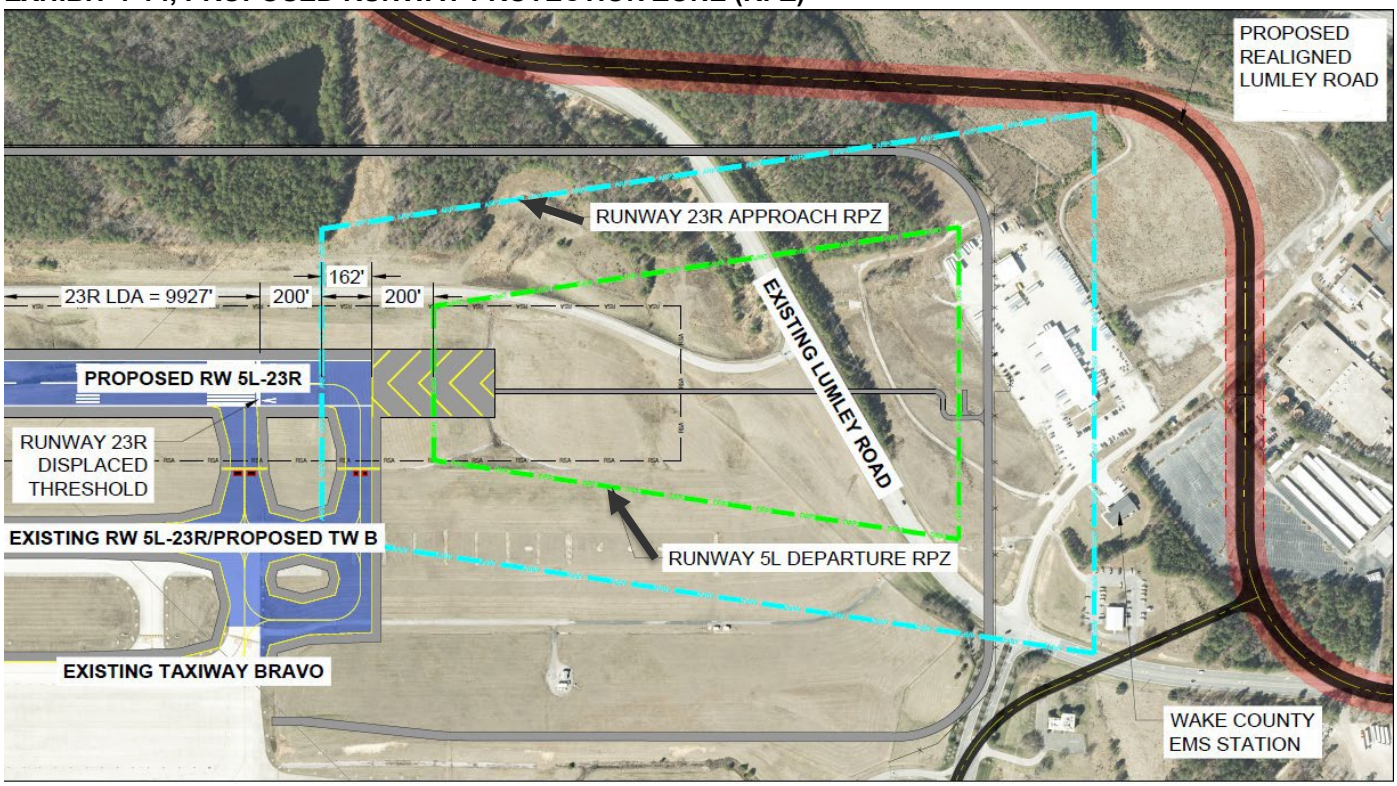
A portion of several properties would be acquired by the Airport Authority to accommodate the relocated roadway and utility rights of way. Final design of Lumley Road relocation is not yet complete. Negotiations are ongoing related to this property acquisition and would not be completed until after FAA and the USACE have made a decision on this EA. It is anticipated that approximately five to eight acres would need to be acquired for the Proposed Action.

The former Estes Express Lines Terminal and Maintenance Shop would need to be demolished to remove it from the RPZ. The former Teamsters Union Building (also known as the previous North Carolina Department of Transportation building) and the former Independent Garage Owners of NC Building (also known as the former Parsons building) would also be demolished to accommodate the relocation of the Lumley-Commerce intersection. All of these buildings are currently vacant and owned by the Airport Authority. The Wake County Emergency Management Services (EMS) Station would be located outside the RPZ and would not need to be relocated. Utility relocations, including the relocation of power lines would also need to be conducted to accommodate the Proposed Action.

Construct a new airport perimeter road around the relocated Runway 5L/23R

This element includes the construction of a perimeter road around the proposed relocated runway to replace the existing portion of the perimeter road that would be removed to construct the relocated runway. The new perimeter road is not a public road but provides the Airport Authority vehicle access within the security fence for Airport maintenance and security purposes. The new portion of the perimeter road is proposed to be approximately 15,000 feet in length.

EXHIBIT 1-14, PROPOSED RUNWAY PROTECTION ZONE (RPZ)



Source: Airport Authority and RS&H, 2022.

Relocate FAA navigational aids and development and/or modification of associated arrival and departure procedures

The navigational aids for the existing Runway 5L/23R are operated and maintained by the FAA. This element would provide for relocation of navigational aids for the relocated runway. The Runway 5L medium intensity approach lights with runway alignment indicator lights (MALSR) would need to be reconfigured by relocating the light stations to correspond to the relocated runway and installing in-pavement approach lights. To accommodate the relocated light stations and access to them, an earthen berm (or bridge structure) would be required to place and access these light stations adjacent to the eastern shore of the Brier Creek Reservoir, similar to the existing Runway 5L MALSR light stations. The access to the relocated navigation aids would be provided to the FAA for maintenance purposes. The existing precision approach path indicator (PAPI) and glideslope antennas would also be relocated to accommodate the relocated runway. The Proposed Action would also require the FAA to test, update, and reissue the arrival and departure procedure charts for the relocated runway. The testing, updating and reissuance of the arrival and departure procedure charts would occur after completion of the EA.

The FAA and the Airport Authority are utilizing the existing arrival and departure procedures for the proposed runway to approximate the potential environmental impacts evaluated in this EA. If different arrival and departure procedures are needed based on final design and updated obstructions, the FAA will reevaluate this EA to determine if any additional NEPA review is required.

1.4 Timeframe of the Proposed Action

Construction of the Proposed Action is expected to take approximately eight years. Upon FAA decision on this EA, construction is proposed to begin in 2023 and end in 2030, with the commissioning of the relocated Runway 5L/23R to occur in 2027. The anticipated first full year of operation of the relocated runway would be in 2028. **Table 1-3** provides the estimated construction phasing of the major Proposed Action elements.

TABLE 1-3, PROPOSED ACTION PROJECT ELEMENTS AND CONSTRUCTION PHASING

Proposed Action Project Elements	2023	2024	2025	2026	2027	2028	2029	2030
Runway Grading and Drainage								
Roadway Relocations								
Runway Paving & Navigational Aids								
Runway Commissioning								
Taxiway B Construction								

Source: Airport Authority, 2021

1.5 Need for Proposed Action

The need for and the purpose of the Proposed Action is an important part of the process established by NEPA. FAA Order 1050.1F states that the statement of purpose and need in an EA presents the problem being addressed and describes what the Airport Authority is trying to achieve with the Proposed Action. The statement of purpose and need for the Proposed Action also serves as the foundation for identifying reasonable alternatives to the Proposed Action and comparing the impacts of various alternatives. For a potential alternative to be considered reasonable and carried forward for detailed evaluation in the NEPA process and the EA, that alternative must address the purpose and need. The alternatives are further discussed in Chapter 2.

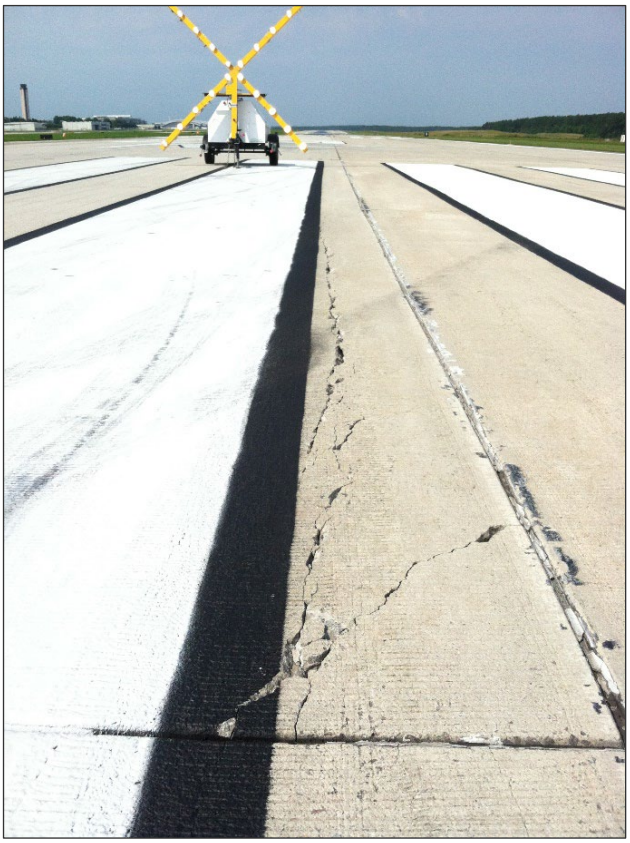
1.5.1 The Need to Reconstruct Runway 5L/23R

As part of the Airport Authority's ongoing pavement management, pavement investigation studies for Runway 5L/23R have been conducted since the runway was constructed in 1985. Runway 5L/23R consists of 16 inches of Portland Cement Concrete (PCC) on six inches of an asphalt base, which was constructed on compacted fill material. Previous laboratory analysis in 2004 and 2010 showed that alkali silica reactivity (ASR) exists throughout the runway. ASR is a perpetual and unstoppable chemical reaction that causes concrete to expand and can lead to surface deterioration and structural failure. Due to ASR, the runway has exhibited fatigue-related cracks for several years. The amount and severity of ASR activity has varied along the length of the runway, but the overall pavement condition has deteriorated rapidly since 2009. A portion of Runway 5L/23R has seen an increase in cracks from seven in 2015 to 63 in 2017. An example of Runway 5L/23R cracks are shown in **Exhibit 1-15.**

In 2019 and 2020, the Airport Authority replaced approximately 220 slabs in Runway 5L/23R due to full-depth cracking and performed numerous patch-type repairs for less severe cracks. Runway 5L/23R had 168 daily closures during that time with the Airport Authority incurring over 12 million dollars for engineering and construction costs. Most of the replaced slabs were in the keel section of the runway, which is the center 50 feet of the runway divided equally on each side of the centerline. Because of the continuing action of the ASR, the Airport Authority is constantly on alert for loose concrete particles. These concrete particles become Foreign Object Debris (FOD). This demands closer attention to the

pavement because any FOD that becomes airborne can cause damage to engines or airframes, and significant damage can be very costly and even life-threatening if the damage occurs during acceleration of aircraft for takeoff.

EXHIBIT 1-15, RUNWAY 5L/23R PAVEMENT CRACKS



Source: Photo of Runway 5L/23R courtesy of the Airport Authority.

The Airport Authority has an affirmative regulatory obligation to address and eliminate FOD. Ongoing repair efforts, extensive monitoring, and more frequent cleaning requires an unusually high number of runway closures, therefore reducing the overall reliability of the primary runway. The disruptive and costly measures to combat this condition are anticipated to increase in the future and are unsustainable. Based on the Airport Authority's inspection of the pavement condition and associated engineering evaluations, the primary runway, Runway 5L/23R is in need of full depth/structural repair. This would constitute a total reconstruction of the runway due to its deterioration.

1.5.2 The Need to Maintain RDU's Existing Infrastructure and Operational Capabilities

RDU is the primary commercial service airport serving Raleigh, Durham, Chapel Hill, and the surrounding area referred to as the Research Triangle region. In 2019, RDU had a total of 7,123,434 enplaned passengers and 221,626 aircraft operations.[15] The COVID-19 pandemic has disrupted the aviation industry in an unprecedented manner. In the immediate aftermath of the spread of COVID-19,

[15] Raleigh-Durham Airport Authority, Raleigh-Durham International Airport: Activity Statistics and Airports Council International-North America (ACI-NA), North American Airport Traffic Report, accessed online at https://airportscouncil.org/intelligence/north-american-airport-traffic-reports/

travel restrictions were implemented in 2020, flights were suspended, business travel effectively disappeared, and airports were brought to a virtual halt in the U.S. and throughout the world. RDU was no exception to this trend. Although the magnitude of COVID-19's effect within the national aviation system has no precedent, the industry has experienced sudden system impacts before and has shown resilience for efficient recovery. Every major worldwide incident, pandemic, or recession experienced in the aviation industry has had immediate and significant impacts to aviation. However, once the event has passed, the system has consistently recovered during subsequent years, showing resilience due to the underlying demand for air transportation for both leisure and business travel. Just as the national aviation system is expected to recover from the COVID-19 pandemic, RDU passengers and aircraft operations are expected to recover as well.

Aviation activity forecasts were prepared for this EA with the consideration of the COVID-19 pandemic's disruption to the aviation industry. According to the aviation activity forecasts, total enplaned passengers at the Airport are forecast to recover from the COVID-19 pandemic in 2023 with 7,145,679 enplaned passengers. Total enplaned passengers are forecast to reach 10.5 million in 2033. Total aircraft operations are forecast to exceed 2019 levels in 2024. Total aircraft operations are forecast to reach 229,810 in 2024 and are projected to increase to 287,850 in 2033. The aviation activity forecasts, and the supporting documentation are provided in Appendix B.

The existing airfield infrastructure at RDU results in assignment of the majority of aircraft operations onto Runway 5L/23R due to its length and width. Runway 5R/23L and Runway 14/32 are considerably shorter in length and do not allow the same type of aircraft that uses the primary runway. The use of only Runway 5R/23L or Runway 14/32, even during construction activities, would reduce the takeoff runway length available to aircraft, which would reduce the Airport's capabilities to serve commercial aircraft. Any permanent closure of Runway 5L/23R and a change from the current airfield configuration with two parallel runways would have an adverse effect on the Research Triangle region by restricting RDU to operate on only one commercial service runway and reducing the overall capability of the Airport to serve the community.

As previously stated, a runway length analysis was conducted to understand the range of runway length needed for the primary runway at RDU. The runway length is established in accordance with the take-off and landing runway length requirements for the most demanding aircraft type(s) contained in the RDU Aviation Activity Forecast. The existing and future aircraft fleet mix was used to evaluate the runway length needs. The use of this existing and projected future fleet ensures that the runway system will be capable of accommodating the aircraft operations through the forecast range.

Without adequate runway length configured to serve the current and anticipated aircraft fleet mix, the existing capability of the overall airfield may be compromised. Takeoff length requirements were calculated following the recommended guidance in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*. The runway length analysis determined that for a runway to act as the primary runway at RDU and serve the critical aircraft at RDU, it must have a runway takeoff length of between 10,000 feet to 12,300 feet. The runway length analysis is provided in Appendix B.

1.6 Purpose of the Project

The purpose of the Proposed Action is to fulfill FAA's statutory mission to ensure that the safe operation of the airport and airway system is the highest aviation priority as set forth under 49 U.S.C. § 47101 (a)(1). In addition, based on the needs previously discussed, the purpose of the Proposed Action is to:

- Provide a structurally sound primary runway at RDU that maintains its current runway capabilities

1.7 Requested Federal Actions

The following are the federal actions necessary for the Proposed Action.

- Unconditional approval of the ALP for the proposed improvements presented in this EA pursuant to 49 U.S.C. § 47107(a)(16).
- Approval of construction, installation, and relocation of FAA-owned navigational and visual aids, including but not limited to glideslope equipment, localizers, approach lighting systems, taxiway edge lighting, signage, and all associated utility lines. The FAA is responsible for the navigational aid equipment necessary to ensure the safety of air navigation for aircraft operations. The FAA will make a determination regarding the installation and relocation of navigational aids associated with the Proposed Action. If the FAA determines to not fund a navigational aid for the new runway (such as an Instrument Landing System or ILS), RDU may elect to install non-federal equipment with local funding per FAA Order 6700.20, *Non-Federal Navigational Aids, Air Traffic Control Facilities, and Automated Weather Systems*.
- Determinations as to the eligibility of the Proposed Action for federal funding for construction of eligible components of the Proposed Action under (1) the Airport Improvement Program (AIP) (49 U.S.C §§ 47106 and 47107) and/or (2) through passenger facility charges (PFCs) (49 U.S.C. § 40117, as implemented by 14 CFR § 158.25).
- The reissuance of arrival and departure procedures charts for the replacement Runway 5L/23R.

In addition, the Airport Authority requires the following approvals from the FAA and USACE before it can implement the Proposed Action.

- Determinations under 14 CFR Part 77, *Objects Affecting Navigable Airspace*, and 14 CFR Part 157, *Notice of Construction, Alteration, Activation, and Deactivation of Airports*.
- Determination under 49 U.S.C. § 44502(b) that the airport development is reasonably necessary for use in air commerce or in the interests of national defense.
- Determination under 49 U.S.C. § 47106(a)(1) that the selected alternative is reasonably consistent with existing plans of public agencies responsible for development in the area.
- Approval of a Construction Safety and Phasing Plan to maintain aviation and airfield safety during construction pursuant to FAA AC 150/5370-2G, *Operational Safety on Airports During Construction* (14 CFR Part 139 [49 U.S.C. § 44706]).
- Approval of changes to the Airport Certification Manual pursuant to 14 CFR Part 139.
- The USACE will evaluate the project and decide whether to issue, conditionally issue, or deny the proposed work pursuant to applicable procedures of Section 404 of the Clean Water Act (33 U.S.C. 1344).

THIS PAGE INTENTIONALLY LEFT BLANK