2 Alternatives

2.1 Introduction

The National Environmental Policy Act of 1969 (NEPA),[20] relies on a robust alternatives analysis for identifying other environmentally preferable options to the Proposed Action. Consideration of alternatives during the environmental review process is considered by the Council on Environmental Quality (CEQ) as the heart of the NEPA process, and it includes identifying all reasonable and feasible alternatives that meet the Purpose and Need of the project with a lesser environmental consequence. This chapter describes the process used to identify and evaluate alternatives for the proposed action. This chapter is organized as follows:

- Regulatory Requirements - This section describes the requirements of NEPA regarding the range of alternatives that should be considered during an environmental review.
- Range of Alternatives Considered - This section describes alternatives that were developed and considered as part of this Environmental Assessment (EA) document.
- Alternatives Evaluation Process - This section describes the screening process that was used to determine which alternatives would fully satisfy the Purpose and Need of the project in a reasonable manner.
- Alternatives Recommended for Detailed Evaluation - This section identifies the alternatives that were carried forward for further environmental review based on the screening and evaluation conducted.

2.2 Regulatory Requirements

Specific Federal Aviation Administration (FAA) guidance was issued under FAA Orders 1050.1F and 5050.4B, which require a thorough and objective assessment of the Proposed Action, the No Action alternative, and all reasonable alternatives that would achieve the stated Purpose and Need for the action. Section 6-2.1(d) of FAA Order 1050.1F provides the following guidance on the content of the alternatives analysis for an EA:

“The alternatives discussed in an EA must include those that the approving official will consider. There is no requirement for a specific number of alternatives or a specific range of alternatives to be included in an EA. An EA may limit the range of alternatives to the proposed action and No Action when there are no unresolved conflicts concerning alternative uses of available resources. Alternatives are to be considered to the degree commensurate with the nature of the proposed action and agency experience with the environmental issues involved. Generally, the greater the degree of impacts, the wider the range of alternatives that should be considered. The preferred alternative, if one has been identified, should be indicated. For alternatives considered but eliminated from further study, the EA should briefly explain why these were eliminated.”

2.3 Range of Alternatives Considered

This section provides a brief description of the alternatives considered in this EA. The initial range of alternatives evaluated included off-airport (including non-construction alternatives), the No Action Alternative, and on-airport alternatives, including the Proposed Action. The alternatives were developed to address one or both areas of need: (1) Insufficient terminal gate capacity and ramp congestion; (2)

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

Insufficient runway capacity to meet future demand at acceptable levels of runway delay, as described in Chapter 1, *Purpose and Need*. The initial alternatives considered in this EA were derived from the Airport Capacity Enhancement Plan (ACEP), as well as public input from the Environmental Impact Statement (EIS) and EA process. The following sections describe each of the alternatives considered in this EA.

2.3.1 Off-Airport Alternatives

Off-airport alternatives were considered but ultimately eliminated from further consideration in this EA. Each of the alternatives considered and the reason(s) for eliminating the alternative is described in more detail in the following pages.

2.3.1.1 Construct New Airport

A new airport was considered to serve as a complete replacement for key existing facilities at Charlotte Douglas International Airport (CLT) and to accommodate future growth. CLT currently has three parallel runways, a crosswind runway, approximately 1.8 million-square foot terminal building with 113 gates (120 gates when Concourse A Phase II is constructed), cargo facilities, support facilities, and North Carolina Air National Guard (NCANG) facilities. By 2028, CLT is projected to need four parallel runways and 150 gates. It is the second busiest airport in the Piedmont Atlantic Megaregion and the only Large Hub Primary Airport in the Charlotte Metropolitan Statistical Area (MSA). Only eight MSAs in the United States generate economies large enough to support more than one Large and/or Medium Hub Primary airport. Each of these eight MSAs has a population double or more as compared to the Charlotte MSA per the 2010 Census. The construction of an entirely new airport is not a viable solution to satisfy the current or projected needs at CLT. New airport development, with facilities capable of accommodating the projected CLT needs, would have costs and environmental impacts of the highest order. It would likely take somewhere in the range of 15 to 20 years to plan, purchase land, and build a new airport. Finally, there is no sponsor indicating a desire to build a commercial service airport to serve air travel demand in the Charlotte Region. Therefore, constructing a new airport to meet the needs is not reasonable and has been eliminated from further consideration in this EA.

2.3.1.2 Use of Existing Airports

The use of the five airports located within the CLT catchment area was considered for their ability to adequately meet the Purpose and Need of the Proposed Action. These airports are discussed in further detail in the next pages.

- Gastonia Municipal (AKH) is a public use airport located in the City of Gastonia and is owned and operated by the City of Gastonia. The airport is approximately 10 nautical miles east of CLT. AKH is identified by the National Plan of Integrated Airport Systems (NPIAS)[21] as a general aviation airport. The airport has one runway, Runway 03/21, that is 3,770 feet in length and 100 feet wide and serves mostly general aviation aircraft.
- Rock Hill-York County Airport (UZA) is a public use airport located in Rock Hill, South Carolina approximately 25 miles south of CLT. It is owned and operated by the City of Rock Hill. UZA is identified by the NPIAS as a reliever airport for CLT. UZA has one runway, Runway 02/20, that is approximately 5,500 feet long and 100 feet wide. The airport serves general aviation and corporate aircraft. The airport master plan dated in 2003 has a 1,000-foot extension in the future

[21] U.S. Department of Transportation and Federal Aviation Administration, Report to Congress National Plan of Integrated Airport Systems (NPIAS) Report, 2019 – 2023.

to bring the length of the runway to 6,500 feet. The airport also has a terminal building, approximately 6,700 square feet in size, designed to accommodate corporate users.

- Concord-Padgett Regional Airport (JQF) is a public use airport owned and operated by the City of Concord and located approximately 20 miles northeast of CLT. JQF is identified by the NPIAS as a primary commercial service airport. The airport has one runway, Runway 02/20, that is approximately 7,400 feet in length and 100 feet wide. The airport serves general aviation aircraft, corporate, military, government, and commercial service aircraft. The airport also has a commercial terminal building, approximately 25,000 square feet in size, designed to accommodate the one commercial airline operating at JQF, Allegiant Air.
- Lincolnton-Lincoln County Regional Airport (IPJ) is a public use airport owned and operated by the City of Lincolnton and Lincoln County and is located approximately 30 miles to the northwest of CLT. IPJ is identified by the NPIAS as a general aviation airport. The airport has one runway, Runway 05/23, that is approximately 5,700 feet in length and 100 feet wide.
- Charlotte-Monroe Executive Airport (EQY) is a public use airport owned and operated by the City of Monroe and is located approximately 25 miles to the southeast of CLT. EQY is identified by the NPIAS as a reliever airport for CLT. The airport has one runway, Runway 05/23, that is approximately 7,000 feet in length and 100 feet wide. The airport serves general aviation, air taxi, and military aircraft.

Each of these airports has a single runway with lengths that range from 3,770 to 7,000 feet long. In contrast, CLT has three parallel runways with 8,676 to 10,000 feet in length. Additionally, three of the airports (AKH, IPJ, and EQY) do not have any passenger terminal facilities. The two airports that do have terminal facilities (UZA and JQF) fall far short of the passenger terminal facilities at CLT (1.8 million square feet of space). The facilities available at these airports would not meet the runway, terminal, or ramp capacity needs at CLT without major infrastructure improvements.

Because of American Airline's (AA) hub operation at CLT, connecting passengers alone totaled almost 32 million in 2016. By 2028, connecting passengers are expected to total 37 million. It would not be possible to serve this number of passengers at any of the airports that were considered without significant infrastructure development. Moreover, splitting the hub operation among multiple airports would not be a viable operationally for connecting passengers and the hub business model. In addition, the use of other airports would require a shift of airline operations from CLT. Neither the City of Charlotte Aviation Department (Sponsor), nor the FAA, have the authority to require users to operate at another airport. Therefore, relying on another airport would not be reasonable or feasible and would not address the needs identified at CLT. It has therefore been eliminated from further consideration in this EA.

2.3.1.3 Alternative Modes of Transportation

Alternative transportation modes were considered for their ability to meet the Purpose and Need of the Proposed Action. Alternative modes of transportation such as rail, bus, or automobile offer feasible alternatives to passengers (those traveling 500 miles or less) and freight shippers. Specifically, these alternative transportation modes mostly mitigate demand for shorter range trips (under 500 miles).

Although the Norfolk Southern Intermodal Facility is located at CLT and provides convenient rail cargo access from the Airport, air cargo and rail cargo typically have different time and price sensitivities. In addition, cargo operations are expected to continue to make up less than one percent of total aircraft operations through 2028 so any change in air cargo demand would not reduce the need for additional

airfield capacity at CLT, nor would it negate the need for additional gate capacity because cargo is not processed in the terminal buildings.

The Federal Railroad Administration (FRA) and the Georgia Department of Transportation are conducting a Tier 1 EIS for a portion of the Southeast highspeed rail corridor from Charlotte to Atlanta, which includes a passenger rail alignment and station serving CLT. Flights from CLT to Atlanta account for less than three percent of the total annual operations at CLT and removing these flights would not negate the need to provide additional airfield and gate capacity at CLT in 2028.

The FRA conducted a Tier I EIS in 2002 for the Southeast High Speed Rail which would implement a high-speed passenger rail service between Charlotte, NC through Raleigh, NC and Richmond, VA to Washington, DC. Subsequently, a Tier II EIS was prepared to address the specific infrastructure improvements for the Richmond, VA to Washington, DC rail corridor. Actual dates for implementation are dependent on identifying and securing funding, design, obtaining permits, and agreements among entities. At this time, it is estimated that the Richmond, VA to Washington, DC rail corridor would be constructed incrementally over a 20-year horizon from 2025 to 2045.[22] No further environmental analysis has been initiated for the remainder of the Charlotte, NC to Richmond, VA route so the timing is unknown. Even if the entire Southeast High Speed Rail could be built by 2028, demand for cities on its route total around seven percent of the 2028 annual operations at CLT. Removing these flights would not negate the need to provide additional airfield and gate capacity at CLT in 2028.

Any future high-speed rail connections could enhance short-range connections within the region but there is no reasonably foreseeable rail project currently in development that would reduce aviation demand at a scale that would prevent the need for the Proposed Action at CLT. Therefore, using other modes of transportation to address capacity constraints at CLT is not a reasonable alternative because other transportation modes serve as options (trips under 500 miles) to air travel, and do not represent a viable replacement. As a result, alternative modes of transportation to meet the needs are not reasonable and have been eliminated from further consideration in this EA.

2.3.1.4 Non-Aviation Technological Improvements

Key non-aviation technological improvements have had an impact on air travel. When first introduced nearly two decades ago, video conferencing was predicted to change the way businesses interact. Although improvements in the affordability, quality, and speed of transmission through 2019 made video-conferencing a more accepted alternative to face-to-face meetings, in many instances it spurred demand for additional travel, rather than replacing the need for additional air services, because of the business interactions the technology promotes.

In 2020, there was a remarkable change in the use of technology due to the COVID-19 pandemic. The COVID-19 pandemic disrupted the aviation industry in an unprecedented manner, and in particular has had a tremendous impact on business travel. In the face of public health concerns and travel restrictions, companies have been forced to replace in-person meetings with virtual meetings. At this time, it is unknown how long business travel demand will be down and what the long-term effects may be.

AA, the hub carrier at CLT, may be less affected by the decline in business travel than other major airlines since the majority of its passengers are traveling for leisure. Its chief revenue officer, Vasu

[22] U.S. Department of Transportation Federal Railroad Administration, September 5, 2019. On-line https://railroads.dot.gov/sites/fra.dot.gov/files/fra_net/19017/DC2RVA%20ROD_05Sept2019_pdfa.pdf, Accessed September 29, 2020.

Raja, said in October of 2020 that business travel makes up "a third of our revenue, but only a third of that comes from the large, global corporates that are most likely to delay travel."[23] Looking at CLT specifically, business travel made up 41 percent of CLT traffic in 2019, based on CLT On-Airport Customer Satisfaction Survey 2019 Year End Results.

Business travel is likely to continue to be affected while the COVID-19 pandemic continues. Looking longer-term, there may be some elements of business travel that will not return once the pandemic is under control because the workforce has become more accustomed to working with colleagues remotely through video conferencing and workplace chat platforms. Depending on the state of the economy and air fares, the standard for what warrants a business trip may change as companies recognize that certain collaborative work can be done remotely. Conversely, some business travel could increase as more employees choose to live in a different city than their employer, resulting in the need to commute by air travel to the office when in-person collaboration is needed.

For many business people, nothing replaces the value of seeing clients in person. Business travel provides the opportunity to network, develop personal relationships with clients, and collaborate. The McKinsey & Company *COVID-19: Briefing Materials* publication,[24] found that many tasks will still need to be in person, including negotiations, relationship building, onboarding and job training, critical decision meetings, and critical conversations. A poll conducted by the Global Business Travel Association in October of 2020 found that 82 percent of respondents believe that face to face meetings are "more" or "much more" effective than virtual meetings.[25]

The recent available surveys and expert predictions on the COVID-19 impact on business travel show different outlooks. Oliver Wyman, a management consulting firm, predicts a ten percent reduction in business travel in the long-term.[26] An IdeaWorks study in December of 2020 found that 19 to 36 percent of business travel may not return.[27]

The airlines recognize that business travel is down and may be for the foreseeable future. As a result, they are focusing on leisure travelers. American Airlines' Chief Executive Officer (CEO) said of its current customers: "They are leisure customers traveling to leisure destinations."[28] Southwest's CEO indicated that it is "focusing its operation on leisure fliers" because it is difficult to predict when business travel will return to previous levels.[29] Looking past the immediate future, the airlines seem to be optimistic that the vast majority of business travel will return. Delta Air Lines' president indicated "we could be looking at anywhere from 10% to 20% reduction in the next couple of years when we get to

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23 Hoopfer, Evan, October 23, 2020, *American Airlines exec sheds light on replacing lost business travel revenue*, Charlotte Business Journal. On-line: https://www.bizjournals.com/charlotte/news/2020/10/23/american-airlines-business-travel.html, Accessed December 2020.

24 McKinsey & Company, October 30, 2020, *COVID-19: Briefing Materials*.

25 Töre, Özgür, October 22, 2020, *GBTA Poll Reveals Impact of COVID-19 on Business Travel*, Ftn News. On-line: https://ftnnews.com/tours/40518-gbta-poll-reveals-impact-of-covid-19-on-business-travel, Accessed October 22, 2020.

26 Wyman, Oliver, November 11, 2020, *How Videoconferencing and Covid-19 May Permanently Shrink The Business Travel Market*, Forbes. On-line: https://www.forbes.com/sites/oliverwyman/2020/11/11/how-covid-19-may-permanently-shrink-the-business-travel-market/?sh=7b5977342432, Accessed December 2020.

27 IdeaWorks Company, December 2020, *The Journey Ahead: How the Pandemic and Technology will Change Airline Business Travel*. On-line: https://ideaworkscompany.com/wp-content/uploads/2020/12/Journey-Ahead-Airline-Business.pdf, Accessed December 2020.

28 Leff, Gary, October 21, 2020, *American Airlines CEO: Today's Passengers Are "Somewhat Different From Our Normal Clientele"*, View From the Wing. On-line: https://viewfromthewing.com/american-airlines-ceo-todays-passengers-are-somewhat-different-from-our-normal-clientele/, Accessed December 2020.

29 Stankiewicz, Kevin, October 22, 2020, *Southwest CEO: It may be 10 years before business travel returns so we're focusing on leisure fliers*, CNBC. On-line: https://www.cnbc.com/2020/10/22/southwest-ceo-gary-kelly-on-return-of-business-travel-from-coronavirus.html, Accessed December 2020.

that new normal of business travel."[30] He reiterated that position on Delta Air Lines' Quarter 4 2020 earnings call.[31] United Airlines' CEO believes corporate business travel will begin to return in 2021 or 2022 and will likely get back to normal by 2024.[32]

As internet conferencing and telecommuting continue to be mainstream, especially in light of the COVID-19 pandemic, these technologies may ultimately reduce business travel demand across leading industries. This is not expected to have a significant impact at CLT where business travel accounted for about 42 percent of passenger traffic in 2019. If the potential reductions in business travel are realized, total passenger traffic could decline by four to 15 percent at CLT in 2028; however, these business travelers could be replaced with leisure travelers as the airlines make adjustments to their route structures. Regardless, this level of impact would not reduce aviation demand to the extent that the Proposed Action would not be needed. Therefore, the use of non-aviation technological improvements to meet the needs is not reasonable and has been eliminated from further consideration in this EA.

2.3.1.5 Aviation Technological Improvements

In recent years, the FAA has enacted several programs designed to provide modernized navigation, surveillance, automation (i.e., computer processing capabilities and tools for air traffic controllers), communications infrastructure, and weather information to make the national airspace system run smoother and more efficiently. These programs range from technology that can be implemented in air traffic control towers (ATCTs) to terminal radar approach control (TRACON) facilities to air route traffic control centers (ARTCCs) as well as onboard aircraft.[33] The use of the relevant technologies is considered a baseline condition for the analysis of the alternatives, including the No Action Alternative.

Eight of these technologies are in place at and proximate to CLT, so their benefit is already integrated into airport operations. They have improved safety and efficiency but do not change existing runway capacity at CLT. Accordingly, the Proposed Action at CLT is still needed. The programs currently in place are:

<u>Surveillance:</u>

- Automatic Dependent Surveillance Broadcast (ADS-B) tracks the Global Positioning System (GPS)-derived position of airborne aircraft and while on the surface of the airport. ADS-B is more accurate than radar alone. For aircraft equipped with ADS-B, it allows pilots and to know the location of other aircraft.
- Airport Surface Detection Equipment, Model X (ASDE-X) is a surveillance system that allows air traffic controllers to track surface movements of aircraft and vehicles. It was developed to help reduce runway incursions.
- Runway Status Lights (RWSL) is a safety system that is connected to ASDE-X to reduce the number and severity of runway incursions and thus prevent runway accidents. It is comprised of Runway Entrance Lights (RELs) and Takeoff Hold Lights (THLs). The system aims to improve

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30 Manfredi, Lucas, October 15, 2020, *Delta, United CEOs forecast the return of business travel*, FOX Business. On-line: https://www.foxbusiness.com/lifestyle/delta-united-ceos-forecast-business-travel-return, Accessed December 2020.

31 MFTranscribing, January 14, 2021, *Delta Air Lines (DAL) Q4 2020 Earnings Call Transcript*, On-line: https://www.fool.com/earnings/call-transcripts/2021/01/14/delta-air-lines-dal-q4-2020-earnings-call-transcri/, Accessed January 2021.

32 Manfredi, Lucas, October 15, 2020, *Delta, United CEOs forecast the return of business travel*, FOX Business. On-line: https://www.foxbusiness.com/lifestyle/delta-united-ceos-forecast-business-travel-return, Accessed December 2020.

33 Federal Aviation Administration, 2021, *Technology*. On-line: https://www.faa.gov/air_traffic/technology/, Accessed January 2021.

situational awareness for pilots and vehicle operators through alerts when it is not safe to enter a runway.

- Airport Surveillance Radar (ASR-11) is an integrated radar system at terminal air traffic control sites for tracking airborne aircraft. It provides data on six levels of rainfall intensity, which provides enhanced situational awareness for controllers and pilots.

Communication:

- Data Comm allows air traffic controllers and pilots to transmit instructions and other essential communications via text instead of voice. Data Comm aims to improve efficiency, enhance safety, and reduce flight delays.[34]

Surface management automation:

- National Aeronautics and Space Administration (NASA) Airspace Technology Demonstration 2 (ATD-2)[35] is a prototype that is a precursor to Terminal Flight Data Manager (TFDM), is a surface management solution that is part of the FAA's Next Generation Air Transportation System (NextGen) program. ATD-2 has the following benefits:
    - Improves the efficiency of operations through time-based metering of departing aircraft to better use all available capacity and reduce delays.
    - Shares flight operations information with users.
    - Provides more precise and accurate scheduling of departures.

Navigation:

- The use of Wide Area Augmentation System (WAAS) provides GPS navigation augmentation to enhance the accuracy of position information for aircraft as well as ADS-B. It provides services for all classes of aircraft in all phases of flight, including en route navigation and for arrivals and departures at airports. WAAS allows for vertically-guided landing approaches in instrument conditions. CLT has WAAS-enabled approaches on its runways.

Weather:

- Integrated Terminal Weather System (ITWS) integrates weather data into timely, accurate aviation weather information. It is an essential component in reducing delays, improving NAS capacity, and enhancing aviation safety. The information provided by ITWS is displayed to controllers at towers, TRACONs, and centers, facilitating a common situational awareness of severe weather to ATC personnel.

Another key FAA initiative is Wake Turbulence Recategorization (or Wake RECAT). Wake RECAT is the safe decrease in the separation requirements between aircraft in the air. Previously, these separation requirements were set based on the weight of the aircraft. With Wake RECAT, aircraft are classified according to other characteristics as well, such as speed and wingspan. Wake RECAT was implemented at CLT in 2015 and has resulted in airborne and taxi out time savings.[36,37] See Appendix B, *Purpose and Need and Alternatives* for more information on Wake RECAT at CLT.

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34 Federal Aviation Administration, February 2007, *Fact Sheet - Data Communications (Data Comm)*. Available on-line: https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=21994, Accessed December 2020.

35 National Aeronautics and Space Administration, December 16, 2020, *Airspace Technology Demonstration 2 (ATD-2): Integrated Arrival/Departure/Surface (IADS) Traffic* Management. Available on-line: https://aviationsystems.arc.nasa.gov/research/atd2/index.shtml, Accessed December 2020.

36 Federal Aviation Administration, April 2015, Fact Sheet - Wake RECAT. Available on-line: https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=18676&omniRss=fact_sheetsAoc&cid=103_F_S, Accessed December 2020.

37 FAA, NextGen Priorities Joint Implementation Plan, Executive Report, Rolling Plan 2017-2019.

Other modernization programs involve upgrading air traffic control automation systems that are used in the airspace surrounding CLT, and to provide current operational data to stakeholders. These improvements are in place and have improved the efficiency and resiliency of the National Airspace System (NAS), but do not change existing runway capacity at CLT. Accordingly, the Proposed Action at CLT is still needed. These improvements include:

- En Route Automation Modernization (ERAM) replaced the 40-year-old computer system used at 20 FAA Air Route Traffic Control Centers nationwide. It is part of NextGen and supports the transition from ground-based air traffic control systems (such as radar alone) to the integrated use of ADS-B and Performance Based Navigation.
- The Terminal Automation and Replacement (TAMR) program involves upgrading air traffic control systems at TRACON facilities across the NAS with the Standard Terminal Automation Replacement System (STARS). STARS receive radar data and flight plan information and presents it to air traffic controllers on high resolution color displays.
- System Wide Information Management (SWIM) is an information-sharing application that promotes situational awareness and more accurate aeronautical, weather, and flight information to industry stakeholders and operators, including airlines and airports.

Each of these technologies has provided incremental safety and efficiency improvements to the NAS and airports. The combined modernization improvements help to make use of all available capacity at an airport, but do not change existing runway capacity. The ATC called rates for departure and arrival rates on the runways have not changed due to the deployment of these systems (nor was a rate change expected by FAA). Accordingly, the Proposed Action at CLT is still needed to increase runway capacity and reduce delays. Therefore, the use of standalone aviation technological improvements to meet the needs is not reasonable and has been eliminated from further consideration in this EA. Rather, aviation technological improvements are integral to optimizing efficient traffic flows with the Proposed Action at CLT.

2.3.2 No Action

Exhibit 2-1 presents the No Action Alternative, where no changes would be made to the airfield or terminal except for the following projects currently under design or construction. These projects include Concourse A Phase II (including the west ramp Phase II), Runway 18C/36C north end-around taxiway (EAT), west airfield hold pads, south deice pad (including the south crossfield taxiway).[38] While the No Action Alternative does not meet the Purpose and Need, it is required to be carried forward in the assessment of environmental impacts by 40 C.F.R §1502.14(d). The No Action serves as a basis of comparison during the assessment of the impacts of the alternatives.

2.3.3 On-Airport Alternatives

Because the Proposed Action reflects two separate and distinct areas of need, the alternatives development process considered each of the needs separately. The range of on-site airfield alternatives is based on alternatives identified in the ACEP, dated February 2016. Additional potential alternatives to the Proposed Action have also been developed accounting for the reduction in the runway length requirement from 12,000 feet to 10,000 feet and the gating analysis conducted on the most recent FAA-approved aviation activity forecast.

[38] Each of these projects are discussed in more detail in Chapter 4, Section 4.15.3.

EXHIBIT 2-1, NO ACTION ALTERNATIVE

Source: Landrum & Brown, 2020

2.3.3.1 Need #1: Insufficient Terminal Gate Capacity and Ramp Congestion

As described in Chapter 1, *Purpose and Need*, terminal expansion and terminal area taxiways and taxilanes are needed to increase terminal gate capacity and reduce congestion on the ramp. Terminal expansion options considered two areas: north of the existing terminal area and south of the existing terminal area. The northern area was deemed infeasible and not carried forward as it would require extensive new infrastructure, which would include relocation of existing airport parking and airport support buildings, acquisition of commercial properties, reconfiguring the airport access roadway network, and bridging/tunneling of the Norfolk Southern Railroad. In addition, there is limited land available due to the Runway Protection Zone (RPZ) of the existing runways.

The southern area was deemed the only reasonable and feasible area to expand the terminal. This area can accommodate the gating requirements needed to increase terminal gate capacity and provides adequate area to reduce ramp congestion. Alternatives that were considered included:

- Expansion of Concourses B and C, which is the Proposed Action
- Addition of a pier to Concourse A
- Expansion of Concourses D and/or E
- Construction of a new satellite terminal

Adding a pier to Concourse A was eliminated as it would not provide a sufficient number of gates, would result in AA's operations being split across the airport, and would require an additional passenger processing facility due to the long walk times from the existing facility. In addition, the expansion of another concourse would be required as a new pier on Concourse A could only accommodate five to six gates. Expansion of Concourses D or E is not feasible as there is limited space to expand these terminals without requiring the relocation of Runway 18L/36R to the east. The relocation of a runway would increase costs and be disruptive to existing operations. The construction of a satellite terminal was eliminated due to construction costs and an increase in passenger connection times. As a result, only the Proposed Action, which includes expansion of Concourses B and C, is being carried forward in the EA.

2.3.3.1 Need #2: Insufficient Airfield Capacity to Meet Future Demand at Acceptable Levels of Delay

As described in Chapter 1, *Purpose and Need*, additional runway capacity is needed at CLT to meet future demand at acceptable levels of runway delay. As a result, new runway alternatives were developed. Several constraints to the location of a new runway were identified, including:

- **Interstate 485 (I-485) –** Alternatives west of I-485 would have to bridge the interstate and use land that the Sponsor does not currently own, and where private development is already planned.
- **Billy Graham Parkway** – Alternatives east of Billy Graham Parkway would require a bridge and reconfiguration of the east side of the Airport. In addition, extensive commercial and residential properties would be displaced on land that the Sponsor does not currently own.
- **Existing Railroad Corridor** – Airfield alternatives north of the existing railroad corridor would require tunneling the railroad. In addition, extensive commercial and residential properties would be displaced on land that the Sponsor does not currently own.

A new runway in any of these areas would likely increase runway capacity and provide delay savings. However, development in these areas would result in excessive costs, environmental impacts, and a

longer development timeframe that would not satisfy the timely need for additional capacity as compared to development within existing airport property.

Additional runway capacity can be provided by adding a parallel or crosswind runway. FAA Order 5090.5, *Formulation of the NPIAS and ACIP*, states that when a new runway is needed to increase hourly capacity, a "parallel runway (is) usually preferred for efficiency."[39] This is especially true at CLT where operations primarily occur on the three parallel 18/36 runways. A new crosswind runway would provide limited benefit at CLT because it would either physically intersect or have intersecting flight paths with the three parallel runways; these intersections preclude independent operations. Existing Runway 05/23, a crosswind runway that intersects Runway 18L/36R, is a good example of this. Air traffic control personnel must coordinate operations on Runway 05/23 with the parallel runways, meaning operations cannot occur simultaneously. This dependency limits the net capacity provided by Runway 05/23. In addition, due to the congestion in the terminal ramp, Runway 05/23 is used frequently used for taxiing aircraft, further limiting its utilization for capacity needs. Any new crosswind runway at CLT would operate similar to Runway 05/23. Given the magnitude of the projected runway delays for CLT (7.5 minutes per operation in 2028 and 9.4 minutes in 2033) and the limited capacity provided by a crosswind runway, only a new runway parallel to the three 18/36 runways would provide sufficient capacity to meet the need at CLT.

In addition, based on an analysis of wind and weather data from the National Oceanic and Atmospheric Association (NOAA) years 1999 to 2019, the orientation of 180 degrees and 360 degrees was determined to be sufficient to provide 97.9 percent or better runway wind coverage on an annual average basis, depending upon the allowable crosswind. FAA guidance states a crosswind runway is recommended when the primary runway orientation provides less than 95.0 percent wind coverage.[40] Therefore, an alternative crosswind runway was not analyzed in the EA.

The following describes the range of Runway Alternatives considered in the EA. The following alternatives include a new fourth parallel runway that would use the designation of Runway 01/19, regardless of the runway location. Appendix B, *Purpose and Need and Alternatives,* provides additional information on the development of the alternatives. The alternatives are depicted in **Exhibit 2-2, Exhibit 2-3, Exhibit 2-4,** and **Exhibit 2-5**.

Alternative 1 (Proposed Action): 10,000-foot Runway 01/19 in the Midfield with 3,100 Feet of Separation to Runway 18R and 1,200 Feet of Separation to Runway 18C/36C: The Proposed Action includes the construction of a new, 10,000-foot long, fourth parallel runway, located 3,100 feet to the east of Runway 18R/36L and 1,200 feet to the west of Runway 18C/36C. Runway 01/19 is intended primarily for departure use in this alternative because it does not meet the separation requirement for triple simultaneous approaches.[41,42] Alternative 1 includes EATs on the north end of Runway 01/19 and the south ends of Runways 01/19 and 18C/36C. This project element was shown, along with the connected actions, in Chapter 1, *Purpose and Need.* A key connected action required to construct the new runway is the relocation of West Boulevard. This is needed to accommodate the Runway 01 end (i.e., the south end of the runway) and the south EAT. The relocation of West Boulevard is proposed

39 FAA Order 5090.5, *Formulation of the NPIAS and ACIP*, page 4-16, Table 4-4.
40 FAA Advisory Circular 150/5300-13A-Change 1, Airport Design, February 26, 2014, page 44, paragraph 302(c),(3).
41 According to FAA Order JO 7110.56Y, *Air Traffic Control*, 3,900 feet of separation is required to allow simultaneous straight in arrivals to Runways 18R/36L, 01/19, and 18L/36R. This minimum separation is not achieved between Runway 18R/36L and the new runway so it was assumed that the new runway would be used primarily be departures.
42 Although Runway 01/19 is primarily intended for departure use and Runway 18C/36C is primarily intended for arrival use, no restrictions on runway use are proposed or assumed. It is important that air traffic controllers have the flexibility to use these two runways for both arrivals and departures to maximize capacity and operational flexibility.

using existing roadways as shown in Exhibit 2-2. This is the only option for the relocation of West Boulevard being carried forward in the alternatives as it had the least impact and costs. Other alternatives were not considered as they would require removal of structures and construction of new roadways.

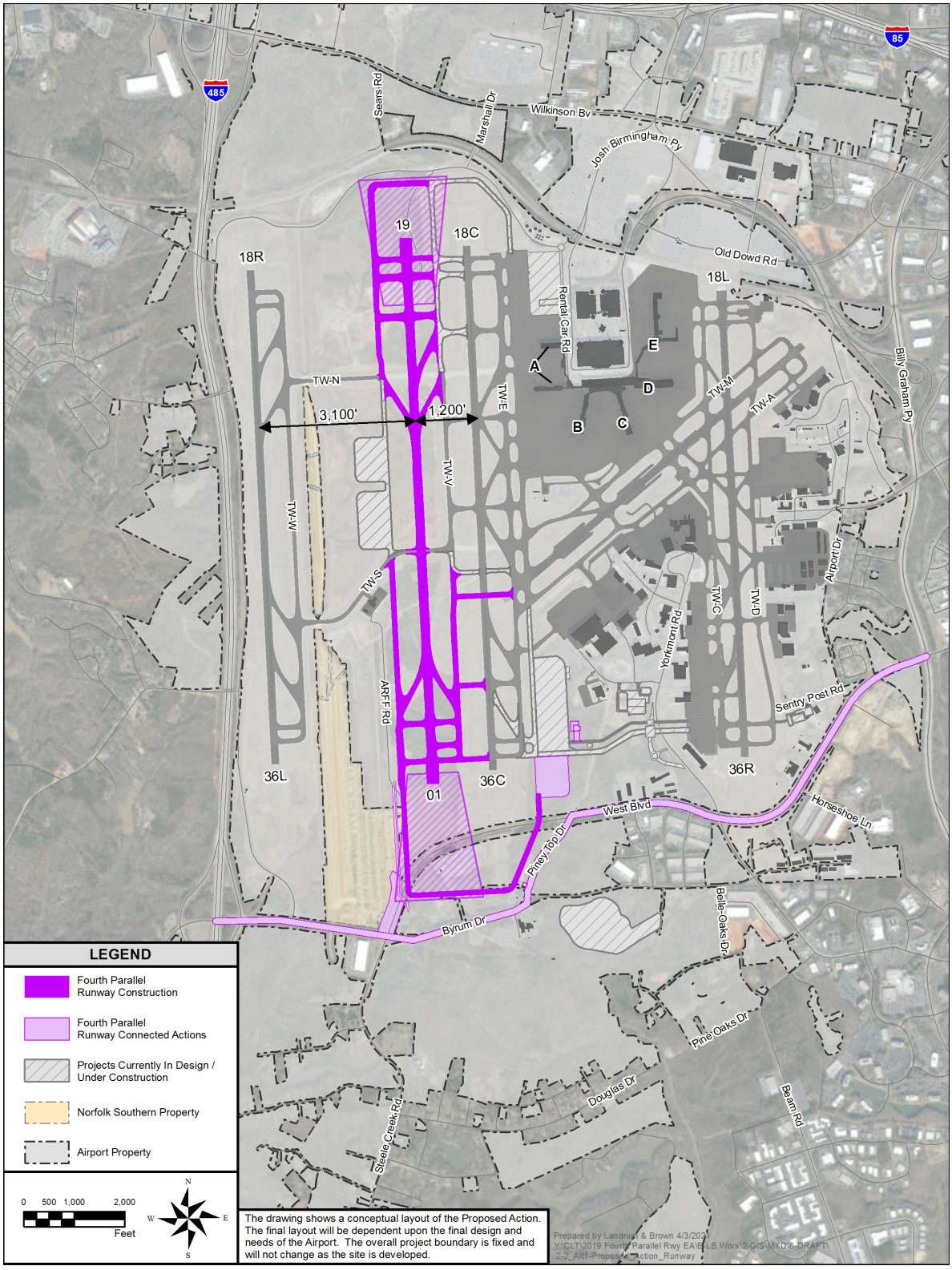
Alternative 2: 10,000-foot Runway 01/19 in Midfield with 3,200 Feet of Separation to Runway 18R/36L and 1,100 feet of Separation to Runway 18C/36C: This alternative includes a new 10,000-foot long Runway 01/19 in the midfield as the fourth runway, separated from Runway 18R/36L by 3,200 feet and Runway 18C/36C by 1,100 feet. As with Alternative 1, Runway 01/19 is intended primarily for departure use in this alternative because it does not meet the separation requirement for triple approaches.[43] The 3,200-foot separation between the new runway and Runway 18R/36L would provide operational flexibility to ATC, including use of dual simultaneous arrival streams when advantageous for efficiency during less busy periods. Alternative 2 includes EATs on the north end of Runway 01/19 and the south ends of Runways 01/19 and 18C/36C. As with the Proposed Action, the relocation of West Boulevard would be required for this alternative.

Alternative 3: 8,900-foot Runway 01/19 in the Midfield with 3,400 Feet of Separation to Runway 18R/36L and 900 Feet of Separation to Runway 18C/36C: Alternative 3 includes a new 8,900-foot midfield runway with 3,400 feet of separation to Runway 18R/36L and 900 feet of separation to Runway 18C/36C. The new runway would have sufficient spacing such that it could be used primarily for arrivals, and simultaneously along with Runways 18R/36L and 18L/36R based on an expected procedure addition in FAA Order JO 7110.56Y, *Air Traffic Control*, which would reduce the separation requirement for triple simultaneous approaches to 3,400 feet due to ADS-B and related improvements.[44] Alternative 3 includes EATs on the north end of Runway 01/19 and the south ends of Runways 01/19 and 18C/36C. As with the Proposed Action, the relocation of West Boulevard would be required for this alternative.

Alternative 4: 7,300-foot Runway 01/19 East of Runway 18L/36R and West of Billy Graham Parkway: This alternative includes a new east 7,300-foot long Runway 01/19 as the fourth runway, separated from Runway 18L/36R by 2,850 feet. The new runway was assumed to primarily be used for arrivals.[45] This alternative would require acquisition of residential and commercial property, which would total approximately 330 acres and include the demolition of approximately 20 commercial structures and approximately 125 residential structures. In addition, the relocation or tunneling of roadways, Airport support facilities, and the NCANG would be required. An alternative similar to Alternative 4 was evaluated in the CLT Master Plan Update: Phase 1, Airport Capacity Enhancement Plan, February 2016, (referred to as Alternative 3), therefore Alternative 4 is not included in Appendix B.

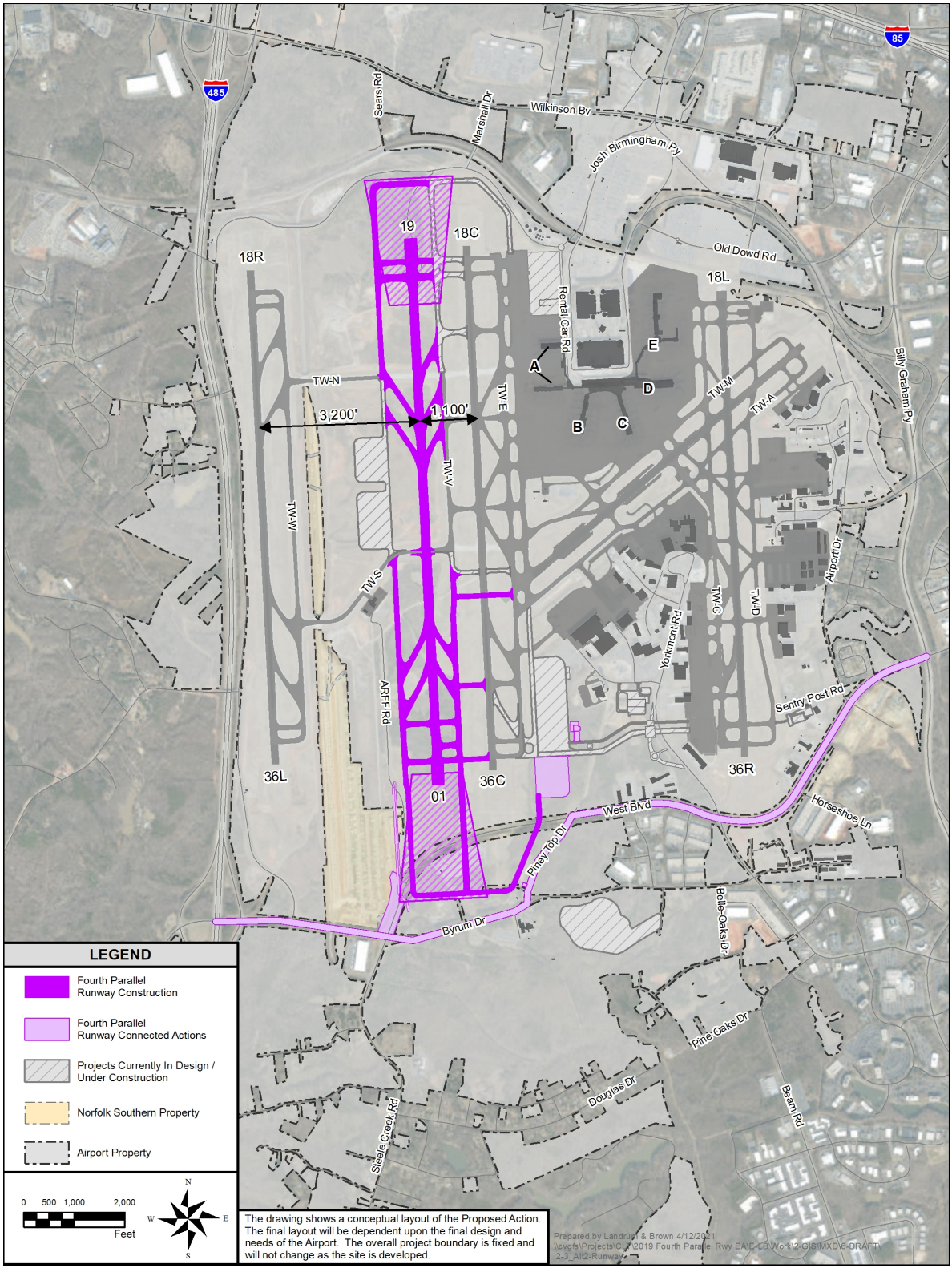
43 Ibid.
44 Ibid.
45 Ibid.

EXHIBIT 2-2, ALTERNATIVE 1: 10,000-FOOT RUNWAY 01/19 IN THE MIDFIELD (PROPOSED ACTION) WITH 3,100 FEET OF SEPARATION TO RUNWAY 18R AND 1,200 FEET OF SEPARATION TO RUNWAY 18C/36C



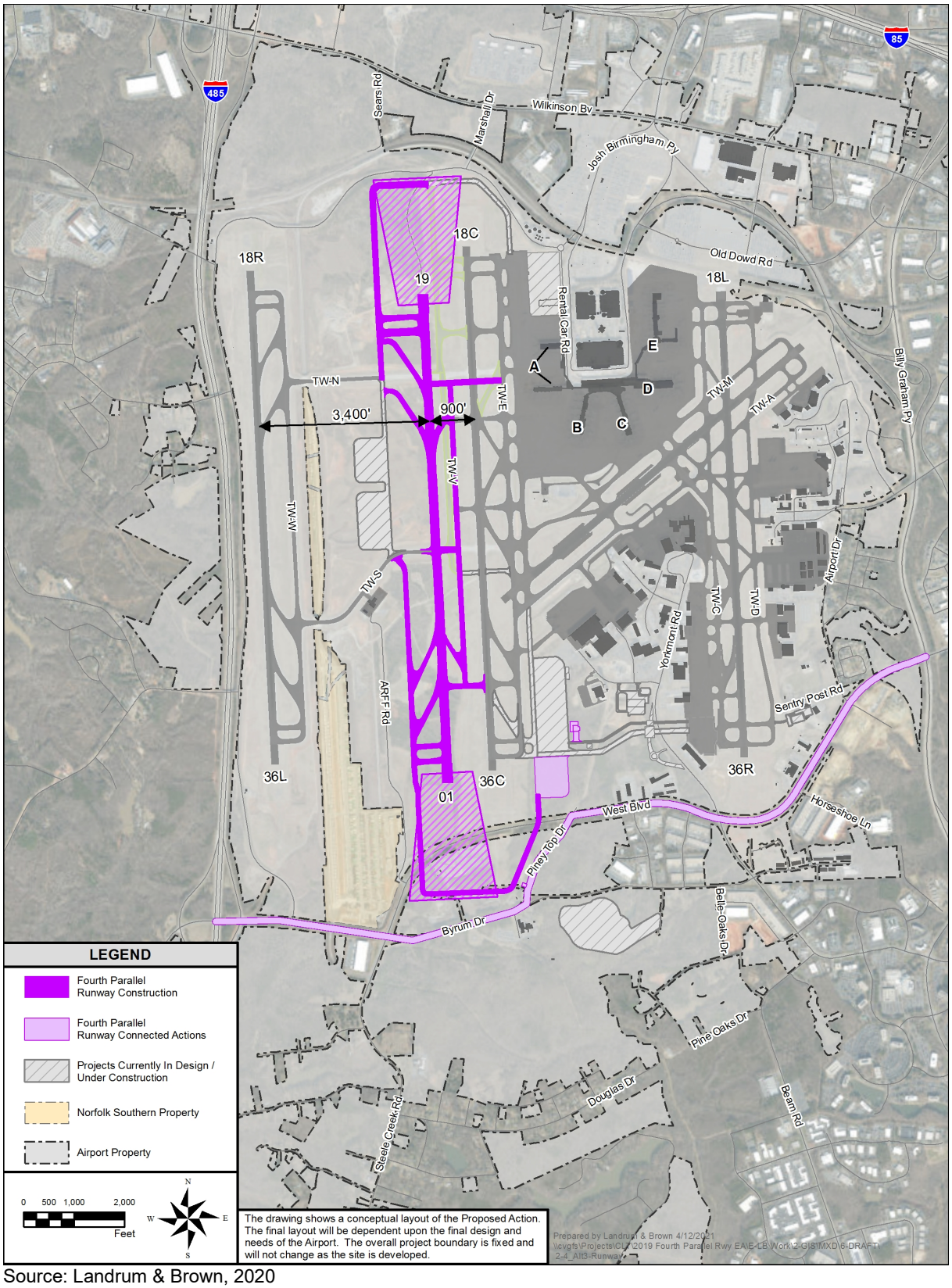
Source: Landrum & Brown, 2020

EXHIBIT 2-3, ALTERNATIVE 2: 10,000-FOOT RUNWAY 01/19 IN MIDFIELD WITH 3,200 FEET OF SEPARATION TO RUNWAY 18R/36L AND 1,100 FEET OF SEPARATION TO RUNWAY 18C/36C



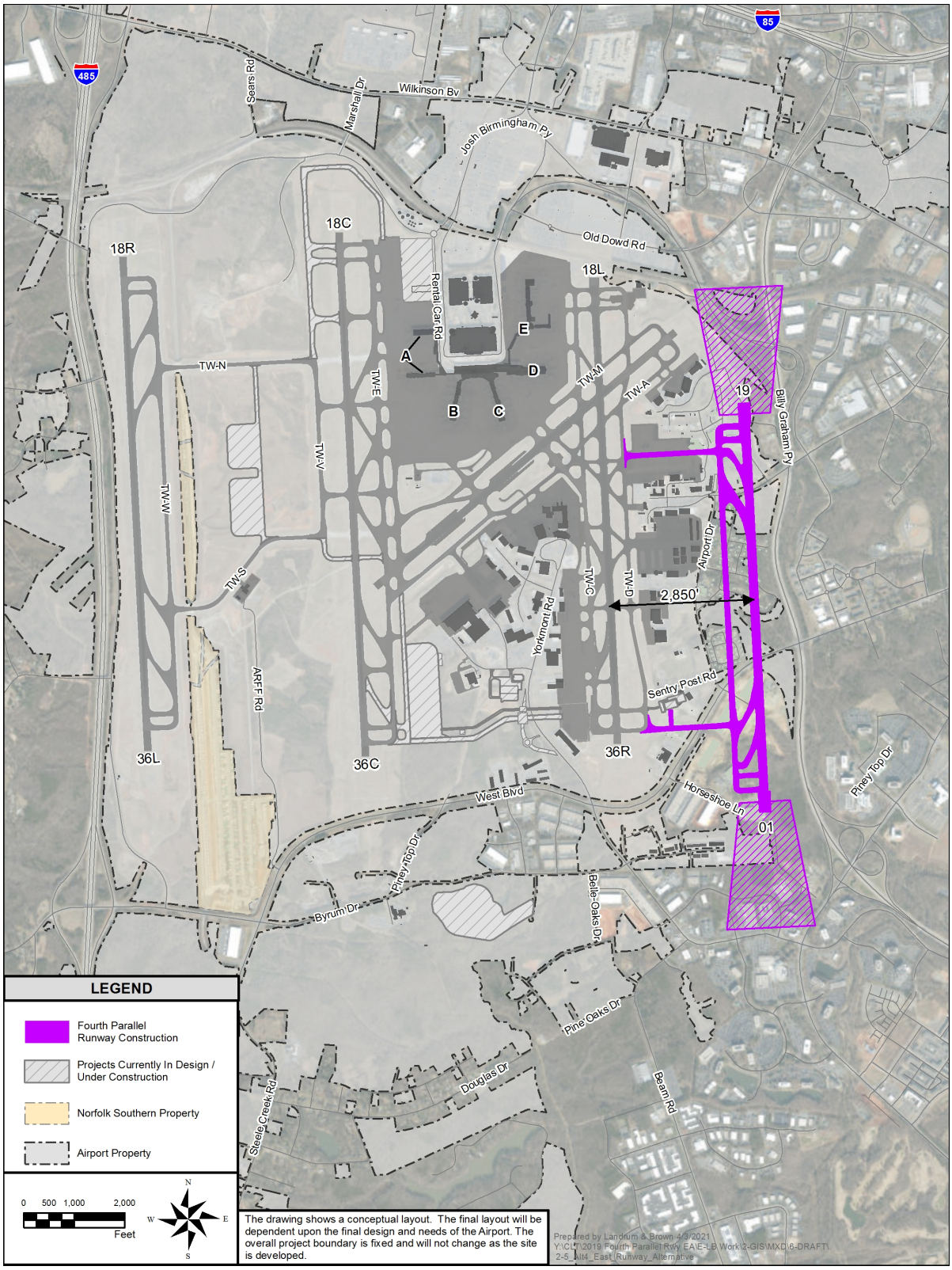
Source: Landrum & Brown, 2020

EXHIBIT 2-4, ALTERNATIVE 3: 8,900-FOOT RUNWAY 01/19 IN THE MIDFIELD WITH 3,400 FEET OF SEPARATION TO RUNWAY 18R/36L AND 900 FEET OF SEPARATION TO RUNWAY 18C/36C



Source: Landrum & Brown, 2020

EXHIBIT 2-5, ALTERNATIVE 4: 7,300-FOOT RUNWAY 01/19 EAST OF RUNWAY 18L/36R AND WEST OF BILLY GRAHAM PARKWAY

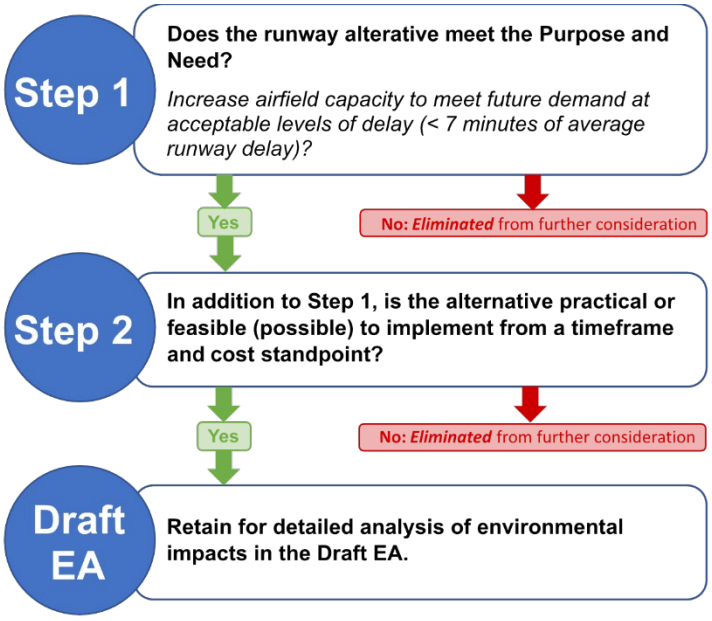


Source: Landrum & Brown, 2020

2.4 Runway Alternatives Evaluation Process

As described in Section 2.3.3.1, all possible terminal alternatives except for the Proposed Action were eliminated by an initial qualitative analysis. Therefore, there is no need to evaluate the terminal alternatives further. On the other hand, four possible runway alternatives were identified as described in Section 2.3.3.2. The range of runway alternatives was evaluated using a two-step screening process. The first step in screening examined whether the alternative was capable of achieving the runway capacity identified by the Purpose and Need statement described in Chapter 1, *Purpose and Need*. This first step eliminated alternatives that do not meet the Purpose and Need statement. If the alternative was found to be capable of achieving the Purpose and Need, it moved to the second step. The second step in the screening process was used to determine which alternatives were reasonable based on a qualitative evaluation for the following factors: (1) Cost and (2) Timeframe. The second step eliminated alternatives that were found to not be reasonable from a cost and timing perspective. The alternatives that were not eliminated through this screening process were retained for a more detailed environmental evaluation in the EA. **Exhibit 2-6** illustrates the general process for evaluating and screening preliminary alternatives.

EXHIBIT 2-6, RUNWAY ALTERNATIVES SCREENING PROCESS



Environmental factors were not considered at this stage of the analysis because the main point of this initial alternatives evaluation process is to screen out alternatives that do not warrant further analysis. After the alternatives are screened based on their ability to meet the purpose and need and their reasonableness, the next step in the alternatives analysis is to complete a detailed analysis of their environmental impacts.

2.4.1 Step 1: Runway Alternative Meets Purpose and Need?

The following sections describe the Step 1 evaluation of each initial alternative and the alternative's ability to meet the Purpose and Need statement. The runway alternatives previously identified were screened to eliminate the alternatives that would not meet the Purpose and Need. In order for an alternative to meet the Purpose and Need, the all-weather average runway delay for the alternative must be below seven minutes per operation. The expected delays associated with each alternative

were developed through simulation analysis and are documented in Appendix B, *Purpose and Need and Alternatives*. The runway alternatives and their ability to meet the screening criteria are described in the following sections.

Alternative 1 (Proposed Action): 10,000-foot Runway 01/19 in the Midfield with 3,100 Feet of Separation to Runway 18R and 1,200 Feet of Separation to Runway 18C/36C

Step 1 Screening Results: The simulation analysis documented in Appendix B, *Purpose and Need and Alternatives* showed that Alternative 1 can be expected to result in all-weather average runway delays of 4.0 minutes per operation in 2028 and 4.6 minutes per operation in 2033. These runway delays meet the criteria of achieving runway delays of less than seven minutes. Therefore, Alternative 1 was carried forward for further consideration in Step 2 of the screening analysis.

Alternative 2: 10,000-foot Runway 01/19 in Midfield with 3,200 Feet of Separation to Runway 18R/36L and 1,100 Feet of Separation to Runway 18C/36C

Step 1 Screening Results: The alternatives analysis documented in Appendix B, *Purpose and Need and Alternatives* determined that Alternative 2 would operate in the same manner as Alternative 1. It would therefore have the same delays (all-weather average runway delays of 4.0 minutes per operation in 2028 and 4.6 minutes per operation in 2033) and meet the seven-minute delay threshold criteria. Therefore, Alternative 2 was carried forward for further consideration in Step 2 of the screening analysis.

Alternative 3: 8,900-foot Runway 01/19 in the Midfield with 3,400 Feet of Separation to Runway 18R/36L and 900 Feet of Separation to Runway 18C/36C

Step 1 Screening Results: The simulation analysis documented in Appendix B, *Purpose and Need and Alternatives* showed that Alternative 3 can be expected to result in all-weather average runway delays of 4.0 minutes per operation in 2028 and 4.7 minutes per operation in 2033. These runway delays meet the criteria of achieving runway delays of less than seven minutes. Therefore, Alternative 3 was carried forward for further consideration in Step 2 of the screening analysis.

Alternative 4: 7,300-foot Runway 01/19 East of Runway 18L/36R and West of Billy Graham Parkway

Step 1 Screening Results: This alternative was reviewed in the ACEP and was found to have average delays that are lower than the Proposed Action.[46] The Proposed Action was found to have all-weather average delays below seven minutes so Alternative 4 would as well. Therefore, Alternative 4 was carried forward for further consideration in Step 2 of the screening analysis.

[46] Alternative 3 in the ACEP was found to have an all-weather average delay of 4.0 minutes per operation at the 2023 demand level. The ACEP 2023 demand level corresponded to a higher level of operations than the EA 2028 or 2033 demand levels, indicating that delays would be lower than 4.0 minutes per operation if Alternative 4 was evaluated with the EA demand levels.

Alternatives Screening Summary

Table 2-1 summarizes the Step 1 evaluation findings. All four alternatives meet the Purpose and Need so will be carried forward into the Step 2 analysis.

TABLE 2-1, STEP 1 RUNWAY ALTERNATIVES SCREENING

Alternative	Less than Seven Minutes of Runway Delay?	Carried Forward to Step 2?
Alternative 1 (Proposed Action)	Yes	Yes
Alternative 2	Yes	Yes
Alternative 3	Yes	Yes
Alternative 4	Yes	Yes

Source: Landrum & Brown, 2020.

2.4.2 Step 2: Runway Alternative is Reasonable or Feasible to Implement?

All of the runway alternatives passed the first level of screening; therefore, they were carried forward to the second level of screening. The second level screening evaluated if those alternatives were reasonable or feasible based on the following factors:

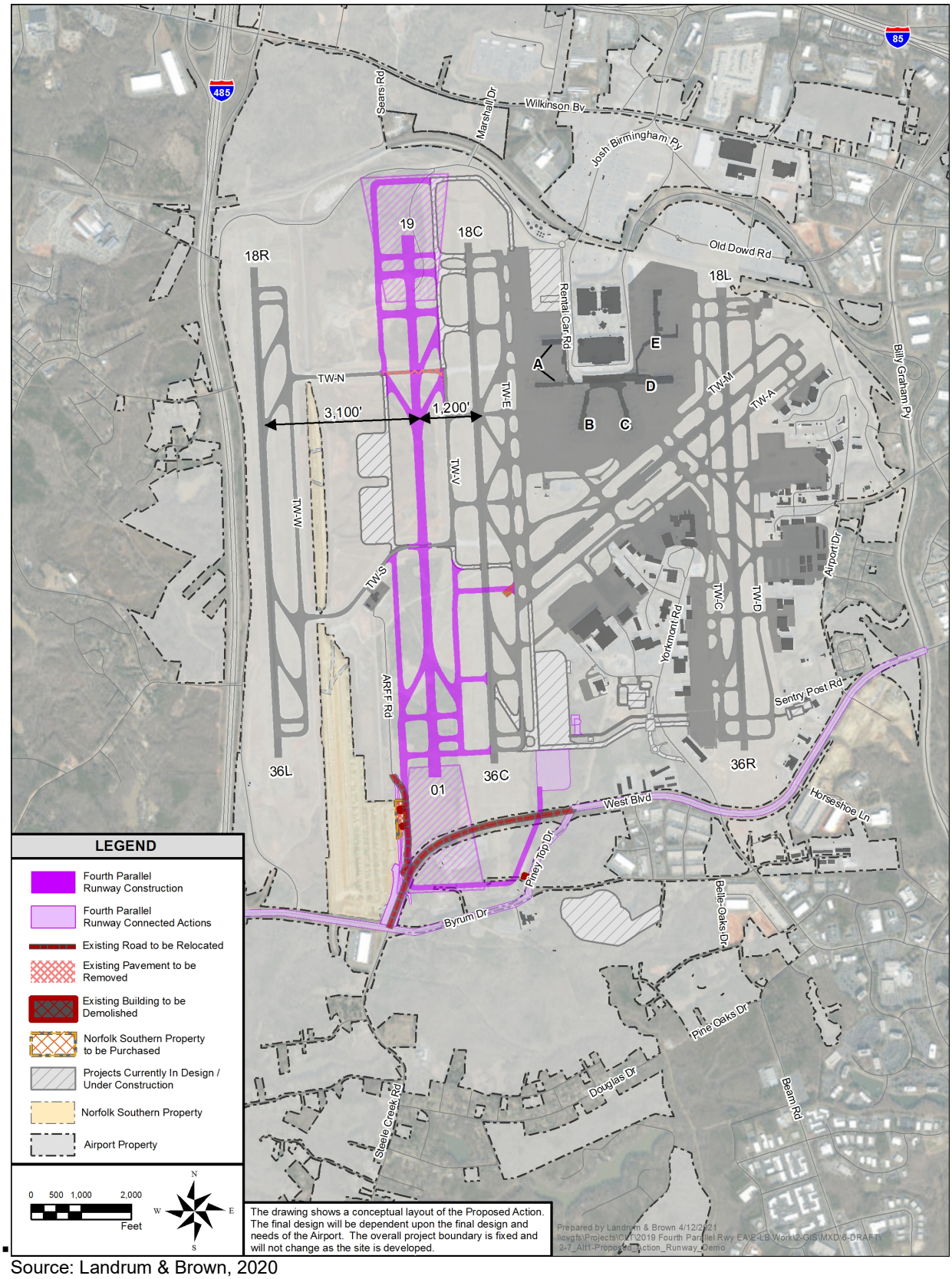
- *Timeframe* - Preliminary estimates of the timeframe that could be expected to implement any of the alternatives, relative to the Proposed Action. Factors for determining timeframe included the grading of the site; time to acquire property and relocate the associated residents or businesses; and the time to relocate additional infrastructure such as roadways.
- *Cost* - Conceptual rough order of magnitude construction costs as a means to compare the alternatives and identify those that would be most cost effective relative to the Proposed Action. Factors for determining cost included known site relocations, access requirements, infrastructure needs, and construction phasing to minimize impacts during construction.

The results of the second level screening of runway alternatives are summarized in the following pages and in **Table 2-2**.

Alternative 1 (Proposed Action): 10,000-foot Runway 01/19 in the Midfield with 3,100 Feet of Separation to Runway 18R and 1,200 Feet of Separation to Runway 18C/36C

- *Timeframe* – The timeframe to design and construct the Proposed Action is expected to take approximately six years. This timeframe is due to grading of the site. The site would not require additional soil for grading, as existing soil located on site would be used. In addition, the site has less than ten structures that would require relocation. These structures include ancillary buildings on the Norfolk Southern Railroad property and a FAA approach lighting building. This alternative site would also have minimal impact to public roadways. A portion of West Boulevard (approximately one mile) would need to be relocated as it is located in the area where the south EAT would be constructed and it is within the RPZ. The relocation of West Boulevard could be completed using existing roadways with minor roadway improvements. **Exhibit 2-7** depicts impacts to existing structures and roadways that would impact the timeframe needed to construct the alternative.
- *Cost* - The construction costs of the Proposed Action runway elements are estimated to be approximately $500 to $650 million dollars. The estimated costs take into consideration the grading and the relocation of structures and roadways. The relocation of West Boulevard using existing roadways was included in the cost estimate.

EXHIBIT 2-7, ALTERNATIVE 1 (PROPOSED ACTION) INFRASTRUCTURE IMPACTS



Source: Landrum & Brown, 2020

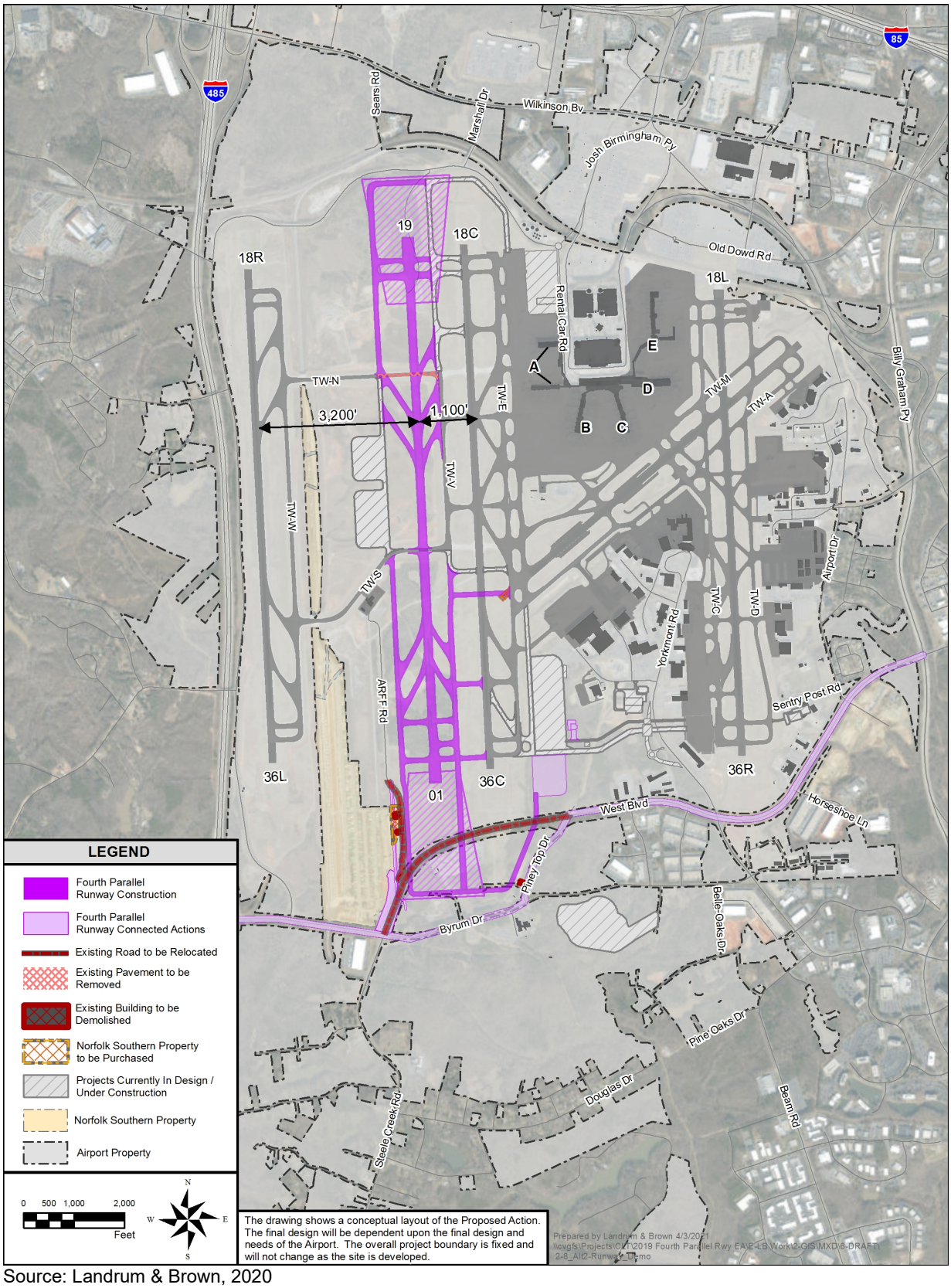
Alternative 2: 10,000-foot Runway 01/19 in Midfield with 3,200 Feet of Separation to Runway 18R/36L and 1,100 Feet of Separation to Runway 18C/36C

- *Timeframe* – The timeframe to design and construct Alternative 2 is the same as Alternative 1 (Proposed Action). The site has less than ten structures that would require relocation. These structures include ancillary buildings on the Norfolk Southern Railroad and a FAA approach lighting building. This alternative site would also have minimal impact to public roadways. A portion of West Boulevard (approximately one mile) would need to be relocated as it is located in the area where the south EAT would be constructed and it is within the RPZ. The relocation of West Boulevard could be completed using existing roadways with minor roadway improvements. **Exhibit 2-8** depicts impacts to existing structures and roadways that would impact the timeframe needed to construct the alternative.
- *Cost* - The construction costs of Alternative 2 runway elements are estimated to be commiserate with Alternative 1 (Proposed Action).

Alternative 3: 8,900-foot Runway 01/19 in the Midfield with 3,400 feet of separation to Runway 18R/36L and 900 feet of separation to Runway 18C/36C

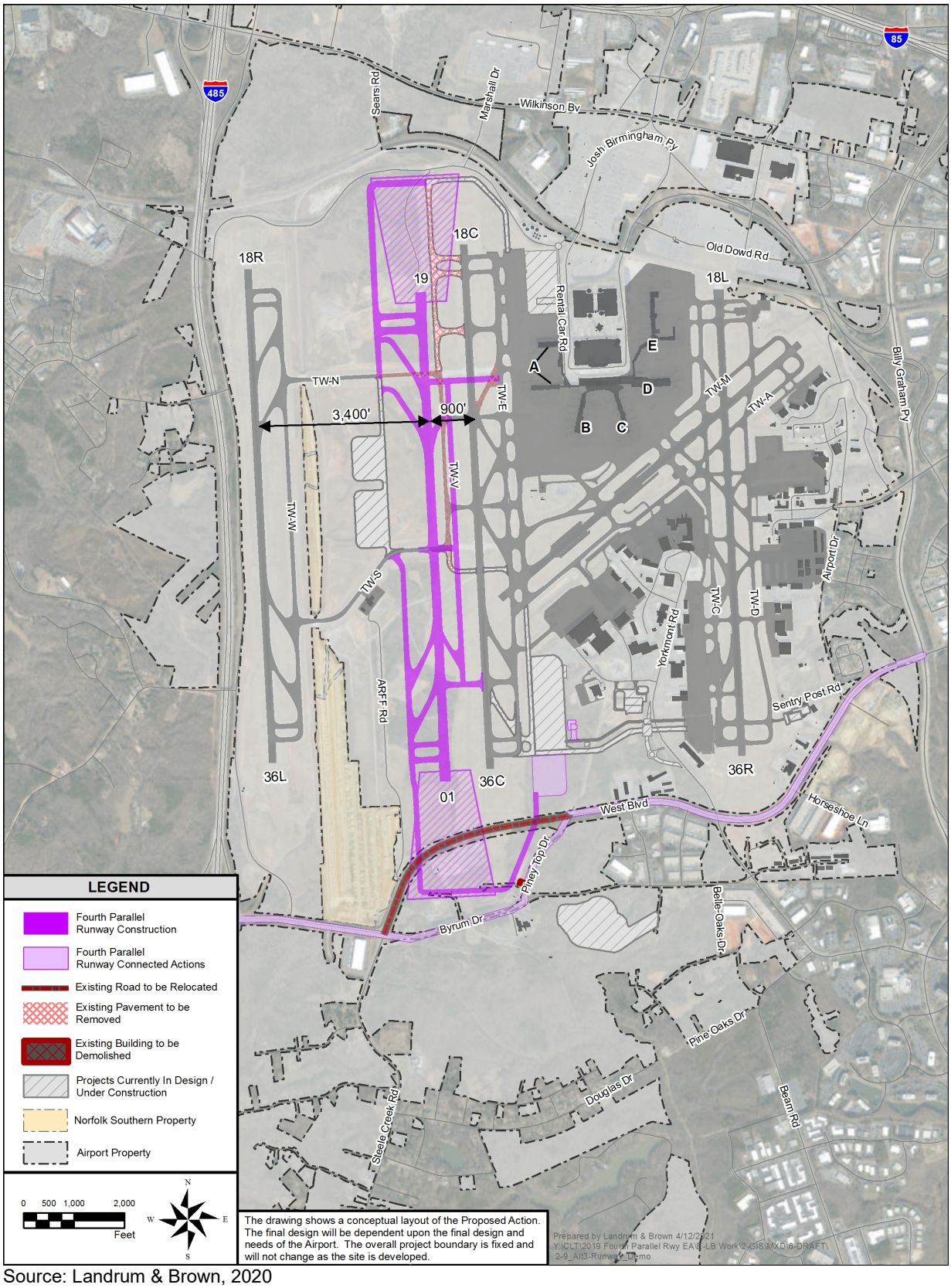
- *Timeframe* –The timeframe to design and construct Alternative 3 is expected to take approximately six years. This timeframe is due to the existing grade of the site. The site would not require additional soil to use for grading, as existing soil located on site would be used to grade the site. In addition, the site has less than ten structures that would require relocation. These structures include ancillary buildings on the Norfolk Southern Railroad and a FAA approach lighting building. This alternative site would also have minimal impact to public roadways. An approximately one mile portion of West Boulevard would need to be relocated as it is located in the area where the south EAT would be constructed and it is within the RPZ. The relocation of West Boulevard could be completed using existing roadways with minor roadway improvements. **Exhibit 2-9** depicts impacts to existing structures and roadways that would impact the timeframe needed to construct the alternative.
- *Cost* - The construction costs of Alternative 3 runway elements are estimated to be commiserate with Alternative 1 (Proposed Action), albeit with less cost for the shorter runway length, taxiway length, and impacts to Norfolk Southern Railroad. It is assumed the grading would be similar to Alternative 1 (Proposed Action).

EXHIBIT 2-8, ALTERNATIVE 2 INFRASTRUCTURE IMPACTS



Source: Landrum & Brown, 2020

EXHIBIT 2-9, ALTERNATIVE 3 INFRASTRUCTURE IMPACTS



Source: Landrum & Brown, 2020

Alternative 4: 7,300-foot Runway 01/19 East of Runway 18L/36R and West of Billy Graham Parkway

- *Timeframe* - The design and construction timeframe of Alternative 4 is estimated to take approximately 15 years. This timeframe is substantially longer than the Proposed Action because of the relocation of the NCANG, the acquisition and demolition of residential and commercial properties, and the relocation and/or tunneling of major roadways located within the footprint or RPZ of the runway. Airport officials have estimated that the relocation of the NCANG would take a minimum of seven years. This timeframe includes the time it would take to choose a potential site, prepare the required NEPA document, and physically relocate the facility. In addition, the 15 year timeframe includes the time required to relocate the major roadway intersection located in the RPZ on the north end of the runway. This relocation would require planning, designing, and relocation of the intersections. In addition, the relocation of the portion of Billy Graham that would be impacted by grading and a portion of West Boulevard that would require tunneling or relocation is included in the timeframe estimate. **Exhibit 2-10** depicts impacts to the NCANG, existing structures, and roadways that would extend the timeframe needed to construct the alternative.
- *Cost* – The cost of Alternative 4 is estimated to be at least five times the cost of Alternative 1 (Proposed Action). This is due to the large amount of fill required for constructing the runway and associated infrastructure. It is also due to the cost associated with the relocation of the NCANG; acquisition, demolition, and relocation of residential and commercial property; the relocation of the roadways/intersections; and potential tunneling of roadways.

2.4.3 Runway Alternative(s) Retained for Detailed Analysis

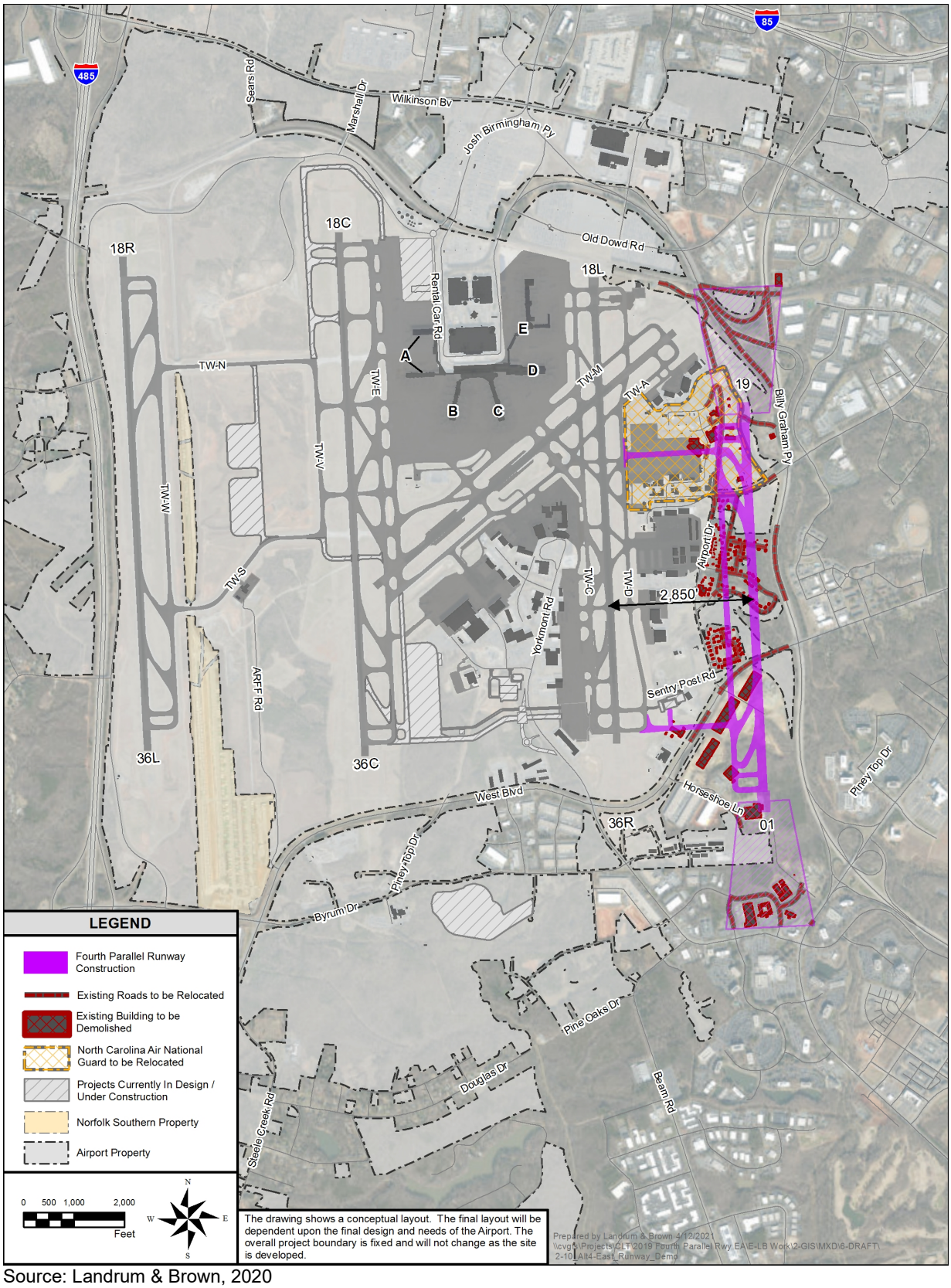
Alternative 4 met the Purpose and Need, but would take considerably more time to implement and require substantially higher costs than the Proposed Action. Therefore, Alternative 4 is not considered reasonable and is not being carried forward for detailed environmental impact analysis. The runway alternatives carried forward for detailed environmental impact analysis in the EA are Alternative 1 (Proposed Action), Alternative 2, and Alternative 3.

TABLE 2-2, STEP 2 RUNWAY ALTERNATIVES SCREENING

Runway Alternative	Factors		Carried Forward?
	Timeframe	Cost	
Alternative 1 (Proposed Action)	Approximately 6 years to design, construct and implement.	Commensurate with the magnitude of the proposed construction.	Yes. This alternative is considered reasonable and feasible and will be carried forward for environmental impact analysis.
Alternative 2	Approximately 6 years to design, construct and implement.	Commensurate with the magnitude of the proposed construction.	Yes. This alternative is considered reasonable and feasible and will be carried forward for environmental impact analysis.
Alternative 3	Approximately 6 years to design, construct and implement.	Commensurate with the magnitude of the proposed construction.	Yes. This alternative is considered reasonable and feasible and will be carried forward for environmental impact analysis.
Alternative 4	Approximately 15 years to design, construct and implement.	Construction costs are estimated to be substantially higher than the Proposed Action	No. This alternative is not considered reasonable and feasible and will not be carried forward for environmental impact analysis.

Source: Landrum & Brown, 2020

EXHIBIT 2-10, ALTERNATIVE 4 INFRASTRUCTURE IMPACTS



Source: Landrum & Brown, 2020

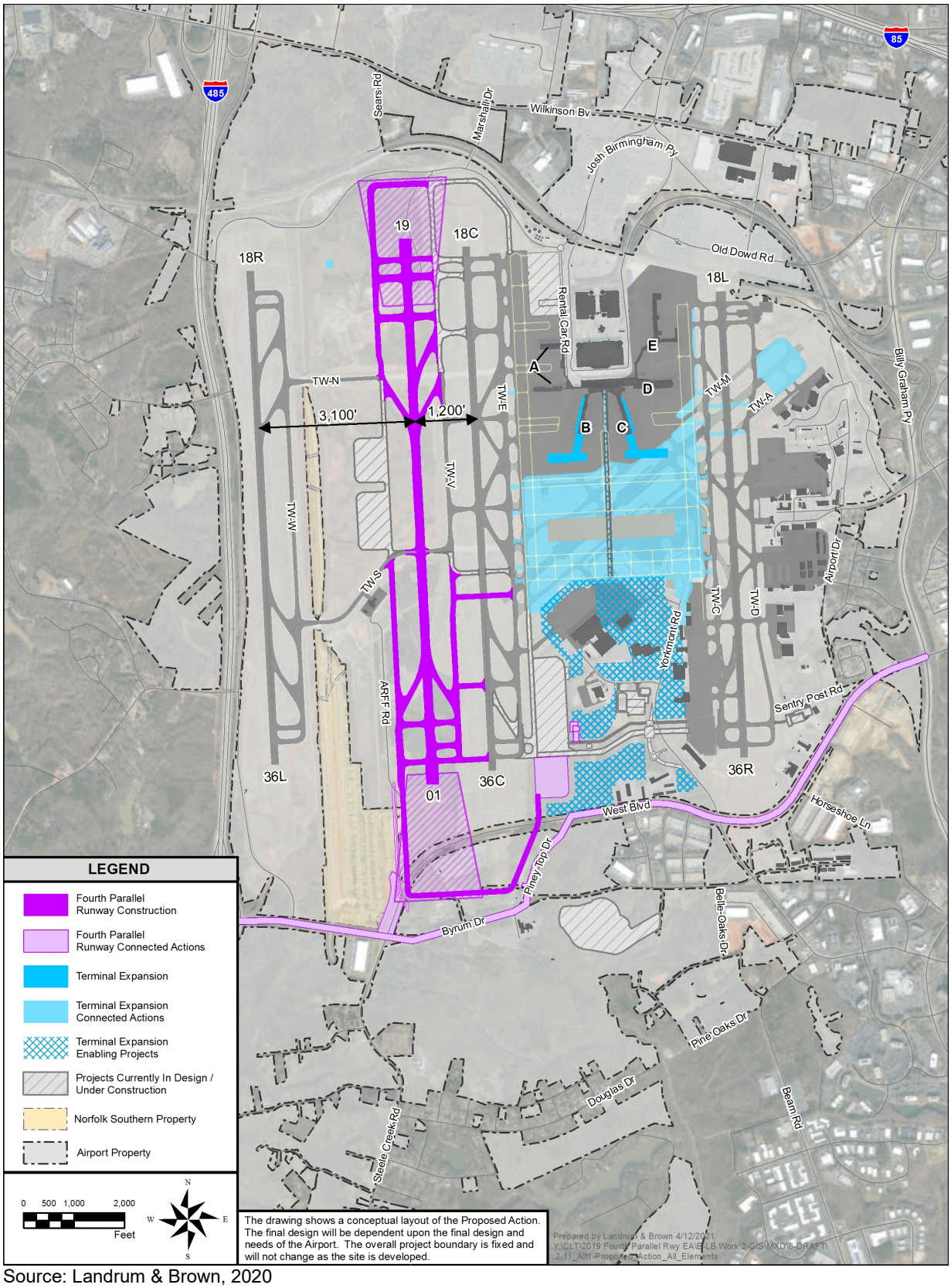
2.5 Alternatives Recommended for Detailed Evaluation in the Environmental Assessment

Based on the screening analysis previously presented, three runway alternatives (Alternative 1 [Proposed Action], Alternative 2, and Alternative 3) and one terminal and ramp alternative (Proposed Action) will be carried forward for further detailed environmental evaluation in the EA. Therefore, Alternative 1 (Proposed Action), Alternative 2, Alternative 3 and the No Action Alternative will be assessed for potential impacts for the projected future conditions in 2028 and 2033.

- **Alternative 1 (Proposed Action):** 10,000-foot Runway 01/19 in the Midfield with 3,100 Feet of Separation to Runway 18R and 1,200 Feet of Separation to Runway 18C/36C, Extension of Concourses B and C, Dual Taxi on Terminal Ramp, and Dual Crossfield Taxi Corridors
- **Alternative 2:** 10,000-foot Runway 01/19 in Midfield with 3,200 Feet of Separation to Runway 18R/36L and 1,100 feet of Separation to Runway 18C/36C, Extension of Concourses B and C, Dual Taxi on Terminal Ramp, and Dual Crossfield Taxi Corridors
- **Alternative 3**: 8,900-foot Runway 01/19 in the Midfield with 3,400 feet of separation to Runway 18R/36L and 900 feet of separation to Runway 18C/36C, Extension of Concourses B and C, Dual Taxi on Terminal Ramp, and Dual Crossfield Taxi Corridors

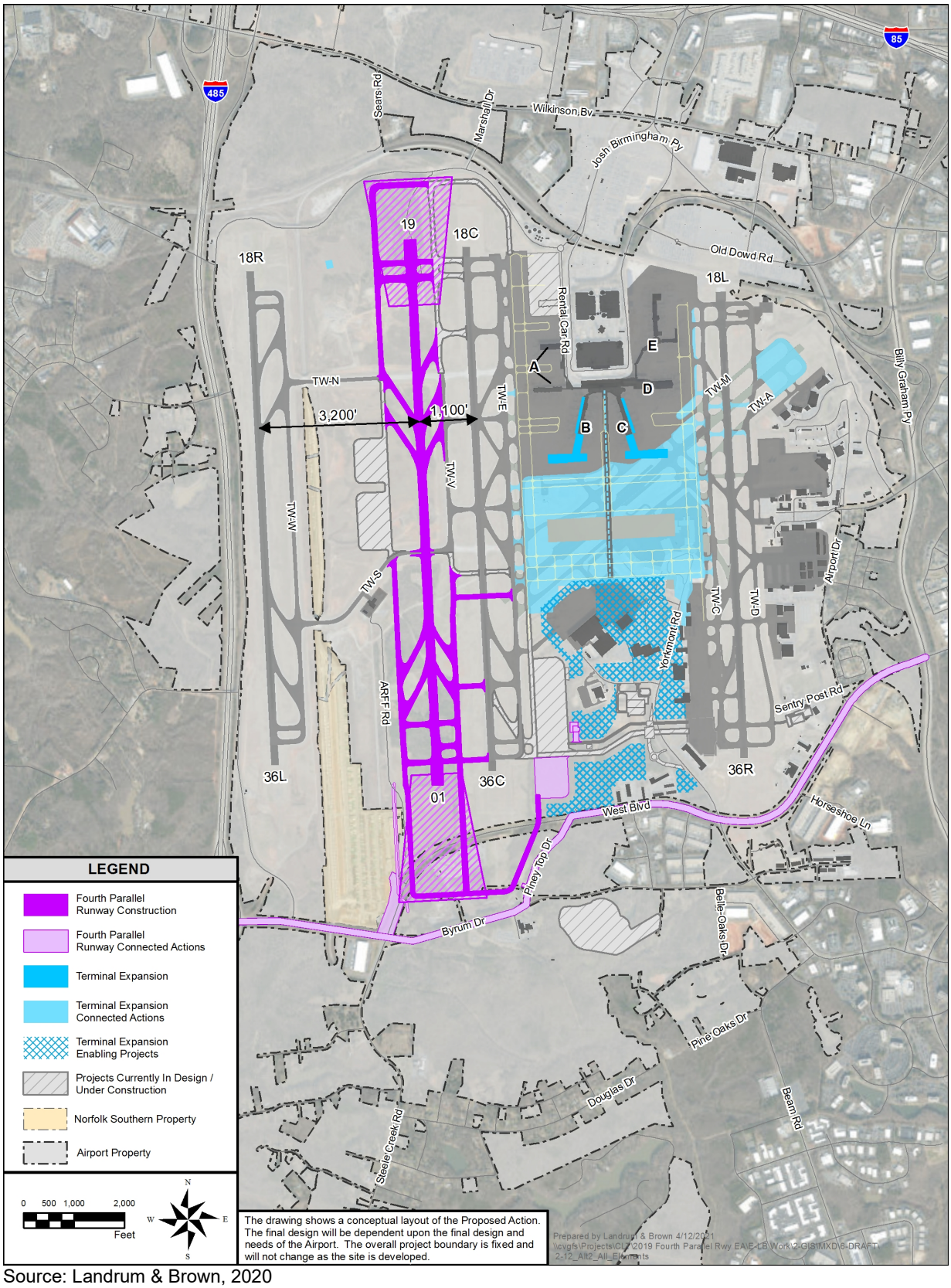
Each alternative is shown respectively on **Exhibit 2-11, Exhibit 2-12, and Exhibit 2-13**. The physical development will not change between the analysis years. The year 2028 is used as a basis for analysis because 2028 is the projected implementation year of the Proposed Action. In addition, 2033 is used as a basis for analysis, most notably for air quality and noise and noise-compatible land use, because it represents a condition five years beyond the opening year where the only potential changes are due to aircraft operations.

EXHIBIT 2-11, ALTERNATIVE 1 (PROPOSED ACTION)



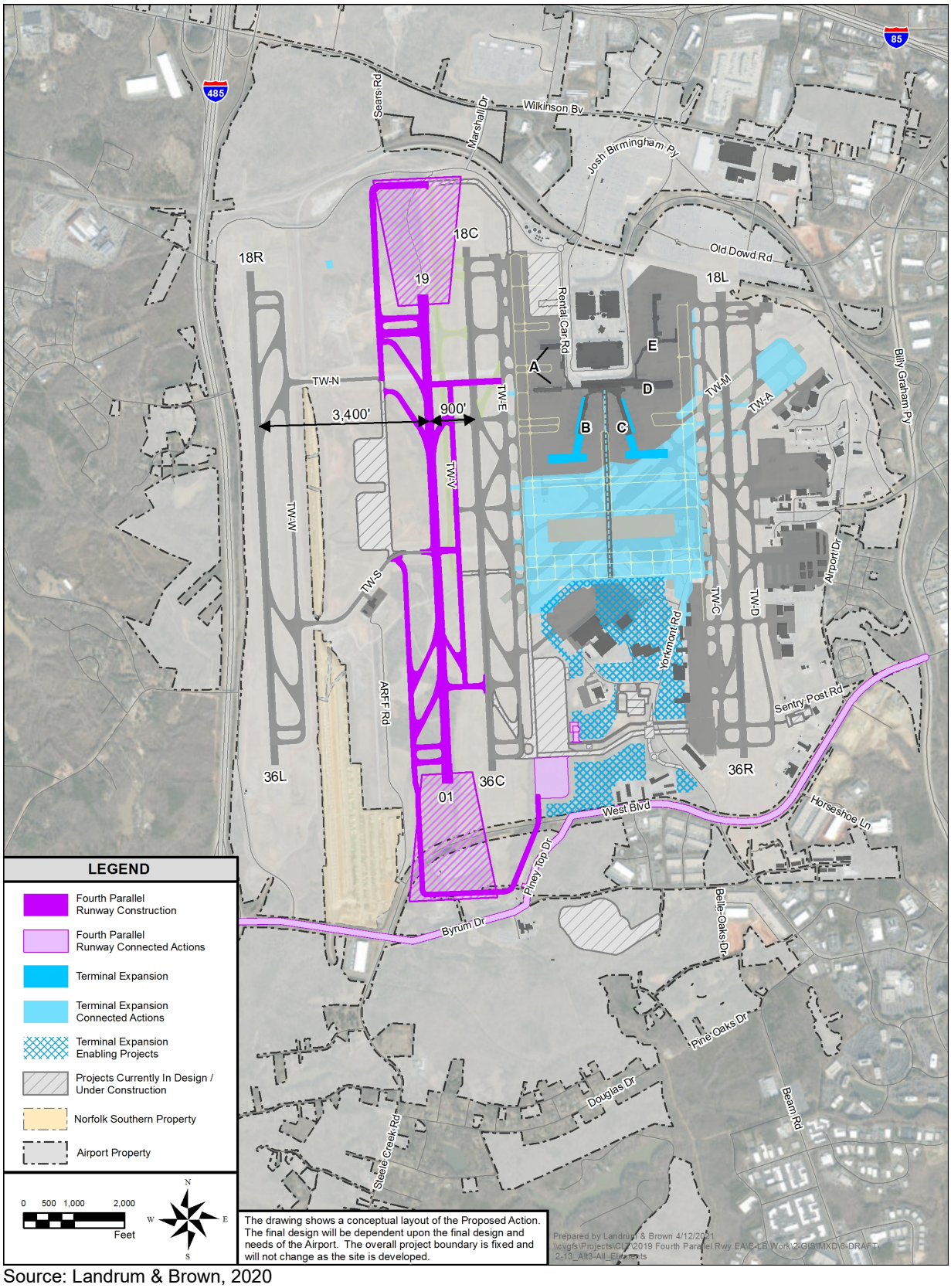
Source: Landrum & Brown, 2020

EXHIBIT 2-12, ALTERNATIVE 2



Source: Landrum & Brown, 2020

EXHIBIT 2-13, ALTERNATIVE 3



Source: Landrum & Brown, 2020